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Sports Medicine: The Road Ahead

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ABSTRACT

Despite being conceived over eight decades back with the pioneering work at Harvard Fatigue Laboratory[1], Sports & Exercise Medicine has unenviably carried its infancy for too long, as the world of medicine was far too busy concentrating on the treatment aspect of debilities (injuries/illnesses).

However, sudden mushrooming of lifestyle ailments, primarily emanating from a sedentary predisposition, physical inactivity & less than healthy eating habits became a cause for concern when this disease & debility burden started assuming demonic proportions.

The above led to the specialty seeing a lot of interest, primarily because of the usefulness of exercise medicine in warding off the onslaught of "Lifestyle Diseases", the inherent untapped potential of addressing the accrual & maintenance of "Ergonomic Fitness", as also the increasing reliance on sports sciences support for excelling in competitive sport at all levels.

The rudimentary framework of academic training available in the country until the recent past hence becomes a liability and needs to be re-invigorated so as to lay the foundation for a quality academic & clinical program, at par with global standards.

Keywords: MD Sports Medicine, Active Rehabilitation, Development National Sports.

INTRODUCTION

Sports Medicine is a multidisciplinary clinical & academic specialty of medicine dealing with health promotion in the general populace by stimulating a physically active lifestyle and prevention, diagnosis, treatment, & rehabilitation of debilities arising subsequent to injuries or illnesses resulting from but not limited to participation in sports or exercise.

The world never realised before but as the disease burden rises exponentially, we have been forced to look at the burgeoning population of debilitated Individuals who need "Active Rehabilitation", to infuse them with confidence & self esteem which unfortunately becomes the first casualty and can never be addressed through mere "Consumption of Medication".

What are we arriving at? We are looking for possible solutions, which may lie with a specialty in nascence, despite being around for over five decades, with the Harvard Fatigue Laboratory & its breakthrough revelations[1] - Sports & Exercise Medicine. Sports Medicine - the name suggests a fallacy, is not for an exclusive category of ‘Sportspersons’. The specialty deals with accrual & maintenance of physical abilities towards a performance goal - through selection, prescription & titration of training load and prevention, diagnosis & management of all conditions which crop while attempting the former in an objective & scientific manner.

Globally defined & recognized not solely for taking care of the sporting elite athletes, the specialty holistically focuses on:-

(a) Prevention of chronic diseases caused by sedentary lifestyle, as an area of increasing interest.

(b) Pre-participation clinical screening before exercise & competition, as well as medical assistance to the athletes engaged in all sports.

(c) The use of supplements, pharmacological agents, doping control & gender verification and its complex moral, legal & health related connotations.
(d) Special medical issues associated with international sporting events of athletes, including disabled athletes, such as the effects of travel & acclimatization.

(e) Sports Sciences contribution towards seeking an enhancement in sporting performance after Performance Diagnosis & institution of scientific training methods.

(f) Accrual & maintenance of physical fitness as applicable in different organizational concepts viz. Armed Forces, Police & Training Academies etc.

**PLAN FOR TEACHING & TRAINING IN SPORTS MEDICINE**

The shortage of skilled human resource in Sports Medicine has crippled provision of scientific support to athletes both in training & rehabilitation as also to the general populace in need of specialist consultation as a rehabilitative or a preventive measure. This makes it imperative that post graduate academic programs in the specialty are instituted & supported by the Govt. of India.

It would be pertinent to note that despite Sports Medicine being recognized as a specialty for grant of MD by Medical Council of India for a little over three decades, until a couple of years back, the highest available and the only recognized qualification in the country was a Diploma in Sports Medicine awarded by National Institute of Sports, Patiala under the aegis of Baba Farid University, Punjab.

This trained manpower has gathered a lot of experience over the years and has to be utilized for imparting academic training in the specialty. A broad outline of any training program in Sports Medicine will have to confirm to the following:-

(a) Academic & Clinical Training in Basic Medical Sciences & Associated Specialties at Medical College & affiliated hospitals.

(b) Sports Medicine (Academic, Laboratory & Field Training) to be imparted at a Sports Medicine Centre along with its affiliated Sports Training Institute.

(c) The above should be followed by a period of internship with mandatory sporting disciplines and an optional specialty training discipline.

In effect, this would entail availability of the following, so as to commence teaching & training in Sports Medicine:-

(a) Faculty trained in Sports Medicine.

(b) Medical College & Hospital.

(c) Sports Training Institute with Support Personnel.

(d) Equipped Sports Medicine Facility.

Building Sports Medicine Qualified Faculty (Peculiar reqmt)

It must be appreciated that Sports Medicine as a specialty is still in a nascent stage, hence merits special consideration, which is a universal need of any new & growing specialty. A Post Graduate Academic Program in Sports Medicine cannot subsist without subject specific specialists, with on the job experience and any attempt to run the same on adhoc trainers from other specialties, will seriously compromise the training, forever.

This lacunae glares at us with the commencement of MD Sports Medicine Courses under the aegis of three universities viz. Maharashtra University of Health Sciences, Nashik; Guru Nanak Dev University, Amritsar & Sri Ramachandra University Chennai which have been recognized by Medical Council of India on faculty drawn from Orthopedic Surgery & Physiology without incorporating the element of Sports Medicine.

The following needs immediate attention so as to broad base availability of trainers & teachers for MD Sports Medicine:-

(a) As of now, Medical Council of India (MCI) does not recognize Diploma Sports Medicine qualified doctors as MD teachers, insisting on a teacher to be holding a degree of MD Sports Medicine to teach students pursuing MD Degree. It will be appreciated that there can be no MD Sports Medicine qualified doctor in the country with experience, as the course itself was not being offered, anywhere.

(b) MCI recognized Diploma Sports Medicine was the highest qualification available, until the recent past. Doctors trained from the elite National
Institute of Sports, Patiala post their Diploma, have earned a wealth of experience hence constitute the ONLY skilled instructor knowledge base as far as the specialty is concerned, in the whole country.

(c) Sports Medicine & its nuances (Performance Diagnosis & Training Prescription, Active Rehabilitation, Sports Nutrition, Sports Psychology, Biomechanics & Kinesiology etc.) are essentials of the specialty, which the Physiologists, Orthopedic Surgeons & Rehabilitation Specialists will find difficult to impart, as they have not been trained in the same. MCI however, opines that MD Physiology, MS Orthopedic Surgery &/or MD Physical Medicine & Rehabilitation can serve as teachers, which in addition to being unfair to the experienced diploma faculty will also be deleterious to prospective MD trainees, as they would be losing out on the basic foundation & core values of this science.

(d) The academic growth of various specialties in medicine is rife with such instances of recognition of suitable experience by the Medical Council of India to grant a waiver and designate doctors as post graduate teachers, some examples follow:-

(i) Way back in time, there have been teachers of eminence who were only Diploma qualified, yet by virtue of their vast experience, were not only recognized as post graduate teachers but served as inspectors, evaluators, examiners & policy makers. Amongst others, Psychiatry was one of the specialties, which boasted of such immensely gifted academicians.

(ii) It is understood that senior faculty with Diploma/PhD qualification particularly in the specialties of Physical Medicine & Rehabilitation, Aviation Medicine, Biochemistry & Physiology are recognized MD Teachers, viz: Vardhman Mahavir Medical College, Lokmanya Tilak Municipal Medical College, Topiwala National Medical College & Grant Medical College.

(iii) Nephrology & Cardiology amongst others all have been est. with instructors & teachers with experience and/or brief training thereby ensuring that the growth of a specialty does not get hampered for want of a qualification, which in that point of time was non-existent.

(e) Exceptional situations, where-in a totally new specialty is growing, require special consideration on case to case basis instead of being regulated through statutes framed way back in time which do not cater to such emergent situations.

(f) Recognizing these highly trained & phenomenally experienced Diploma Sports Medicine Specialists as MD teachers will ensure the following:-

(i) That, specialty training is imparted by specifically qualified personnel instead of an adhoc arrangement of using specialists from other streams of medicine.

(ii) That, subject specific experience of Sports Medicine Specialists is primarily utilized for imparting quality Post Graduate training in Sports Medicine.

(iii) That, this highly skilled manpower remains motivated, to contribute to the nation, which is unlikely, if their professional experience & competence is relegated to the back seat because of an opportunity, that never existed in their times.

(g) Hence, as a prerequisite to training Sports Medicine Specialists for the country, as also to ensure that scientific support to national sports is not compromised with less than adequate training, the Ministry of Health & Family Welfare and the Medical Council of India in right earnest should recognize existing Diploma qualified specialists with experience as Post Graduate Teachers for MD Sports Medicine.

SELECTION PROCEDURE

The selection of candidates to undergo MD Sports Medicine will have to be in consonance with National Guidelines & Supreme Court rulings on the subject, through a Competitive Entrance Test.

EVALUATION PROGRAM

The interim, term & final assessments of enrolled candidates in the training program will be as per affiliated University guidelines on examination.

INFRASTRUCTURE

An instructional & evaluation facility in Sports Medicine will require provision of suitable manpower, transport & accommodation for the
following laboratories, evaluation & rehabilitation areas as a minimum, so as to facilitate efficient functioning:-

(a) Human Performance Evaluation  
(b) Sports Physiotherapy  
(c) Sports Nutrition  
(d) Sports Rehabilitation  
(e) Biochemistry  
(f) Sports Psychology  
(g) General Training Methodology  
(h) Sports Anthropometry  
(j) Strength Training & Conditioning  
(k) Bio-Mechanics & Kinesiology  
(l) Diagnostic & Treatment  

CONCLUSION

Introduction of Sports Medicine is imperative as there is a strong relationship between physical activity and health. Physical activity levels are declining in our country across all age categories leading to a disproportionate rise in the incidence of “Lifestyle diseases”. The core expertise of these specialists in Exercise Medicine will facilitate tailoring of physical fitness training regimes for illnesses/debilities thereby reducing the health care costs. In addition, this will also ensure state of the art scientific support to training athletes, at par with the best in the world. However, the above requires availability of trained & experienced instructors hence necessitates special consideration by Government of India & Medical Council of India, so as to recognize the Diploma Sports Medicine qualified doctors as MD Sports Medicine teachers, in keeping with the tenets of natural growth of the specialty & graduation to higher tier courses.

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REFERENCES

2. Medical Council of India Official Website; Colleges & Courses Search; http://www.mciindia.org/InformationDesk/CollegesCoursesSearch.aspx  
The Relationship between BMI & Early Menarche in School Going Girls in Nashik

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ABSTRACT

Background- Increasing rates of childhood obesity over recent decades have been reported in many industrialized countries, and a range of associated health risks has been identified. Among them is earlier puberty in girls that it has major public health implications. Menarche is a relatively late marker of puberty and is a well validated indicator of pubertal timing. However, there is a lack of standardized comparable data to evaluate the role of BMI in affecting age at menarche across different countries.

Aim of Study- To investigate the relationship of BMI and age of menarche.

Objective- The objective is to find out whether there is association of early menarche with obesity and overweight.

Materials and Method - Cross sectional descriptive study was conducted on 200 school girls of 8-16 years of age in Nashik. Informed consent, relevant data like demographic information, height, weight, B.M.I and age at menarche was noted. Subjects were divided on the basis of age of menarche into early (8-11yrs) and late matures (12-16yrs) and both matures were further divided on the basis of BMI into overweight and underweight.

Results- Unpaired t- test was used. Out of the 200 females in the study population, 149(74.5%) were post menarcheal, while 51(25.5%) were pre menarcheal. Anthropometric indices and their relationship with menarche showed that the mean height, weight and B.M.I. of the menstruated girls were all significantly higher than those of non-menstruated ones. The youngest age at menarche was 9 years and oldest was 16 years.

Conclusion- There is association between early menarche and B.M.I. Menarcheal girls showed higher body mass index than the non menarcheal ones.

Keywords: BMI, early menarche.

INTRODUCTION

Puberty is a natural development issue common to both men and women. Onset of sexual puberty in girls is associated with beginning of menarche. Menarche being the onset of menstruation is one of the most significant milestones in a woman's life. It is the most widely used indicator of sexual maturation in females as well as the most accurately recalled indicator of puberty among girls because unlike other pubertal changes that are gradual, menarche is a distinct event with a sudden onset. A girl needs to achieve minimum 23% of body fat in order to start menstruation. Therefore the overweight and increased B.M.I. has been among the major changes in girls, and it is more likely that these factors affect the menarche age. The menarche age is often investigated...
for various reasons. It is one of the major indexes of the female fertility and will include the period up to the menopause.

Increasing rates of childhood obesity over recent decades have been reported in many industrialized countries, and a range of associated health risks has been identified. Among them is earlier puberty in girls that it has major public health implications. Menarche is a relatively late marker of puberty and is a well validated indicator of pubertal timing. Age at menarche appears to have been declining in recent decades in western industrialized countries. However, due to different study designs, there is a lack of standardized cross-nationally comparable data to accurately measure any decline. The decrease in average age at menarche during the past 40 years in the United States has been concurrent with an upward shift in the population distribution of body mass index (BMI). Several epidemiological reports in the past 30 years indicate a relationship between earlier menarche in girls and increased BMI. Recent longitudinal studies suggest that increased body fat at birth or in early childhood, or rapid increase in BMI during infancy, predicts earlier onset of puberty. However, there is a lack of standardized comparable data to evaluate the role of overweight (or BMI) in affecting age at menarche across different countries.

However, there is no absolute agreement in this regard and some researchers believe that there is no significant relationship between the menarche age and BMI. The earlier studies show that the menarche age is associated with the incidence of diseases such as the risk of breast cancer, obesity and the cancer of endometrium; therefore, this study is designed to find out the relationship between menarche age and obesity in school going girls in Nashik, so that based on the findings, we can develop health and fitness plans and provide the target population with appropriate nutritional and behavioural patterns.

PURPOSE OF STUDY

To assesses the relationship between BMI and menarche age in the school going girls. So that based on findings health and fitness plan can be developed for target population.

METHOD

This cross sectional study was conducted on 200 school going girls in nashik.

INCLUSION CRITERIA

- Age of 8-16 years girls.
- girls who exactly remember their date of menarche

EXCLUSION CRITERIA

- Having hormone related disorders.
- Hypo/hyper thyroidism.
- Disorders related to adrenal gland.
- Juvenile diabetes.
- Skeletal, neurological, musculoskeletal disorders.
- Steroids.
- Athletes

PROCEDURE

This cross sectional descriptive study was conducted on school girls in Nashik of 8-16 years of age. A number of 200 students were selected from different schools in nashik. The relevant data were collected by asking questions on demographic information as well as measuring the height, weight and calculation of BMI. Age at menarche was obtained from each subject using the status quo method where girls in different age groups were asked whether or not they had experienced their first menses. The subjects that had experienced their first menses were asked to recall the age at first occurrence; weight was measured using a portable digital weighing scale. The participants were weighed standing on the scale with their shoes and socks off. The participants’ height was measured by a plastic measuring tape attached to a smooth wall; the participants were required to put their legs straight together, keep their arms to their sides and keep all, knees, shoulders and back, head all in the same direction; the ruler was kept touching their head on the top and the measurement was recorded with an accuracy of 0.5 cm.BMI was calculated using the formula weight/height2 (kg/m2). The subjects whose BMI for age were <5th percentile of the National Centre for Health Statistics (NCHS) reference population were considered to be underweight, those whose BMI for age were between the 5th and 85th percentile were considered as having normal weight and BMI ≥ 85th but < 5th percentile
were considered at risk of being overweight. Those with BMI > 95th percentile were considered to be obese. Consent was obtained from individual school principals and parents.

**DATA ANALYSIS-** Distributions were described as means and percentile. The obtained data were analyzed using unpaired t-test.

**RESULT**

In the present study, a number of 200 female students participated in the study. As shown in table (1)105 (52.5%) of them were in early adolescence, 95 (47.5%) were in mid adolescence

**Table 1: Stage of adolescence**

<table>
<thead>
<tr>
<th>Age Group(years)</th>
<th>No.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early 8-11</td>
<td>105</td>
<td>52.5%</td>
</tr>
<tr>
<td>Mid 12-16</td>
<td>95</td>
<td>47.5%</td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Menarcheal status of the subjects:**

Of the 200 females in the study population, 149 (74.5%) were post menarcheal, while 51(25.5%) were Pre menarcheal. More than half54 (51.4%) of the subjects in early adolescence were post menarcheal, while all females in mid adolescence had attained menarche as shown in Table 2.

**Table 2: Stage of adolescence by menarche status.**

<table>
<thead>
<tr>
<th>Adolescent Stage</th>
<th>Premenarcheal No (%)</th>
<th>Postmenarcheal No (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early 8-11</td>
<td>51 (48.5%)</td>
<td>54 (51.4%)</td>
<td>105 (100%)</td>
</tr>
<tr>
<td>Mid 12-16</td>
<td>0 (0.0)</td>
<td>95 (100%)</td>
<td>95 (100%)</td>
</tr>
<tr>
<td>Total</td>
<td>51 (25.5%)</td>
<td>149 (74.5%)</td>
<td>200 (100%)</td>
</tr>
</tbody>
</table>

Anthropometric indexes and their relationship with menarche showed that the mean height, weight and BMIof the menstruated girls were all significantly higher than those of the non-menstruated ones.

**Table 3:**

<table>
<thead>
<tr>
<th>Index</th>
<th>Menstruated Girls Mean ± SD</th>
<th>Non-Menstruated Girls Mean ± SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td>51.43±10.73</td>
<td>40.54±9.6</td>
<td>0.001</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>156.06±11.35</td>
<td>148.21±8.36</td>
<td>0.002</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>21.27±4.15</td>
<td>18.43±3.63</td>
<td>0.002</td>
</tr>
</tbody>
</table>

The prevalence of underweight was found to be 8.72% amongst the post menarcheal girls while it was 13.73% in the premenarcheal girls. Overweight were more prevalent amongst the postmenarcheal females than in the premenarcheal females.

**Table 4:Percentage of menstruated and non-menstruated girls according to BMI**

<table>
<thead>
<tr>
<th>BMI</th>
<th>Menstruated Girls Number</th>
<th>Percent</th>
<th>Non-Menstruated Girls Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;18.5</td>
<td>13</td>
<td>8.72</td>
<td>7</td>
<td>13.73</td>
</tr>
<tr>
<td>18.5-24.9</td>
<td>115</td>
<td>77.19</td>
<td>41</td>
<td>80.39</td>
</tr>
<tr>
<td>&gt;25</td>
<td>21</td>
<td>14.09</td>
<td>3</td>
<td>5.88</td>
</tr>
</tbody>
</table>

The youngest age at menarche was 9 years and the oldest was 14 years. The mean age at menarche was 11.80 ±1.22 years with a median age of 12 years.
**DISCUSSION**

In this cross-sectional study conducted in Nashik, the mean age at menarche was 11.80. Although the main timing of puberty changes is the genetic factors, other factors such as geographical location, general health status, nutrition and socioeconomic status affect the onset of menstruation and its progression. There are many studies showing the decreasing trend of the menarche age in the last 100 years; one such study is Anderson and colleagues (2003) study in the US, investigating the changes of the menarche age, which showed that the mean menarche age in American girls had decreased from 12.75 to 12.54 in a 20-year time span. Also, the results of Kaplowitz’ (2006) and Kaplowitz and colleagues (2001) study showed that the mean menarche age had decreased within the past 40 years, attributing the reduction to girls’ increasing obesity.

The present study showed that subjects who had attained menarche in early adolescence had higher BMI than their pre-menarcheal counterparts. This is similar to findings by Goon et all and Raji et al. Danborno and Oyibo studied the anthropometric and menstrual characteristics of girls from Nigeria and Niger Republic. Several studies indicate that the childhood obesity is a predictor of early puberty. In the present study, the menstruated girls had higher weight than the non-menstruated ones. This is in line with some earlier studies too. The increase in the body fat mass can be a significant message to cause the secretion of Leptin, stimulating the hypothalamus and consequently the over-secretion of GnRH. Moreover, GnRH stimulates the hypophysio-ovarian axis and initiates the speeding up the puberty.

Although the mechanisms involved in the negative correlation between obesity and menarche age are not well recognized, it is suggested that many endocrine factors are alleged to affect the speed of sexual puberty and fat accumulation in the body. Firsch (1974) believes that in order to start menstruation, girls need to achieve a minimum weight of 47.8 kg; and more importantly, their body fat should amount to 23.7% (from 16%). Therefore, the puberty starts earlier in medium-obese girls (with 20 to 30% overweight than normal) than in girls with normal weight; in contrast, girls with malnutrition will experience a delay in menstruation.

Garn and colleagues also found that female participants who stated their menarche age to be lower than 11 years old experienced BMI of 2 to 3 kg/m² higher than participants who stated their menarche age to be after the age 14. Also, other factors throughout lifetime of an individual can account for the relationship between menarche age and BMI. The socioeconomic status at the birth time and adulthood, current smoking status and use of alcohol are among the factors related with adulthood BMI. Based on the views of Freedman and colleagues (2003), adulthood childhood BMI and adulthood obesity are related because the former can lead the body towards sexual puberty and allows the first menstruation.

**CONCLUSION**

The results of the present study and earlier studies indicate that the menarche age is experiencing a decreasing trend. Although BMI can be considered as a key factor for menarche age, differences of the menarche age throughout the world can be attributed to various environmental factors too. Fitness expert should emphasize on educational plans and encourage the adolescents to change their lifestyle and select suitable nutritional and behavioral patterns, so that complications resulting from the lowered menarche age could be prevented.

**LIMITATIONS**

- The present study was dependent on
self-reported age at menarche, which implies that participants might not report accurately or younger girls may report menarcheal age more accurately, because the event was more recent.

- One more limitation concerns the study design. We conducted the cross-sectional study. This emphasizes the need for longitudinal studies in the causal relationship between age of menarche and anthropometric profiles.

- The study is conducted only in one city nashik, and only 4 schools are covered. And nashik is still not a metro city and food habits of school girls can be different from big cities, for more accurate results study should be conducted in metro cities with big sample size where food habits and life style is different from small cities.

- Question related to food habits and life styles are not asked.

- We have taken only B.M.I; fat mass is not calculated. Further studies can be done with waist hip ratio and fat mass calculation.

Acknowledgement- I am grateful to all school principals, for helping me out. Also, I would like to thank my parents for their unconditional support. Lastly, I am highly grateful to all the subjects and their parents for their co-operation.

Conflict of Interest: None

Ethical Adherence: Yes

Disclaimers: None

Source of Funding: Self

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To Evaluate the Practice of Breast Self-Examination among Married Women at Adesh University Bathinda

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¹BPT, ²Principal and Prof, ³Assistant Professor, College of Physiotherapy, Adesh University Bathinda, Punjab

ABSTRACT

Breast cancer incidence rates, pattern of presentation and survival rate vary worldwide. Lack of awareness towards screening facilities is the main causes of breast cancer. A survey based upon a multiple choice self administered questionnaire was conducted in medical educational institute in Punjab, to assess the baseline knowledge towards breast self-examination. 100 filled Questionnaire was analyzed by finding mean. All of them were married working women at Adesh University, Bathinda. Majority of them were illiterate and all of them were between the age group of 25-50 years. In terms of ethnicity 89% were from Malwa region, 8% from Doaba region and 3% from other region of Punjab. In the present study, only 13% women reported a family history of breast cancer and most of the respondents (78%) were believe that early detection can improve or control the outcome of the breast cancer, but worse knowledge of risk factors and about procedure of breast self-examination. Pamphlets were distributed after filling the questionnaire to raise the knowledge level towards breast cancer and its detective measures.

Participants: 100 Subjects
Study design: A Survey
Keywords: Breast Cancer, Breast Self-examination.

INTRODUCTION

The most common malignancy affecting women is breast cancer. Breast cancer is considered as a major health-threatening factor to women health [1]. It is the commonest cancer of urban Indian women and the second commonest in the rural women [2].

In India, cancer prevalence is estimated around 2.5 million, with over 0.8 million new cases and 0.5 million deaths occurring each year [3]. 519,000 women died in 2004 due to breast cancer and 69% of these deaths occurred in the developing countries (WHO). The incidence as well as the survival rates varies worldwide with marked geographical variations. The age standardized rate is the highest at 99.4 per 100,000 in North America, while lower rates have been reported from African and Asian countries [4].

The incidence of the disease was 21.3 per 100,000 in 2008, which was up from an incidence of 12.5 in 1999. Indian council or Medical Research analyzed cancer cases in Delhi, Mumbai, Chennai and Bangalore between 1982 and 2005, and found that incidence of breast cancer had doubled. While Bangalore saw breast cancer cases more than double since 1982-15.8 in a population of one lakh in 1982 to 32.2 in 2005. Delhi recorded 24.8 new cases of breast cancer a year per 100,000 women that raised to 32.2 in 2005. Mumbai recorded 20.8 new cases of breast cancer per 100,000 population, in 1982 that increased by almost 10% in 2005 [5].

According to National Cancer Registries and regional cancer centers, breast cancer is the commonest cancer amongst women in Ahmadabad, Delhi, Kolkata, Mumbai and Trivandrum. It accounts for 19-34% of all cases among women in India [6].

The world cancer report stated that over 1.1 million women worldwide were diagnosed with breast cancer while 41,000 die from illness each year.
The incidence of breast cancer is highest among Chinese population (66.1 per 100,000), followed by Indians (47 per 100,000) and Malays (27.7 per 100,000) [7].

Medical advances have shown that one-third of all cancers are preventable and a further one-third, if diagnosed sufficiently early, is potentially curable. One potentially important strategy in reducing breast cancer mortality is the use of screening to achieve earlier detection of cancer. This is very important because an excellent prognosis is directly associated with the stage at which the tumor is detected and how localized the lesion is. Early diagnosis usually results in treatment before metastasis and signifies a better outcome of management [8].

Most successful approach to decrease mortality due to breast cancer is the application of secondary prevention. Breast Self Examination (BSE), Clinical Breast Examination (CBE), mammogram are the important methods traditionally used for detecting the breast cancer in the early stage [3] and breast self-examination leads to the diagnosis of breast cancer at early stage [9].

The purpose of a BSE is to learn the topography of the breasts; which in turn will allow for one to notice changes in the future in order to detect breast masses or lumps. Breast self-examination, carried out once monthly, between the 7th and 10th of the menstrual cycle, goes a long way in detecting breast cancer at the early stages of growth when there is low risk of spread, ensuring a better prognosis when treated [8]. Breast self-examination is a recommended screening method for early detection of breast cancer, so it is essential to educate the women about BSE as an early detection method for this fatal disease [1].

Health education should be the basis of all early detection programs. There is good evidence that in most developed countries the combination of professional and public education resulted in the reduction in the size of breast cancers on presentation.

Peer education is currently one of the most widely adopted health promotion strategies used with young people, and is almost universally represented as effective. Peer education is the process whereby well-trained and motivated young people undertake informal or organized educational activities with their peers (those similar to themselves in age, background or interests) over a period of time, aimed at developing their knowledge, attitudes, beliefs and skills and enabling them to be responsible for and protect their own health [10].

MATERIALS & METHOD

A self administered questionnaire was designed in local language consisting of 13 questions. First socio-demographic data was set up in the profile of the participant then each question were formatted to assess their knowledge about breast cancer; its risk factors; early changes in breast; know about early detection measures of breast cancer and informed consent was taken before filling the questionnaire.

RESULT & DATA ANALYSIS: FIG NO.1:-

A total of 100 questionnaires were analyzed. 100% questionnaires were filled by interview method in local language. The respondents were married women at medical institute between the age group of 25-50 years. As shown in fig no.1, 13% had family history of breast cancer while 6% were aware about the risk factors of breast cancer and only 8% had knowledge about the early changes in breast during breast cancer. However, 78% of the respondents had believe that early detection can control the outcome of breast cancer. Majority of the women had never undergone the practice of breast self-examination among the older age group as well as younger age group.

DISCUSSION

Breast self-examination is one of the vital screening techniques for early detection of breast lumps, especially cancer of breast. The procedure of
BSE is simple, non-invasive, requiring little time, can only be practiced with the right attitude to sustain it and achieve the desire goal. It is an inexpensive method for early detection of breast tumors, thus the knowledge and consistent practice could protect women from severe morbidity and mortality due to breast cancer.

The aim of the study was to investigate the practice of breast self-examination among the married women. The overall result revealed that majority of them had low knowledge about the practice of breast self examination. In this study, about 13% of women suffered from family history of breast cancer, 6% of the total knows about the early changes in the breast cancer. About 8% of them aware about the risk factors of breast cancer. There is no knowledge about the practice of breast self-examination besides it is a early screening method for breast cancer. But 78% believe that early detection methods can improve or control the outcomes of breast cancer.

In the present study no one was aware about BSE. This is lower than 85.5% of women studied in Port Harcourt and 50% of those studied in South Africa. BSE was not known to most of the respondents in this study. Less than half of the respondents never performed BSE. The result of this study provides a preliminary understanding on knowledge and practices of BSE targeted to a Indian women with breast cancer. However, research evidences is needed to confirm the significant differences between demographic variables and BSE practice.

Interventions are needed to improve the self efficacy of women to engage in regular breast awareness as well as BSE practices. With better uptake of BSE behavior the opportunities for early detection can be increased. Breast cancer is set to become a chronic illness, where women need to be empowered and to self manage living effectively often an indefinite period of time.

The knowledge of respondents about presence of earlier changes in breast cancer was low. In this survey, only 6% know about the warning signs. This study was corroborated with the study conducted in Port Harcourt, Nigeria where only the 48.2% of respondents knew about the presence of warning signs of breast cancer. Among the respondents in the study, 78 % believed that early detected breast cancer could be managed.

8% had knowledge of risk factors of breast cancer. This further strengthened the need for breast cancer educational programs, important in ensuring that women present early at the health care facilities for diagnosis and treatment.

It is apparent from this study that practice of BSE is not done by many respondents because of the knowledge about breast cancer and BSE is very low. Hyuns study reveals that women who are taught to perform BSE have a better level of knowledge about breast cancer.

The probable reason of low compliance, may be that the women in the sample did not believe that they were susceptible to breast cancer. Another explanation could be the lack of education and lack awareness about breast cancer.

Our findings were similar with other studies of African women which also show poor knowledge on risk factors, and inconsistent practice of BSE in various group of women in Nigeria, Senegal and South Africa. Similarly, close to three quarters of females undergraduate students in Nigeria had heard about BSE, although only about one in fifth had ever practiced it. In Angola, a study of 595 university students indicated that the majority of them were not known to breast cancer.

A survey in Senegal on 300 women indicates that only 42.7% having knowledge about breast cancer and BSE is much in rural areas. The overall, knowledge of BSE in this population was very poor. This low level of knowledge reflects the fact that adequate public education is essential to facilitate the early detection of breast cancer.

CONCLUSION

Our findings indicate that the practice of BSE while perceive as being important is not frequently practiced in the women of Punjab. These findings suggest an urgent need for intervention to implement and re-enforce existing cancer awareness and cancer screening programs.

Health education campaigns will be needed to elucidate the public on the practice of BSE. Further,
studies need to explore what interventions could be best use to improve the uptake and practice of BSE and other methods of detection.

**Acknowledgement:** I owe my deepest gratitude to my loving parents S. Tejpal Singh and Mrs. Jasdeep Kaur and my Husband Mr. Iqbal Singh Sidhu for making everything possible and special thanks to Parneet Kaur & Pavanjot Singh for their unconditional support.

**Conflict of Interest:** Confirm that this research paper has no conflicts of interest.

**Source of Finding:** Self

**Ethical Clearance:** Cleared and issued

**REFERENCES**


Flat Foot and Posterior Tibial Tendon Length- A Correlational Study

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ABSTRACT

Background: Dysfunction of the posterior tibial tendon may result in a pathologic deformity, and if not appropriately addressed through corrective measures (rest, rehabilitation and/or bracing), surgical intervention is necessary to correct the resulting deformity and restore function of the limb.¹⁰ Posterior tibial tendon dysfunction is a progressive condition, so early recognition and treatment is essential to help delay or reverse the progression.

Aim of The Study: To study the correlation between flat foot and posterior tibial tendon length.

Method: This was a correlational study. 50 participants were evaluated by using purposive sampling, 50 participants belonged to age group of 18-30 years involved in track and field events. They were assessed for flat foot by measuring their arch index, range of motion was measured using universal goniometer, too many toes sign was observed and unilateral heel raise was graded accordingly.

Findings: The result showed there is no correlation between flat foot and posterior tibial tendon length.

Conclusion: This study concludes there is no relation between flat foot and posterior tendon length.

Keywords: Flat foot, posterior tibial tendon dysfunction, athletes, arch index.

INTRODUCTION

The arch, or arches, of the foot can be described as a single twisted osteoligamentous plate. The anterior margin of the plate (formed by metatarsal heads) is horizontal and in full contact with the ground. The posterior margin of the plate (the posterior calcaneus) is vertical. The resulting twist in the plate between its horizontal and vertical margins imposes both longitudinal and transverse arches.¹¹ Loading the plate (weight-bearing) will tend to untwist the plate, flattening the arches slightly. As the plate is unloaded (body weight removed), the resilient arches return to their original shape. The counter rotations that occur in twisting and untwisting of the plate appear to help maintain the superimposed leg in a vertical position while shock absorption takes place.¹² The vault of the adult foot traditionally is considered to be composed of two different arches, the longitudinal and transverse arches of the foot.

The longitudinal arch has been described as an arch based posteriorly at the calcaneus and anteriorly at the metatarsal heads. The arch is continuous both medially and laterally through the foot, but because the arch is higher medially, the medial side is usually the side of reference. The transverse arch, like the longitudinal arch, is a continuous structure. It is easiest to visualize at the level of the anterior tarsals.
and at the bases of the metatarsals. At the anterior tarsals, the middle cuneiform forms the keystone of the arch. The arch continues distally to the metatarsals with slightly less curvature. The second metatarsal, recessed into the mortise, is at the apex of this arc. At the level of the metatarsal heads, the transverse arch is completely reduced with all metatarsal heads parallel to the weight bearing surface.

The plantar arches are adapted exclusively to serve the weight-bearing functions of the foot. The following stability functions could be performed by a foot with a fixed arch structure: 1. Distribution of weight through the foot for proper weight-bearing and 2. Conversion of the foot to a rigid lever. However, the following mobility functions can only be performed by a non-rigid structure: 1. dampening the shock of weight-bearing; 2. adapting to changes in the superimposed rotations. When the arches of the foot are affected pathologically it leads to either pes cavus or pes planus deformity. Pes planus is marked by excessive unwinding of the osteoligamentous plate with weight-bearing. The pronated position of the talocalcaneonavicular (TCN)-subtalar and the transverse tarsal joints create a medial rotator stress on the leg. The medial rotator stress or position of excessive medial rotation of the leg may result in several possible problems around the knee joint, including excessive angulations of the patellar tendon and excessive pressure on the lateral patellar facet. The lowering of the arch that accompanies TCN and transverse tarsal joint pronation may result in a functional leg length inequality if the problem is asymmetrical. Lowering the arch also tenses the plantar ligaments and the plantar aponeurosis.

The tibialis posterior is credited with a being an important dynamic contributor to arch support and with having a significant role in controlling and reversing the pronation of the foot that occurs during gait. Tibialis posterior dysfunction may be a key element leading to acquired flat foot. Dysfunction of the posterior tibial tendon may result in a pathologic deformity, and if not appropriately addressed through corrective measures (rest, rehabilitation and/or bracing), surgical intervention is necessary to correct the resulting deformity and restore function of the limb. Posterior tibial tendon dysfunction is a progressive condition, so early recognition and treatment are essential to help delay or reverse the progression. Posterior tibial tendon dysfunction (PTTD) has profound effects on the complex interrelationships among the ankle, subtalar, and transverse tarsal joints. These abnormalities also have a significant effect on the more distal and proximal articulations of the foot. Dysfunction of the tibialis posterior tendon results in less efficient gait, as the heel does not effectively medialize, and the gastrocsoleus complex requires greater excursion to become a heel inverter. In cases where the tibialis posterior muscle no longer contracts, resting heel valgus may be accentuated as the gastrocsoleus complex becomes a deforming force, and its subsequent contraction creates an external valgus moment on the heel. Late changes of the pathologic flatfoot include lateral hindfoot bony impingement, sinus tarsi inflammation, peroneal tendonitis, equinus contracture, and eventual arthrosis. A comparative study by Josh Tome et al concluded, the abnormal kinematics observed at the rearfoot, midfoot and forefoot across all phases of stance implicate a failure of compensatory muscle and secondary ligamentous support to control foot kinematics in subjects with stage 2 PTTD. A study was conducted that by Melessa Rabbibto, concluded that runners with stage 1 PTTD are likely to present with normal inversion ankle muscle strength significant differences in rearfoot pronation during walking gait. The increased foot pronation is hypothesized to place greater strain on the posterior tibial muscle, which may partially explain the progressive nature of this condition. The present study is intended to investigate the correlation between flat foot and posterior tibial tendon length in athletes who are indulged in track and field sports.

**MATERIALS & METHOD**

50 participants who volunteered for participation, 32 male (22.3±2.21) and 18 female (22.4±1.78) athletes involved in track and field events were included in the study and were sampled conveniently. The inclusion criteria was athletes of age 18-30 years, arch index of >0.28, no other musculoskeletal pain of the ankle complex. The athletes were excluded if athlete was diagnosed with any recent ankle or foot injuries (6 months), pathologies of hip, knee, ankle and foot, foot deformities. All the participants were assessed thoroughly prior involving them in the study. Arch Index was measured with water color method and graded accordingly on a graph paper. After which...
the participant was explained and told to perform unilateral heel raise of the affected foot. With support for balance by the examiner, the athlete was asked to first suspend the unaffected leg in the air, then attempt to perform a heel raise on the affected foot. The participant was assessed for too many toes sign as described by Johnson (1983), [9], [4], [9], [11]. The range of motion of the ankle was assessed with the universal goniometer. The manual muscle strength was assessed of the posterior tibialis muscle. The athlete was seated; the physiotherapist tested the PTT strength (inversion) against resistance. During the test the hindfoot was placed first in plantar flexion and eversion and the forefoot in abduction to eliminate the synergistic action of the anterior tibial tendon, which would otherwise fire and mask a strength loss in the PTT. The athlete was then asked to invert the foot against the physiotherapist’s hand, and the strength was graded. [9], [4], [9]. The Institutional Ethical Committee of KLEU Institute of Physiotherapy, Belgaum approved all study procedures and the participants provided informed written consent before the participants participated in the study.

STATISTICAL ANALYSIS

Data was computed and analyzed using SPSS (Statistical Package for Social Science) software version 16. t-test was used to analyze the data.

RESULTS

Demographic Data: The mean age of all the subjects was 23.3±2.21 (females) and 22.4±1.78 (males) years Table 1. There was no statistical difference between the age of male and female athletes.

Table1. Demographic data

<table>
<thead>
<tr>
<th>PARTICIPANT</th>
<th>MEAN AGE(Mean ± SD)</th>
<th>AGE IN YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEMALE (18)</td>
<td>22.3±2.21</td>
<td>18-25</td>
</tr>
<tr>
<td>MALE (32)</td>
<td>22.4± 1.78</td>
<td>18-24</td>
</tr>
<tr>
<td>AGERAGE</td>
<td>22.4± 1.93</td>
<td>18-25</td>
</tr>
</tbody>
</table>

Unilateral Heel Raise: The unilateral heel rise was analyzed by using Chi-square test and t-test between the female and male participants and it was statistically not significant (p value 0.266)

Table 2

<table>
<thead>
<tr>
<th>GENDER</th>
<th>GRADE 2</th>
<th>GRADE 3</th>
<th>T VALUE</th>
<th>p VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEMALE</td>
<td>14(77.8%)</td>
<td>4(22.2%)</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>MALE</td>
<td>20(62.5%)</td>
<td>12(37.5%)</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>AGERAGE</td>
<td>34(68%)</td>
<td>16(32%)</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

X²=1.236; P=0.266

Range of Motion: The range of motion was analyzed by using t-test and was statistically not significant Table 3.

Table3. Range of motion of the ankle joint.

<table>
<thead>
<tr>
<th>RANGE OF MOTION</th>
<th>SIDE</th>
<th>MALE(32)</th>
<th>FEMALE(18)</th>
<th>t VALUE</th>
<th>p VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLANTARFLEXION</td>
<td>RIGHT</td>
<td>43±2.79</td>
<td>42.1±5.58</td>
<td>0.627</td>
<td>0.537</td>
</tr>
<tr>
<td></td>
<td>LEFT</td>
<td>43.2± 2.65</td>
<td>41.9±5.67</td>
<td>0.916</td>
<td>0.370</td>
</tr>
<tr>
<td>DORSIFLEXION</td>
<td>RIGHT</td>
<td>15.2± 2.35</td>
<td>15.1± 2.50</td>
<td>0.117</td>
<td>0.907</td>
</tr>
<tr>
<td></td>
<td>LEFT</td>
<td>15.2± 2.35</td>
<td>15.4± 2.63</td>
<td>0.192</td>
<td>0.849</td>
</tr>
<tr>
<td>INVERSION</td>
<td>RIGHT</td>
<td>30.6±1.81</td>
<td>31±2.67</td>
<td>0.486</td>
<td>0.631</td>
</tr>
<tr>
<td></td>
<td>LEFT</td>
<td>30.7±1.78</td>
<td>31.1±2.69</td>
<td>0.553</td>
<td>0.585</td>
</tr>
<tr>
<td>EVERSI0N</td>
<td>RIGHT</td>
<td>13± 1.23</td>
<td>13±1.35</td>
<td>0.065</td>
<td>0.949</td>
</tr>
<tr>
<td></td>
<td>LEFT</td>
<td>12.9± 1.25</td>
<td>13.1±1.41</td>
<td>0.368</td>
<td>0.714</td>
</tr>
</tbody>
</table>
DISCUSSION

The primary finding of this study was that there exists no correlation between flat foot and posterior tibial tendon length in athletes involved in track and field sports. The lack of correlation between flat foot and posterior tibial tendon dysfunction is in contrast with the previous research. The too many toes sign was also not statistically significant but clinically significant and so was unilateral heel raise. The range of motion of the athletes assessed was not found to be affected and was statistically not significant.

A comparative study by William at al (2000)\[13\] was conducted to compare changes in Posterior Tibialis Muscle Length between subjects with (posterior tibial tendon dysfunction)PTTD and Healthy Controls during walking and concluded specific foot kinematics contribute more to the posterior tibial length than others. The largest contributors to the posterior tibial length were the greater hindfoot eversion and forefoot abduction in subjects with PTTD compared to healthy controls. Hindfoot and forefoot deformities were not taken into consideration in the present study.

The predisposing factors for developing flat foot both proximal and distal causes should have been addressed as the abnormal biomechanical factors plays a key role in the development of flat foot in athletes.

Study by Melisa Rabbito et al(2011)\[11\] postulated flat foot in females athletes is more common, so the present study was in contrast to the findings of the study by Melisa et al, so if competitive female athletes were assessed and correlation studied would have yielded positive results.

Footwear plays a very important role in altering the biomechanics of the foot, which was not assessed and incorrect footwear leads to abnormal force dissipations for already existing abnormal proximal deformities, muscle imbalances and is a contributing factor for posterior tibial muscle dysfunction. The present study the factors contributing for the development of flat foot were not assessed.

In the present study the range of motion was also not significant; this could have been a possible reason for the absence of correlation.

A study on acquired Flatfoot in adults due to Dysfunction of the Posterior Tibial Tendon found, early recognition of dysfunction of the Posterior Tibial Tendon is important because of the progressive natural history of the disease.

The length of the gastrocnemius and soleus was also not taken into consideration. Study by Klien et al (1996)\[9\] postulated the length of the gastro-soleus complex plays a vital role in the normal biomechanics of the foot and should be evaluated when dealing with the foot. The length measurement was not measured of the gastrosoleus complex in the present study.

The future scope of the study could be better investigative procedures to confirm the presence of PTTD, differentiation between congenital and acquired flat foot deformity and a detailed assessment of the predisposing factors responsible for flat foot.

CONCLUSION

This study concludes there is no correlation between flat foot and posterior tendon length.

Acknowledgement: The authors are very thankful to Principal of our Institute Dr. Sanjiv Kumar for allowing us to utilize the facilities of the esteemed institution. It would be unfair if we fail to thank all the participants in this study without whom this study would have been impossible.

Conflict of Interest: There was no conflict of interest among the authors with regards to the above study.

Source of Funding: The above study was a self funded project.

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Immediate Effect of Slider Neurodynamic Technique on Pain and Knee Extension Range in Patients with Lumbosacral Radiculopathy

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¹²nd Year M.P.T. Musculoskeletal, ²Senior Lecturer, ³Principal,
SBB College of Physiotherapy, VS Hospital, Ellisbridge, Ahmedabad

ABSTRACT

Purpose: To investigate the immediate effect of slider neurodynamic technique on pain and knee extension range of motion in slump position in patients with lumbosacral radiculopathy.

Methodology: 30 subjects having low back pain with radiculopathy were selected for the study from the OPD of S.B.B. College of Physiotherapy, V.S. Hospital, Ahmedabad. They were divided into two groups of equal sizes. Group A received 5 sets of slider neurodynamic technique. Group B received sham neural mobilization. Outcome measures were numerical pain rating scale and knee extension range of motion in slump position, measured before and after the intervention.

Results: Paired t-test was applied to compare the difference between pre and post intervention outcome measures. Independent samples t-test was applied to compare the change in outcome measures between both groups. There was a statistically significant improvement in knee extension range of motion in group A. There was no improvement in NPRS scores in any of the two groups.

Conclusion: Slider neurodynamic technique has an immediate effect in improving lower quadrant flexibility but not in relieving pain in patients with back pain and lumbosacral radiculopathy.

Keywords: Slider, neurodynamic techniques, lumbosacral radiculopathy

INTRODUCTION

Lumbar-spine disorders rank fifth among disease categories in the cost of hospital care and account for higher costs resulting in absent from work and disability than any other category.[1] Physical therapists utilize a wide range of interventions in the management of low back pain with radiculopathy; however, evidence for the effectiveness of these interventions is limited.[2] Intervention in patients with a disease requires that the intervention has to be more beneficial, safer, and cost-effective compared with the untreated natural history. Intervention should occur after accurate diagnosis and consideration of prognostic findings. This dilemma is particularly important in patients with low back pain with or without radiculopathy.[3]

Lumbosacral radiculopathy is associated with neural signs and symptoms. Therefore, Butler[4] and Shacklock have proposed neural mobilization as a treatment of such symptoms. Michael Shacklock has proposed two neurodynamic techniques under neural mobilization; sliders and tensioners. Slider technique has an extra-neural effect and produces sliding of the nerve in relation to its mechanical interface.[5]

The SLR test and knee extension ROM in slump test are frequently used in the assessment of patients presenting with lumbar spine dysfunction to identify the degree of impairment due to lumbosacral radiculopathy.[6] Numerical Pain Rating Scale is a responsive, reliable and valid tool for measuring pain compared to other scales.[7] The purpose of this study was to explore the immediate effect of slider technique on pain and lower quadrant flexibility in patients with lumbosacral radiculopathy.
METHODOLOGY

A Quasi-experimental study design was utilized. Sample size was calculated by conducting a pilot study. Power of the study was kept at 80%. It came out to be 14 in each group. 30 patients were selected for the study from Out-patient department of S.B.B. college of Physiotherapy, V.S. Hospital, Ahmedabad. They were allocated to any of the two groups of equal sizes using convenient sampling method. Inclusion criteria were patients having low back pain with radiculopathy of age ≥25 years and with positive neurodynamic tests, i.e. level 2 neurodynamic SLR test and Slump test. Patients having somatic referred pain, upper motor neuron lesion or peripheral neuropathy and those who had taken epidural steroids in the past six months were excluded. Written and verbal consent was taken from the patients before including them in the study.

Level 2 neurodynamic SLR testing was done by flexing the hip joint keeping the knee in extension upto P1. Then, in order to confirm whether the symptoms are nerve-related, ‘switch on’ was done, i.e., ankle dorsiflexion for symptoms above the knee and hip joint adduction and internal rotation if the symptoms were below the knee for structural differentiation.

Slump test was done in seated slump posture with hands kept behind the back. Then, the patient was instructed to flex the cervical and dorsal spine and therapist kept one hand over the occiput to make sure the patient doesn’t extend the spine. Now, the ankle joint was passively taken into dorsiflexion and knee into extension up to the point where symptoms were reproduced in the same area, i.e. P1.[5] Before giving the intervention the outcome measures were recorded. Numerical pain Rating Scale was taken for pain and Knee extension range of motion was measured using a universal goniometer in slump position keeping the ankle joint in full dorsiflexion. The patient was asked to extend the knee in slump position keeping the neck in maximum cervical flexion and ankle in dorsiflexion. The patient was instructed to stop at the point where he starts having reproduction of symptoms. This range of motion was measured with universal goniometer.

INTERVENTIONS

Group A received 5 sets of slider technique. Two ended Slider technique was given in supine lying position, because all patients selected had positive level 2 neurodynamic assessment. Hip joint was passively taken into flexion with knee flexion keeping the ankle in dorsiflexion, which was followed by hip extension and knee extension. Each oscillation was done for 4 seconds such that symptoms were just evoked but not provoked. Each set was of 2 minutes. A period of two minutes of relaxation was given in between two sets.

Group B (control group) received 5 sets of sham neural mobilization. Passive hip and knee flexion was given in symptom free range sliding the heel on the plinth while keeping the ankle joint free and bringing it back to the resting position. Each oscillation was of 4 seconds. Each set was of two minutes. A period of two minutes of relaxation was given in between two sets.

Post-intervention outcome measures were taken immediately after the interventions.

DATA ANALYSIS

Data analysis was done using SPSSv20 for Windows. Mean(±SD) age of patients in group A and group B was 56.8±9.7 and 52.1±7.5 years respectively. 7 males and 8 females were in group A and 6 males and 9 females in group B. Mean NPRS scores before giving the intervention were 5.3±0.948 and 5.4±1.075 in group A and B respectively. Mean knee extension ROM scores were 19.7±2.983 and 21.9±3.0 degrees in groups A and B respectively. Independent samples t-test was applied to compare the baseline characteristics of both groups. All values showed no statistically significant difference between the two groups.

Data showed normal distribution. Hence, Paired t-test was applied to compare the pre and post intervention outcome measures. It showed that there was no statistically significant difference in pain in any of the two groups. (table 1)

Knee extension Range of motion showed a statistically significant improvement in group A, but no significant improvement in group B. (table 2)
Independent samples t-test was applied to compare the change in outcome measures in both groups. There was no statistically significant difference between the change in NPRS scores. There was a statistically significant difference in change in outcome measures between both groups. (table 3)

Level of significance was kept at 5%.

Table 1: Comparison between pre and post intervention NPRS scores

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre-intervention NPRS Mean±SD</th>
<th>Post-intervention NPRS Mean±SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5.3±0.948</td>
<td>5.1±0.737</td>
<td>0.168</td>
</tr>
<tr>
<td>B</td>
<td>5.4±1.075</td>
<td>5.3±0.948</td>
<td>0.343</td>
</tr>
</tbody>
</table>

Table 2: Comparison between pre and post-intervention knee extension ROM

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre-intervention knee extension ROM Mean±SD</th>
<th>Post-intervention knee extension ROM Mean±SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>19.7±2.983</td>
<td>9.3±2.983</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>B</td>
<td>21.9±3.0</td>
<td>21.3±3.056</td>
<td>0.081</td>
</tr>
</tbody>
</table>

Table 3: Comparison between changes in outcome measures between the groups

<table>
<thead>
<tr>
<th>Groups</th>
<th>Difference of mean of NPRS</th>
<th>P value</th>
<th>Difference of mean of knee extension ROM</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.2</td>
<td>0.556</td>
<td>10.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>B</td>
<td>0.1</td>
<td></td>
<td>0.6</td>
<td></td>
</tr>
</tbody>
</table>

DISCUSSION

There was no statistically significant improvement in pain in any of the groups. This may be because a single session may not be effective in reducing pain. If the study was conducted for more number of sessions, there might be a significant improvement in pain.

Sahar M. Adel (Journal of American Science, 2011) conducted a study on sixty chronic low back pain patients to compare the effect of neural mobilization and lumbar stabilization exercises and found that neural mobilization, when given with lumbar stabilization exercises is more effective than exercise given alone in reducing pain(NPRS), functional disabilities (Modified Oswestry Disability Index) and H-reflex latency.[8]

There was a statistically significant improvement in knee extension ROM in the group which received slider technique. This was because slider technique is given in such a way that there is development of tension at one end and releasing the tension at the other end by moving various joints. This causes cephalad and caudal sliding of the nerve which leads to reduction of symptoms arising due to adhesions of the nerve with its mechanical interface. This is in accordance with a study done by Herrington Lee in which slider and tensioner both were effective in improving knee extension ROM in slump position.[9]

Limitations of the study and further suggestions:

Randomization was not done. Ethics approval was not obtained. Further studies investigating the effects of slider technique for more number of sessions can be done.

CONCLUSION

One session of Slider neurodynamtc technique is effective in improving knee extension ROM which is a measure of lower quadrant flexibility.

Acknowledgement: Nil

Ethical Clearance: Permission for doing the study was obtained from the Principal, S. B. B. College of Physiotherapy.

Source of Funding: Self

Conflicts of Interest: Nil

REFERENCES

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An Experimental Study to See the Efficacy of Manual Therapy and Conventional Therapy in Low Back Pain

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ABSTRACT

Low back pain is a significant problem in today’s society. Low back pain (LBP) is usually defined as pain, muscle tension, or stiffness. Few cases of back pain are due to specific causes: most cases are non-specific. This research work is done to see the efficacy of McKenzie technique and IFT in patients suffering from low back pain.

Conclusion: the present study shows that there is a significant effect of McKenzie technique and IFT in low back pain and there is a reduction in the scoring of Roland Morris Questionnaire and VAS.

Keywords: McKenzie technique, IFT, Roland Morris Questionnaire.

INTRODUCTION

Low back pain (LBP) is usually define as pain, muscle tension, or stiffness localized below the costal margin and above the inferior gluteal folds, with or without leg pain.

Low back pain is a significant problem in today’s society, with lifetime incidence rates report between 50% and 90%. Clinical observations suggest that oberrations of posture may play a role in the development of low back pain.

In the majority of cases, a specific diagnosis for LBP can not be defined on the basis of Anatomical or Physiological abnormalities.

Physical and psychological risk factor to the occurrence of back disorders and back pain. Relatively little is known about Risk factors for the transition from acute to chronic low back pain. More recently, genetic and bio-mechanical models have contributed to the understanding of the development of back disorder that present as back pain.

Causes
• Congenital causes: spina bifida, facet, tropism.
• Traumatic causes: sprain, strain, prolapsed disc.

• Inflammatory causes: Tuberculosis.
• Degenerative causes: Osteoarthritis.
• Metabolic causes: Osteoporosis.

Few cases of back pain are due to specific causes: most cases are non-specific. LBP affects the ability to control standing posture. Nonspecific LBP has been considered resultant of articular and or muscular imbalances of the lumbo-pelvic complex and more frequent for women.

Acute back pain is the most common presentation and is usually self-limiting, lasting less than three months regardless of treatment.

Chronic back pain is a more difficult problem, which often has strong psychological overlay; work dissatisfaction, boredom, and a generous compensation system contribute to it.

some signs: * morning pain on walking.
* Intermittent pain during day.
* Pain when lifting.
* Straight leg raising hurts .
* Pain bending forward a little .

* Burning pain

The treatment methods for LBP include medication, exercise, manual therapy, and surgery. Spinal manipulation (SM) is a form of manual
therapy with moderate clinical effectiveness similar to other non-surgical interventions for acute and chronic LBP.8

The Mckenzie method is popular amongst physiotherapy as a management approach for spinal pain. The Mckenzie method utilises an assessment process which aims to identify subgroups of patients within the non-specific spinal pain population whose symptoms behave in a similar way when subjected to mechanical forces.9

The Mckenzie method has been known by other names, such as Mechanical Diagnosis and therapy (MDT), end-range exercises, active range of motion (AROM) exercises, unloaded exercises, directional preference exercises, or extension exercises.10

Interferential current is essentially a deeper form of electrical stimulation. The basic principle of Interferential Therapy (IFT) is to utilise the significant physiological effects of low frequency (<250pps) electrical stimulation of nerves without the associated painful and somewhat unpleasant side effects sometimes associated with low frequency stimulation.

The physiological effects of IFT include:

1. An increase in localized blood flow which can improve healing by reducing swelling (the additional blood flowing through the area takes oedematous fluid away with it) and as a result helps remove damaged tissue and bring nutrients necessary for healing to the injured area.

2. The stimulation of local nerve cells that can have a pain reducing/anaesthetic effect due to potentially blocking the transmission of the pain signals (pain gate mechanism) or by stimulating the release of pain reducing endorphins (opioid mechanism).

3. Relaxation of muscle spasms can be achieved through external application of an electrical current, overcoming some of the muscle inhibition often caused by local injury and swelling.

4. Increased permeability of the cell membrane which helps ion movement to and from cells thus promoting healing.11

AIMS AND OBJECTIVES

The aim of the present study is to compare the effect of Mckenzie technique and Mckenzie technique with IFT in low back pain.

RESEARCH HYPOTHESIS

Null hypothesis (H0): There will not be any significant effect of Mckenzie technique and IFT in low back pain.

Alternative hypothesis (H1): There will be a significant effect of Mckenzie technique and IFT in low back pain.

METHODOLOGY

Study design: Experimental Study.
Sampling: Convenient Sample.
Sample size: (20)
Duration of study: 20 days

CRITERIA FOR SAMPLING

Inclusion criteria
1. Age group between 35 – 50 years.
2. Both genders were included.
3. Patients with pain from last 1 year only.

Exclusion criteria
1. Patients with spinal injuries.
2. Patients with spinal deformities.
3. Diabetic patients.
4. Non willing patients.

TOOLS FOR DATA COLLECTION
1. Rolland Morris Questionnaire
2. Vas pain scale
3. Couch
4. Adhesive tape
5. Gel

PROCEDURE

Subjects were selected from the outpatient department of various hospitals who were suffering
from low back pain and they were screened for inclusion and exclusion criteria. A total of 30 subjects were selected for the study but only 20 subjects fulfilled the requirement according to the inclusion criteria.

Procedure of the technique was explained to the subjects and informed consent was obtained from the subjects. A total of 20 subjects were included in the study.

Procedure was explained, and adequate instructions and motivation were given to the subjects.

**Strategies in the McKenzie method:**

**01 Dynamic strategies:** Flexion in standing: With feet shoulder-width apart and maintaining knee extension, the patient is asked to flex the spine the spine as far as pain allows and to return to neutral standing. This movement is then repeated up to 10 times.

Extension in standing: With feet shoulder-width apart and maintaining knee extension, the patient is asked to place the hands at the lower back, to bend backwards as far as pain allows and to return to neutral standing. This movement is then repeated up to 10 times.

Extension in lying: Lying prone with hands directly under the shoulders, the patient is asked to raise the upper body by extending the arms and maintaining the thighs and legs on the plinth. The patient is then asked to return to the initial position and to repeat the movement up to 10 times.

Side glide in standing: Standing with the feet shoulder-width apart and maintaining shoulders parallel to the ground, the patient is asked to move the hips to the left (Left side gliding) while their trunk remains in a neutral position. The patient is then asked to return to the initial position and to repeat the movement up to 10 times. Therapist assistance may be needed to perform the movement, particularly when there is a lateral shift deformity, which consists of an acute non-structural misalignment of the spine (Also known as sciatic scoliosis).

**02 Static strategies:** Static loading strategies include sustained postures that are hold at end-range for up to five minutes. Different postures may be used during the examination, including lying prone in extension.

**Other strategies:** When the above dynamic and static loading strategies fail to provide a clear symptom response to assist in the classification of low-back pain, over pressure may be applied by the therapist. For example, while the patient performs extension in lying as described above, the therapist applies over pressure perpendicular to the spine still allowing the movement to occur. The magnitude of the force applied by the therapist is dictated by the symptom response. For example, more pressure should by applied if this causes less pain. Another potential variation of this loading strategy is to perform the movement with the hips off-centre, usually shifted away from the painful side.

**RESULT**

**Paired Samples Test**

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMPRE – RMPOST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>3.00000</td>
<td>.94281</td>
<td>.29814</td>
</tr>
<tr>
<td>VASPRE – VASPOST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>2.70000</td>
<td>.94868</td>
<td>.30000</td>
</tr>
</tbody>
</table>
Table showing the pre and post value of Roland Morris questionnaire and VAS.

**DISCUSSION**

The recent study was done to compare the effect of Mckenzie technique and IFT in low back pain.

The analysis was done by calculating the mean of the pre and post values of Roland Morris Questionnaire and VAS.

According to the analysis there is a significant effect of Mckenzie technique and interferential therapy (IFT) in low back pain after the treatment duration of 20 days.

According to the result, this is seen that there is a reduction in the post values of scoring of Roland Morris Questionnaire and VAS used for pain.

**CONCLUSION**

The recent study shows that there is a significant effect of Mckenzie technique and IFT in low back pain and there is a reduction in the scoring of rolland morris questionnaire and VAS pain scale.

**Limitation of Study**

1. Small sample size.

2. Duration of the study was short.

**Future Study**

1. Large sample size

2. Duration of the study can be lengthened.

**Acknowledgement:** Nil

**Ethical Clearance:** Research work has been approved by the research committee of College of Applied Education and Health Sciences.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**REFERENCES**

Effects of Modified Constrained Induced Movement Therapy & Hand Arm Bimanual Induced Therapy in Upper Limb Rehabilitation of Sub-Acute Stroke Patients in Indian Population

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¹Assistant Professor, Career College, Bhopal

ABSTRACT

Objective: This study is aimed at determining the effect of mCIMT & HABIT in improving the upper limb functions in the sub-acute stroke patients & finding out which has the better effect.

Study Design: Experimental. Subjects: 40 patients (age group between 30-60 years) having stroke involving left MCA were selected as per the inclusion and exclusion criteria. Method: Using the random sampling method, the 40 subjects were divided into 2 equal groups. Both the groups were given conventional physical therapy as a baseline treatment. Along with the conventional therapy the group A received mCIMT for 30 minutes daily after the treatment session whereas group B received the HABIT. The study was performed for six weeks. Evaluation was done before starting of the treatment and then after every two weeks. Outcomes were evaluated using the Action Research Arm Test and the upper extremity section of the Fugl-Meyer Scale. Result: final assessment done post completion of the treatment showed that there was significant improvement in the hand arm functions of both the groups, when compared, Group A patients showed better result than that of Group B patients, (t=5.3588; p < 0.001). Conclusion: The results support the efficacy of programs incorporating conservational treatment + mCIMT for rehabilitating affected arm motor function in patients with sub-acute stroke. These changes are clinically significant.

Keywords: Stroke, Modified Constrain Induced Movement Therapy, Bimanual Therapy, Hand function.

INTRODUCTION

Stroke is the leading cause of disability in the world, with an estimated incidence of 114 to 350 cases per 100,000 persons and a prevalence of 1.5% to 3% in different countries.¹ Both acute treatment and rehabilitation of stroke have improved considerably during the last decades. Early treatment, such as thrombolysis in ischemic stroke within a few hours post onset prevents many patients from experiencing lasting symptoms, but a substantial number of stroke survivors still have to live with long-term impairments.² These impairments comprise a broad array of physical, cognitive and emotional difficulties that impact on personal, social and occupational areas and quality of life. Therapist’s main goal is to attempt maximum recovery of the patient.

Recovery can be described as regaining or approaching former possible capabilities and the term can be further subdivided into restitution and compensation.¹ Restitution means resumption of a pre-stroke state with the original body structures, which is rare after stroke, but can occur when small infarcts leave enough functionally intact tissue, or when function was only compromised by oedema.¹

One of the most debilitating condition a stroke patient suffers is Upper extremity motor deficits.
It is the main area of concern because more than half of patients continue to have upper extremity dysfunction at six months after onset \(^1\). There is a strong relationship between upper extremity function and ability to perform activities of daily living, social and recreational activities\(^3\). This unsuccessful use of affected upper extremity lead to learn nonuse phenomenon in which patients habitually rely on their unaffected upper extremity to accomplish their activity of daily living\(^5\). Keeping this in mind Knapp et al 1958, 1963, Taub 1970 - 1977 carried out an experimental study on monkeys, who stopped using the affected upper extremity immediately after underwent surgical severance of the afferent nerves transferring somatic sensation in one forelimb and never spontaneously resumed its use.\(^{1,2}\) This gave birth to the Constrained Induced Movement Therapy. The effects of CIMT on humans, involve both\(^{1,2}\): -

1) Motor restriction of the unaffected upper extremity.

2) Training of the affected extremity. Taub’s original protocol have been defined as Constrained Induced Movement Therapy. Protocols in which

1) the duration of treatment

2) the amount of therapy

3) the constraint regimen differs from that described by Taub are referred to as Modified Constrained Induced Movement Therapy (mCIMT).

Modified Constraint Induced Movement Therapy is a form of active rehabilitation therapy that enhances use of affected upper extremity function in stroke and other central nervous system damage victims.\(^6\) An alternating treatment that is gaining increasing attention is Hand Arm Bimanual Intensive Therapy (HABIT) which employs the repetitive practice of symmetrical bilateral movement to improve motor performance of affected upper extremity.\(^8,9\).

Bimanual or bilateral arm training is a generic term, which comprises different approaches from simple repetitive movements to advanced task-related training. McCombe Waller et al. (2008) suggested that training of the hemiplegic arm should include a certain amount of bimanual tasks, since activities of daily living usually involve the coordinated use of both hands. The movement time of the non-paretic hand is prolonged in bimanual tasks, which gives the impression that the paretic upper extremity inhibits the non-paretic upper extremity.\(^2\)

It remains unclear whether HABIT could be an alternative program through which to overcome the phenomenon of learned non use\(^{10}\).

Thus, in this research study we are attempting to compare the two forms of treatment & study their outcomes on the basis of which it will be clear that which type of treatment should be given to the patients suffering from hemiplegia.

3. Aim/Objective of the Study:

1) To find out the effectiveness of Modified mCIMT on arm functions in hemiplegics.

2) To find out the effectiveness of HABIT on arm functions in the hemiplegics.

3) To compare the effects & find out the outcome measures between the two.

4. Materials Required:

1) Peg board

2) Glass

3) Water jar

4) Table

5) Bottle

6) Ball

Sample Size:

Total Sample size – 40

Group A - 20

Group B - 20

Method of Collection of Data

Study Design – Randomized Control Trial.

Sampling Design – Simple Random sampling method was used to divide the patients in two groups.

METHODOLOGY

Study Setting: Career Institute of medical sciences, Bhopal & Peoples’ General Hospital, Bhanpur, Bhopal

Study duration: The study was carried out for the duration of 6 months.
Protocol duration: - The protocol for both the groups lasted for 6 weeks.

**Inclusion Criteria:**

1. Embolic or Ischemic Stroke experienced within past 12 months but not less than 4 weeks before study enrollment.
2. Patient having 20 degree of wrist extension and 10 degree of metacarpophalangeal and interphalangeal joint extension in the affected upper extremity.
3. Age limit 30-60 years.
4. Mini Mental State Examination score 24 or more.
5. Patient should be able to stand for two minute with or without support.
6. Modified Ashworth Scale two or less than two in affected upper extremity.
7. Patient suffering from middle cerebral artery.
8. Patient suffering from left hemiparesis.

**Exclusion Criteria:**

1. Patient having any orthopedic problem in affected upper extremity.
2. Patient having pain in affected upper extremity of more than 3 on Visual Analog Scale.
3. Patient having any perceptual and visual-spatial disorders.
4. Patients having cognitive or sensory deficit (Modified mini mental status test & sensory examination).
5. Spasticity scoring more than 2 on MAS.

**SUBJECTS**

40 subjects of the age group between 30 to 60 years were taken for the study. The subjects who met the inclusion criteria were included in the study. Permission for the study was taken from the Career Institutional Ethical Review Board. An informed & written consent was taken from the patients, where the patient agreed to participate in the study & the data was collected from the patient by using evaluation tools.

**TECHNIQUE**

For the 6 months study, 40 patients diagnosed having stroke affecting the MCA territory were selected according to the neurological assessment, physical assessment, reports from the neurologists & inclusion / exclusion criteria. Neurological evaluation includes the vital signs & higher functional ability evaluation & MRC grading.

The participants were divided into two groups, group A & B using Systemic Random Sampling method. Subjects of both the group received conventional physical therapy including icing, superficial stroking, brushing, stretching, PNF techniques, strengthening exercises, active exercise, ADLs, Balance, & gait training as the baseline treatment.

After the conventional treatment, patients were made to relax, then, both the groups were given further treatment. Group A was given mCIMT & Group B was given HABIT.

All activities will be started with simple task & with less repetition & will be progressed by making same or different tasks challenging & increasing number of repetitions. Group A subjects will perform the activities with the affected limb only while Group B subjects will use both the limbs simultaneously.

**Exercises given to patients:** -

1) To move an object (glass, peg, bottle) up from the table at least in front of chest.
2) To pick an object up from table at least in front of chest, then moving it right and left.
3) Transferring an object from one shelf to another.
4) Taking an object form table bringing to mouth and placing it back on table.
5) Throw a ball and if possible to catch it.
6) Pouring water in glass from jar.
7) Reaching for an object grasping it & releasing it.
8) Separating the similar looking objects based on their color/shape/size.
9) Arranging object in slot /line.
10) Placing peg on peg board.

Pre and post treatment values were taken
1. Fugl Meyer Assessment: – Upper Extremity Score: - one outcome measure was the 66 – point, upper extremity section of the Fugl-Meyer Assessment of upper extremity score by using a 3-point ordinal scale (0= cannot perform, 1= can perform partially, 2= can perform fully). FM has been used extensively in studies measuring functional recovery in stroke patients, & is highly recommended for “use in clinical trials designed to evaluate changes in motor impairment following stroke.

2. Action Research Arm Test: - is a 19 – item test divided into 4 categories (grasp, grip, pinch, & gross movement) with each item graded on a 4 – point ordinal scale (0=can perform no part of the test, 1=performs test partially, 2= completes test but takes abnormally long time or has great difficulty, 3=performs test normally) for a total possible score of 57. The test is hierarchical in that if the patient is able to perform the most difficult skill in each category, they will be able to perform the other items within the category & thus, they need not be tested.

**Statistical analysis:** - Collected data analysis will be done by mean and standard deviation and by SPSS repeated measures.

**RESULTS**

**Intra group comparison**

**TABLE: 1: Comparison of ARAT Scores: Group A- Modified CIMT + Conventional therapy**

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Schedule of assessment</th>
<th>Number of subjects</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action reach arm test</td>
<td>Pre test</td>
<td>20</td>
<td>27</td>
<td>4.66</td>
<td>-5.538</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Post test</td>
<td>20</td>
<td>33</td>
<td>4.23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE: 2: Comparison of FMS Scores: Group A- Modified CIMT + Conventional therapy**

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Schedule of assessment</th>
<th>Number of subjects</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fugl-Myer Scale</td>
<td>Pre test</td>
<td>20</td>
<td>30.65</td>
<td>3.66</td>
<td>-6.264</td>
<td>.0000</td>
</tr>
<tr>
<td></td>
<td>Post test</td>
<td>20</td>
<td>36.10</td>
<td>4.74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE: 3 Comparison of ARAT Scores: Group B- HABIT + Conventional therapy**

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Schedule of assessment</th>
<th>Number of subjects</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action reach arm test</td>
<td>Pre test</td>
<td>20</td>
<td>26.45</td>
<td>4.33</td>
<td>2.477</td>
<td>0.023</td>
</tr>
<tr>
<td></td>
<td>Post test</td>
<td>20</td>
<td>28.95</td>
<td>3.77</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE: 4: Comparison of FMS Scores: Group B- HABIT + Conventional therapy**

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Schedule of assessment</th>
<th>Number of subjects</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fugl-Myer Scale</td>
<td>Pre test</td>
<td>20</td>
<td>29.85</td>
<td>3.49</td>
<td>6.092</td>
<td>.000</td>
</tr>
</tbody>
</table>
Table 5: Comparison between the two groups on Action Reach Arm Test: using independent t-test

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Schedule of assessment</th>
<th>Number of subjects</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Test comparison</td>
<td>CIMT Pre test</td>
<td>20</td>
<td>27</td>
<td>4.66</td>
<td>1.4204</td>
<td>&gt; 0.1</td>
</tr>
<tr>
<td></td>
<td>Bimanual Pre test</td>
<td>20</td>
<td>26.45</td>
<td>4.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post test comparison</td>
<td>CIMT Post Test</td>
<td>20</td>
<td>33</td>
<td>4.23</td>
<td>5.3588</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>Bimanual Post Test</td>
<td>20</td>
<td>28.95</td>
<td>3.77</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comparison between the two groups on Fugl-Myer Scale: using independent t-test

**DISCUSSION**

This study evaluated the effectiveness of Constraint Induced Movement Therapy & Hand Arm Bimanual Intensive therapy along with conventional therapy, in improving arm functions of sub-acute stroke patients.

In the 6 week study, 40 patients with stroke involving Middle Cerebral Artery of the left side were selected according to the selection criteria. Using the random sampling method, subjects were divided into 2 groups – Group A & Group B with 20 subjects in each group. Both the groups received conventional treatment as the baseline treatment, along with this Group A received mCIMT & Group B was given HABIT for the facilitation of their affected upper limb movements. Assessment was done before commencement of treatment & then on the final day. Action Research Arm Test & Fugl Meyer scale for upper limb function were used as outcome measures of assessment.

Our intervention targets the wrist & fingers, so in that regards the Activity Arm Research test may be the most suitable instrument for measuring change, as it is most sensitive to subtle change in wrist & fingers. The Fugl – Mayer is adequate for measuring changes in patients with less motor return, who were primarily capable of gross movements, whereas only three items of Action Research Arm test gross function.

In this study, the pretreatment values of Activity Arm Research Test & Fugl-Meyer scale have shown that there was no significant difference between both the groups. Due to the homogenous nature of the basal values, the post treatment scores were comparable.

The result of the final assessment done after completion of the treatment showed that there was significant improvement in the hand arm functions of both the groups, when compared, Group A patients showed better result than that of Group B patients (t=5.3588; p< 0.001). Intra group evaluation was also done to check the efficacy of the treatment regimes. A gradual improvement was seen throughout the treatment session, the pre & the post treatment scores of the Activity Arm Research test & Fugl Meyer scale showed a significant improvement in the function, with more improvement observed in Group A.

Subjects participating in a regimen combining conservational treatment + Modified Constraint Induce Movement Therapy showed significant increase in the affected arm functions measured by the Fugl – Meyer scale, & large increase in movements as measured by Activity Arm Research Test. In both the cases, Group A subjects showed significant changes at the p=0.001 level. These motor changes transferred to new ability to perform valued activities that the subjects had not performed until now, such as reaching for a cup, drinking water with a glass, etc.

Frequent practice of mCIMT when combined
with conventional treatment has shown to be even more effective in improving motor performance than conservational treatment combined with HABIT.

**CONCLUSION**

-mCIMT when combined with the conventional treatment gives better results than HABIT.

**Conflict of Interest:** This manuscript has not been published. We have no conflicts of interest to disclose.

**Source of Funding:-** Self – The study was not funded by any institution or organization. It’s a self-funded study.

**Acknowledgement:** I show my gratitude to all the subjects who participated in the study.

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Influence of Hand Dominance on Motor Performance and Hand Digit Mapping in Indian Population

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¹Post graduate Student, ²Assistant Professor, Amity Institute of Physiotherapy, Amity University, Noida

ABSTRACT

Background and Objectives: Handedness is an attribute of human beings defined by their unequal distribution of fine motor skill between the left and right hands. The preference for the right or left hand has been correlated with the laterality, cerebral dominance and asymmetries in the brain. Various studies have investigated the relationship between hand preference for different activities, and varied results have been obtained. The results also varied with the different cultural backgrounds, establishing a need to investigate it further.

Method and Materials: A total of 150 participants of age group 4 to 30 years took part in the study. The handedness was evaluated by Edinburgh Handedness Inventory, hand digit mapping was assessed by asking the subjects to count and performance was measured by pegboard task. The data was correlated with handedness.

Results: The Pearson correlation coefficient for handedness and difference in performance score of right handed and left handed for all 150 subjects was significant with P=0.05. The Pearson correlation coefficient for handedness, month counting and number counting was not significant for all 150 subjects.

Conclusion: A significant correlation was found between the right hand performance and handedness in Indian population whereas no correlation was found between handedness and hand digit mapping in Indian population.

Keywords: Hand preference, hand digit mapping, motor performance.

INTRODUCTION

Handedness refers to a consistent asymmetry in skill or preferential use between the hands for various unimanual activities¹, and is related to lateralization within the brain of other functions such as language⁵. Although several theories attempted to explain the origin and underlying mechanism of hand preference, naturally occurring regressive events in neurogenesis such as neuronal cell death and axonal elimination, may be the factor in the individual differences in brain morphology and in functional lateralization.³⁴ In 2007, researchers discovered LRRTM1 (Leucine-rich repeat transmembrane neuronal protein 1), the first gene linked to increased odds of being left-handed.⁵⁶.⁷ The prevalence of innate left handedness of human population is about 10%.⁸ Studies indicate that the prevalence of the left handedness is 4.6% in Orientals and 8.7% in Caucasians.⁹,¹⁰ The recent demographic data shows 8% prevalence of left handers in Indians.¹¹,¹². The brains of left handers are structured differently in a way that widens their range of abilities, and the genes that determine left-handedness also govern development of the language centers of the brain.¹³ Developmental and cross-cultural studies show that finger counting represents one of the basic number learning strategies.¹⁴,¹⁵,¹⁶ The environmental factors also have an impact on the asymmetric distribution of handedness. There is interference of cultural values with the expression of hand preference.¹⁷,¹⁸,¹⁹ Hand preferences have traditionally been measured using handedness inventories, quantifying hand preferences for the performance of a variety of
The literature also indicate that spatial accuracy tasks are learned better after initial practice with the non-dominant hand, whereas initial practice with the dominant hand is more efficient for maximum force production tasks. A limited number of studies in this domain have been done in Indian culture, indicating the need to assess the relationship between hand preference and digit mapping in Indian population.

MATERIALS & METHOD

A total of 150 subjects were included who were further divided into 3 age groups; group 1 included the age range of 4 – 9 yrs (children), the group 2 included the age range of 10 - 19 yrs (adolescent), and the group 3 included the age range of 20 - 30 yrs (adults). Individual screened out for any type of cognitive deficits, those who had scores less than 24 on mini mental state examination for adults and children who scores below 14 on modified mini mental state examination, subjects who had any orthopedic problem or pain in the upper extremity, those with any neurological disease and with any sensory deficit in hands, subjects with weak musculature of upper extremities were excluded. The informed consent was obtained of all adult participants and child participant’s parents. The experiment consisted of a hand preference questionnaire, a finger counting task, a month counting task, and a hand performance task, which were performed by the subject in front of the examinator in a random order.

For the finger counting task, the subjects were seated in a chair with both the hand free and resting on a table. The subjects were then asked to ‘count from one to ten with their fingers’, without indications concerning which hand to be used first. Next was the month counting task where subjects were asked to count the names of 12 months on their hands, without any indications concerning the hands to be used and the pattern of finger digit or hand digit mapping used was noted.

The subjects then completed an eight item questionnaire adapted from the Edinburgh Handedness Inventory (Oldfield, 1971), for which they were asked to indicate their preferred hand for eight bimanual tasks. For young children, it was first ensured that they understood the question and they knew each action and objects listed in the questionnaire. The participants were tested for the pegboard task by using an Annet pegboard. The pegboard was 32 by 18 cm with two rows of 10 holes drilled along each length. Each hole was approximately 1.2 cm in diameter, and the two rows were 15 cm apart. Ten pegs, 7.0 cm in length and 1.0 cm in width, were positioned along one length of the board. The pegboard was placed in front of the subjects in such away that the rows with pegs are farthest from them. The subjects were given command to move all the 10 pegs from the filled row to the empty row. Participants completed two trails with each hand in a randomized order, and the time was noted using a stopwatch without the knowledge of the subject. The hand preference of the subject was recorded.

The motor performance task was done on the very next day of the preference test, measuring the
time each hand needed to move pegs from one row of holes to another. The subjects had to shift the pegs one by one to the corresponding opposite hole as fast as possible. The command given to the patient was ‘move the pegs from one row to the other as fast as you can’. Each hand was tested twice alternatively and the time duration was noted using a stop watch, for the motor performance. The whole procedure took approximately 30 to 40 minutes to administer. Once the data was obtained it was recorded for further statistical analysis.

**DATA ANALYSIS**

Pearson’s correlation coefficient was used to assess the relationship between handedness and difference in motor performance and handedness and hand digit mapping. The statistical package for social sciences was used for analysis of data.

**RESULTS**

**TABLE 1: Pearson correlation value for handedness**

<table>
<thead>
<tr>
<th></th>
<th>HANDEDNESS</th>
<th>DIFFR</th>
<th>DIFFL</th>
</tr>
</thead>
<tbody>
<tr>
<td>HANDEDNESS</td>
<td>1.000</td>
<td>-.180</td>
<td>-.160</td>
</tr>
<tr>
<td>Sig. (2 –tailed)</td>
<td>.</td>
<td>.028</td>
<td>.050</td>
</tr>
<tr>
<td>N</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>DIFFR</td>
<td>-.180</td>
<td>1.000</td>
<td>.637</td>
</tr>
<tr>
<td>Sig. (2 –tailed)</td>
<td>.028</td>
<td>.</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>DIFFL</td>
<td>-.160</td>
<td>.637</td>
<td>1.000</td>
</tr>
<tr>
<td>Sig. (2 –tailed)</td>
<td>.050</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>N</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
</tbody>
</table>

The result found was significant at 0.05 level for handedness and difference in score of right hand (DIFFR) whereas no correlation was found between handedness and difference in left hand score (DIFFL).

**TABLE 2: handedness and different tasks**

<table>
<thead>
<tr>
<th></th>
<th>HANDEDNESS</th>
<th>MONTH</th>
<th>COUNTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>HANDEDNESS</td>
<td>1.000</td>
<td>-.117</td>
<td>.062</td>
</tr>
<tr>
<td>Sig. (2 –tailed)</td>
<td>.</td>
<td>.154</td>
<td>.449</td>
</tr>
<tr>
<td>N</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>MONTH</td>
<td>-.117</td>
<td>1.000</td>
<td>.677</td>
</tr>
<tr>
<td>Sig. (2 –tailed)</td>
<td>.154</td>
<td>.</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>COUNTING</td>
<td>.062</td>
<td>.677</td>
<td>1.000</td>
</tr>
<tr>
<td>Sig. (2 –tailed)</td>
<td>.449</td>
<td>.000</td>
<td>.</td>
</tr>
<tr>
<td>N</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
</tbody>
</table>

The result found was not significant for correlation between handedness, month counting and number counting however there was a significant correlation of 0.01 level between month counting and number counting.

![Fig 3. Significance value of month counting and number counting in relation to handedness.](image)
TABLE 3: Different patterns of counting

<table>
<thead>
<tr>
<th></th>
<th>Little finger first</th>
<th>Index finger first</th>
<th>Thumb first</th>
<th>On finger tips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Month counting</td>
<td>92</td>
<td>48</td>
<td>6</td>
<td>80</td>
</tr>
<tr>
<td>N=146</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number counting</td>
<td>92</td>
<td>52</td>
<td>6</td>
<td>90</td>
</tr>
<tr>
<td>N=150</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Out of 150 subjects 54% (n=81) started counting 1-5 from the right hand and 6-10 on the left hand. 61.3% (n=92) initiated counting 1-10 from the little finger, 34.6% (n=52) subjects started with the index finger and only 4% (n=6) begin with the thumb. 60% (n=90) of the total subjects counted 1-10 on their finger tips using opposition, while only 40% did it by dividing the finger into three parts. All but 12 subjects were verbally speaking while counting.

DISCUSSION

The present study suggests that there is a significant correlation between handedness and difference in the performance score of right hand whereas no such correlation exits between the handedness and difference in performance of left hand. This is consistent with the results of Eric A. Roy in which performance with the preferred right was found overall to be superior and W.J. Triggs who suggests that preference is strongly related to hand asymmetries in task performance whereas the results of the present study are contradictory to the results of Kumar Sameer which suggested discordance between the preference and performance measures of handedness in self classified right handed subjects. The difference in the results could be due to the different performance measures. Geschwind and Levitsky (1968) first reported that the planum temporale was larger on the left in 65% of brains, and changes away from asymmetry of planum temporale involved increase in the size of the smaller side, rather than decrease in the size of larger. Annett (1992) suggested that asymmetry of hand skill shows a parallel with the relationship between planum temporale asymmetry and planum temporale size, indicating that asymmetry was associated with relative reduction on one side. Based on this Annett and Kilshaw (1983) suggested that the specialization of cerebral function associated with a typical human bias to the left hemisphere and right hand might be due to a right hemisphere handicap rather than to a left hemisphere advantage. Those who lack the typical bias, expected to be more frequent among left handers than any other hand preference group, would escape this handicap to motor performance. Annett (1985) has proposed that the normally distributed continuous differences in the strength and skill of the right and left hands are the result of numerous small accidental influences on the development of the two sides of the body (e.g. larger muscles, more efficient neuromuscular coordination). Annett has hypothesized that an underlying genetic influence is superimposed on this distribution of manual differences and thus producing a systematic bias towards increased strength and skill on the right side of the body (the Right Shift). According to hypothesis of Annett no such systematic bias favoring the development of strength and skill on the left side exits. The findings of the present study provide support for the existence of an underlying bias favoring the development of the right hand in right handers and the absence of such a bias favoring the left hand in left hander. In right handers the difference in the performance scores of left hand and right hand are correlated to each other suggesting that right handed subjects were equally good in performance with both the hands. In left handed as well as in ambidextrous subjects no such correlation was found between the difference of the performance score of left hand and right hand. One possible reason behind the result is that the number of the left handers and ambidextrous is comparatively low than right handed subjects. No significant correlation was found between handedness and hand digit mapping (assessed by month counting and finger counting), which suggest that a subject can use either left-to-right hand digit mapping or right- to-left hand for digit mapping irrespective of his hand preference. However a correlation between month naming and number counting exits suggesting use of similar pattern of hand digit mapping for two different given tasks. This is true for right handed and left handed
subjects whereas ambidextrous subjects show varying hand digit mapping for two different tasks. It has been noticed that greater number of subjects used their right hand to count from 1-5 and then move onto the left hand for counting 6-10. A SNARC- incongruent effect was found in the present study showing small digits (e.g.1, 2) associated with the right hand and large digits (e.g. 7, 9) with the left hand. The SNARC effect is not observed in all participants, which could be explained by the hypothesis that those who do not exhibit the SNARC effect have either no preferred left or right starting hand for finger counting or no specific finger-counting strategy at all. The association of the hand digit mapping in two different task i.e. month counting and number counting can be attributed to the frequent use of similar strategy used for hand digit mapping or learned hand digit mapping. The result of the present study favors the performance of the right handers. Therefore further studies can be conducted with larger sample size. The effect of age can be seen on the hand preference and motor performance as the hand preferences changes from childhood to adolescence.

CONCLUSION

The study demonstrates the bias of right hand and suggests that right hand performance is dependent on the handedness, where as no such dependence is seen in the left hand performance. No relation between the hand digit mapping and handedness is observed.

Acknowledgement - Nil
Conflict of Interest - Nil
Source of Funding - Self
Ethical Clearance – Approved by Ethical Committee

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A Comparative Study on the Efficacy of Maitland’s Mobilization and Muscle Energy Technique on Frozen Shoulder

Arvind Kumar
Principal, Shri USB College of Physiotherapy, Abu Road, Rajasthan

ABSTRACT

Objective: Muscle Energy Technique can be an effective alternative to Maitland’s Mobilization to treat pain in frozen shoulder patient. Muscle energy technique may also be used to decrease functional disability in the patients in whom mobilization is contraindicated.

Results: Maitland’s Mobilization is more effective in improving range of motion and decreasing functional disability in patients with frozen shoulder as compared to Muscle Energy Technique.

Conclusion: Muscle energy technique may also be used to decrease functional disability in the patients in whom mobilization is contraindicated.

Keywords: Maitland’s Mobilization, Frozen shoulder, Muscle Energy Technique, Mobilization.

INTRODUCTION

Patients with diagnosis of frozen shoulder are commonly seen in physiotherapy department. The condition was first recognized as being distinct from glenohumeral arthritis at least as early as 1872 by Duplay. Codman introduced the term “frozen shoulder” in 1934 to describe patient who had a painful loss of shoulder motion with normal radiographic studies, describing the presentation as a slow onset of shoulder pain, an inability to sleep on the affected side, restricted glenohumeral elevation and external rotation.

The term “frozen shoulder”, theorizing that this pathology results from thickening and eventual contracture of the glenohumeral capsule. Over the years the frozen shoulder has had many different names, including shoulder periarthritis, adherent subacromial bursitis and frozen shoulder. Currently adhesive capsulitis and frozen shoulder are the preferred term and may be used interchangeably.

Approximately 2-3% of adult aged between 40 and 65 years developed adhesive capsulitis with greater occurrence in women. The exact cause is not known. The autoimmune theory has been proposed, but conclusive evidence has not been found yet. There is higher than normal association between frozen shoulder and diabetes mellitus.

REVIEW OF LITERATURE

Ekelund and Rydall (1992) compared the outcomes of patients treated with distension arthrography, local anesthetic and manipulation followed by physical therapy. At four to six week follow up, 91% of the subject who had undergone this combination of treatment reported complete or partial relief of pain and 82% exhibited normal active range of motion or near normal active range of motion.

Waldberg et al (1992) reported that physical therapy combined with subcutaneous calcitonin injections, performed daily for 21 days, resulted in significantly greater pain reduction compared to physical therapy alone. Both group received identical physical therapy including active mobilization with...
electro-analgesia and cryotherapy. However there was no significant difference in the time to functional recovery between the two groups.  

Mao et al (1997) reported statistically significant improvement in glenohumeral active range of motion and reappearance of the axillary recess (via arthrography) in subjects managed with 12 to 18 sessions of physical therapy including moist heat, ultrasound, passive joint mobilization flexibility and strengthening exercises.

Placzek J D et al (1998) studied the long term effect of glenohumeral joint translation (gliding) manipulation on range of motion, pain and functions in patients with frozen shoulder. Thirty-one patients underwent brachial plexus block followed by translation manipulation of glenohumeral joint. Changes in the range of motion and pain were assessed before manipulation with the patient under anesthesia, immediately after manipulation with the patient still under anesthesia, at early follow up (5.3±3.2 weeks) and to long term follow up (14.4±7.3 months). Passive range of motion increased significantly for flexion, abduction, external rotation and internal rotation. Significant decrease in visual analog pain score between initial evaluation and the follow up assessment also occurred.

**MATERIAL & METHOD**

A quasi-experimental approach was followed with two experimental groups or comparison, using before and after treatment scores. A total number of 30 patients are selected, male and female patient between age group 40 – 65 years were selected. A total duration of the study is one month. The duration of programmed for each subject is four week’s once a day, for six days a week. The selection of sample is based on purposive sampling. The subjects diagnosed as frozen shoulder by Orthopaedician and who showed a capsular pattern of restriction were requested to participate in the study. The purpose of the study was explained to all the subjects and all volunteered to take part in the study. An informed consent was taken from each subject. All subjects were assessed using specific perform. All subjects were assigned randomly, following random number table to either Maitland’s mobilization group (Group-A) or Muscle Energy Technique group (Group- B). The total no of subjects in the study were, N=30 in the age group of 40-65 years with variable duration of pain (3 to 8 months). The total number of subjects in group A, n = 15 with mean age of 55.60 years and SD 6.80 with mean duration of pain 5.6 months and SD 1.11 were taken. The total number of subjects in group B, n = 15 with mean age of 53.93 years and SD 7.32 with mean duration of pain 5.4 months and SD 1.76 were taken.

There were six male and nine female patient’s in group A and nine male and six female patients in group B. Material Used: Treatment couch, Short wave Diathermy, Goniometer, Shoulder pain & disability index etc. 1) Goniometer 2) Shoulder pain and disability index 3) Pain Scale 4) Disability scale. Both group patients were given SWD before starting the treatment.

**Group A** patients were given Maitland’s mobilization technique of suitable grades for 24 sitting in 4 weeks. Group B patients were given muscle energy techniques for 24 sitting in 4 weeks. 3-5 muscle contractions with 5-7 seconds each contraction (not more than 20% of total muscle strength) for three repetitions. The patients attended physical therapy session daily i.e 6 days in a week. Maitland’s mobilization: Therapist stands / kneels alongside of the patient’s right elbow.

Therapist flexes the patients elbow and holds his wrist in right hand gently, and then places the fingers of his left hand over the patients upper arm anteriorly with the lateral border of the proximal phalanx of the index finger against the anterior surface of the proximal end of the patients forearm and thumb against the lateral surface of the elbow. Patient’s right upper arm is lifted fractionally off the couch.

**DISCUSSION**

Using statistical methods for data analysis, the results obtained are as follows. To study the effect of Maitland’s mobilization in patients with frozen shoulder, the ROM and SPADI score were compared before and after treatment. The results are given in the table IA.
<table>
<thead>
<tr>
<th>Sl no.</th>
<th>Variables</th>
<th>Pre treatment</th>
<th>Post treatment</th>
<th>t ((t_{tab}^{14} = 2.15))</th>
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<tr>
<td></td>
<td></td>
<td>Mean</td>
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<td>Mean</td>
</tr>
<tr>
<td>01</td>
<td>External Rotation</td>
<td>19.00</td>
<td>12.13</td>
<td>44.00</td>
</tr>
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<td>Abduction</td>
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<td>16.34</td>
<td>110.00</td>
</tr>
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<td>Flexion</td>
<td>92.33</td>
<td>14.74</td>
<td>127.33</td>
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<tr>
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<td>71.53</td>
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<tr>
<td>06</td>
<td>Total SPADI Score</td>
<td>69.26</td>
<td>12.09</td>
<td>23.53</td>
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</tbody>
</table>

Using paired t test, it was found that results were significant at \(P<0.05\). This suggests that there is a significant increase in the range of motion and decrease in the pain and disability after treatment. To study the effect of Muscle Energy Techniques in patients with frozen shoulder, the ROM and SPADI score were compared before and after 20 days of treatment. The results are given in the table 2.

<table>
<thead>
<tr>
<th>Sl no.</th>
<th>Variables</th>
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<td>Mean</td>
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</tr>
<tr>
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<td>Total Pain Score</td>
<td>74.13</td>
<td>09.96</td>
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<tr>
<td>05</td>
<td>Total Disability Score</td>
<td>65.72</td>
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<tr>
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<td>Total SPADI Score</td>
<td>69.04</td>
<td>11.80</td>
<td>31.14</td>
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</table>

Using paired t test, it was found that results were significant at \(P<0.05\). This suggests that there is a significant increase in the range of motion and decrease in the pain and disability after treatment.

TABLE 3: The comparison of Maitlands Mobilization and Muscle Energy Techniques is made on the measures of ROM and SPADI scores. A pretreatment comparison is given in the table 3.

<table>
<thead>
<tr>
<th>Sl no.</th>
<th>Variables</th>
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<td>External Rotation</td>
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<td>12.33</td>
<td>16.00</td>
</tr>
<tr>
<td>02</td>
<td>Abduction</td>
<td>77.00</td>
<td>16.34</td>
<td>81.00</td>
</tr>
<tr>
<td>03</td>
<td>Flexion</td>
<td>92.33</td>
<td>14.74</td>
<td>91.66</td>
</tr>
<tr>
<td>04</td>
<td>Total Pain Score</td>
<td>71.53</td>
<td>09.61</td>
<td>74.13</td>
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<tr>
<td>05</td>
<td>Total Disability Score</td>
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<tr>
<td>06</td>
<td>Total SPADI Score</td>
<td>69.26</td>
<td>12.09</td>
<td>69.04</td>
</tr>
</tbody>
</table>
Using unpaired t test, it was found that these results do not indicate significant difference. It suggests that there is no significant difference in pre treatment scores of two groups (samples are Homogeneous).

A comparison of post treatment measures as indicated in table 4 suggest significant difference between the measures of the two groups. The range of motion is much higher in Maitlands Mobilization for all types of movement assessed except for flexion. Similarly the disability measures in Maitlands mobilization group is much less as compared to and Muscle Energy Technique group.

**TABLE : 4 Mean, SD, and t values for comparison of Maitlands mobilization and MET groups on Post treatment scores.**

<table>
<thead>
<tr>
<th>Sl no.</th>
<th>Variables</th>
<th>Maitlands Mobilization</th>
<th>Muscle Energy Technique</th>
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<tr>
<td></td>
<td></td>
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<td>External Rotation</td>
<td>44.00</td>
<td>09.67</td>
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</tr>
<tr>
<td>02</td>
<td>Abduction</td>
<td>110.00</td>
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<tr>
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<td>118.33</td>
</tr>
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<td>05</td>
<td>Total Disability Score</td>
<td>22.11</td>
<td>06.74</td>
<td>34.13</td>
</tr>
<tr>
<td>06</td>
<td>Total SPADI Score</td>
<td>23.53</td>
<td>06.96</td>
<td>31.14</td>
</tr>
</tbody>
</table>

Using unpaired t test, it was found that results were significant at P<0.05. This suggests that there is a significant difference in the post treatment scores of both groups.

To examine the relative efficacy of the two treatment techniques the mean gain of various measures were compared as given in the table 5.

The improvement in the ROM and decrease in disability noticed with Maitlands Mobilization group is significantly higher than the improvement noticed with Muscle Energy Technique group.

**TABLE : 5 Mean of gain scores and SD of gain scores for two treatments and t value for significance of difference.**

<table>
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<tr>
<th>Sl no.</th>
<th>Variables</th>
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<th>Muscle Energy Technique</th>
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<td></td>
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<td>Flexion</td>
<td>35.00</td>
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<td>05</td>
<td>Total Pain Score</td>
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<td>Total SPADI Score</td>
<td>45.73</td>
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</table>
Using unpaired t test, it was found that results were significant at \( P<0.05 \). This suggests that there is a significant difference in the gain scores of both groups (Except total pain score for which ‘t’ value is found to be nonsignificant)

**CONCLUSION**

Patients with frozen shoulder largely benefit from manual therapy treatment techniques.

Maitland’s Mobilization is more effective in improving range of motion and decreasing functional disability in patients with frozen shoulder as compared to Muscle Energy Technique.

Muscle Energy Technique can be an effective alternative to Maitland’s Mobilization to treat pain in frozen shoulder patient. Muscle energy technique may also be used to decrease functional disability in the patients in whom mobilization is contraindicated.

**Acknowledgement:** I express my sincere thanks to subjects who participated and gave their full cooperation.

**Conflict of Interest:** None

**Source of Support:** None

**Ethical Clearance:** The article has been approved by ethical and approval committee constituted for physiotherapy.

**REFERENCE**

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A Study to Compare the Efficacy of MFR along with Conventional Therapy v/s Conventional Therapy alone in the Management of Cervicogenic Headache

Surabhi Shrivastava¹, Namrata Srivastava², Sneha Joshi³
¹Physiotherapist, ²Assistant Professor, ³Assistant Professor,
Career Institute of Medical Science, Department of Physiotherapy, Bhopal

ABSTRACT

Objective: This study was conducted to compare the efficacy of MFR along with conventional therapy v/s conventional therapy alone in the management of cervicogenic headache.

Study Design: Experimental study design.

Subjects: 30 patients between the age group of 25-45 years having cervicogenic headache were selected as per the inclusion and exclusion criterion.

Procedure: In this study 30 subjects who met the inclusion criteria, were explained about the study protocol and after obtaining informed consent from them, they were randomized into two groups- control group and experimental group. Subjects in control group received only conventional therapy which included- moist pack for 10 minutes followed by stretching of the cervical muscles, and strengthening of deep cervical flexors. This was followed by postural correction.

Experimental group subjects received conventional therapy followed by MFR for 3 minutes. 6 weeks of training were given, 5 times a week. Headache severity, intensity were monitored before starting the treatment and then after 6 weeks. Outcomes measures were VAS and NDI.

Result: No preexisting group differences were found during the pretest evaluation. Subjects receiving MFR along with conventional therapy showed reduction in symptoms with an improvement in the quality of life.

Conclusion: The results indicate that MFR with conventional therapy is more effective than conventional therapy alone in the management of CGH.

Keyword: Cervicogenic headache (CGH), Myofascial Release (MFR).

INTRODUCTION

Cervicogenic headache is a syndrome characterized by chronic hemicranial pain that is referred to the head from either bony structures or soft tissues of the neck.¹

Almost any pathology affecting the cervical spine has been implicated in the genesis of CGH as a result of convergence of sensory input from the cervical structures within the spinal nucleus of the trigeminal nerve.²

Epidemiological researchers suggest a higher prevalence of headache in adults with neck pain.³ Females seem more predisposed to CGHs affecting 4 times as many women as men. Since CGHs commonly affect women, it is important to consider
menstruation and hormonal shifts as a contributor to headaches.\textsuperscript{11} CGHs are common in weight-lifting athletes.\textsuperscript{1, 14}

The cervical spine consists of 7 vertebrae, C1 to C7. First, second and seventh are atypical vertebrae while third to sixth is typical\textsuperscript{13} The muscles of the craniocervical region serve two primary roles: to hold the head upright against gravity and to infinitely position the head in space in order to optimally position the sensory organs. The muscle of the cervicothoracic region also serves two primary roles: again to position the head and neck in space and to stabilize the head and neck to allow and produce movement of the scapula.\textsuperscript{4}

The most common origin of pain is typically in the upper cervical joints, namely the occiput through C1 and C2 segments. Lower or middle segments can also produce cervicogenic headache.\textsuperscript{3}

Hilton described the concept of headaches originating from the cervical spine in 1860.\textsuperscript{6}

Cervicogenic headache was first introduced by Sjaastad et al in 1983. From 1983 to 1987, he and his colleagues conducted a series of studies dealing with cervicogenic headache, something described as a variant of the chronic paroxysmal headache. According to Sjaastad et al, CGH is diagnosed from three features: (1) unilateral headache triggered by head/ neck movements or postures; (2) unilateral headache triggered by pressure on the neck; (3) unilateral headache spreading to the neck and the homolateral shoulder/ arm.\textsuperscript{7}

Cervical headache is classically described as a unilateral headache (Sjaastad et al 1983) but it can be bilateral with often one side predominant (Jull 1986a; Watson & Trott 1993).\textsuperscript{8}

The intensity of cervical headache can be mild, moderate or severe. It is most commonly moderate.\textsuperscript{8} Pain is dull and non-throbbing in character\textsuperscript{9}. CGH may be present for days, weeks or even months.\textsuperscript{10} Heat can be applied in multiple ways ranging from in-clinic devices to home applications, with varying thermal properties that can influence physiological effects. Therapeutic applications may include superficial moist heat, shortwave diathermy, and infrared heat\textsuperscript{15}.

Stretching is a therapeutic maneuver designed to increase the extensibility of soft tissues, thereby improving flexibility by elongating structures that have adaptively shortened.\textsuperscript{16}

Strengthening exercise helps to improve strength, tone, endurance, improve function etc.\textsuperscript{17}

Postural correction- often by simply correcting the underlying postural stresses the primary symptoms can be minimized or even alleviated\textsuperscript{16}.

Myofascial Release is a safe, gentle, hands-on technique that works on the level of the fascia to open the restrictions\textsuperscript{12}. Physiological Effects of MFR includes- Increase blood/ lymph flow, increase flow of nutrients, removal of waste products/ metabolites, increase extensibility of tissues, increase joint ROM etc.

**METHODOLOGY**

**Study design**- Experimental design.

**Sample technique**: Simple random sampling method.

**Sample size**: 30 subjects were selected for study.

They were randomly divided into 2 groups; control group and experimental group with each group having 15 subjects.

**Study setting**- It was conducted in an outpatient setting in physiotherapy department of Career Institute of Medical Science BHEL, Bhopal (M.P).

**SAMPLING CRITERIA**

**Inclusion criteria**:

1) Male and females between the age group- 25 to 45 years.

2) Condition duration not more than 2 years.

3) Restriction in C0-C1, movements in front bending.

4) Restriction at the movements of C0-C7 in side bending.

5) Patient with forward head posture.

headache.

**Exclusion criteria:**
1) Migraine
2) Tension type headache,
3) External compression headache
4) Benign exertional headache.

**Variables-**

- **Independent variable**
  MFR

- **Dependent variable-**
  - Pain score on VAS
  - Neck Disability Index

**Study duration-**
6 months.

**Duration of protocol-**
The total duration of protocol was 6 weeks, 5 times weekly.

**Data collection procedure-**
Subjects who met the inclusion criteria, were randomized into two groups.

- **Control group-** Subjects received moist pack for 10 minutes followed by stretching of the upper trapezius, levator, scalenes, suboccipitals, pectoralis minor and pectoralis major and strengthening of deep cervical flexors. This was followed by postural correction.

- **Experimental group-** Subjects received conventional therapy followed by MFR for 3 minutes.

**METHOD OF APPLICATION OF TREATMENT**

A) **Moist pack-**
  Patient was placed in supine lying position on moist pack for 10 minutes.

B) **Postural correction-**
  - Axial extension (cervical retraction) to decrease a forward head posture-
  - Patient in sitting or standing position with arms relaxed at the side.
  - Lightly touch above the lip under the nose and ask patient to lift the head up and away.
  - Verbally reinforce the correct movement of tucking the chin in and straightening the spine, and draw attention to the way it feels.
  - Have the patient move to the extreme of the correct posture and then return to the midline.
  - Hold for 5 sec, repeat- 5times.

**B) Postural correction-**

  - Scapular retraction-
  - Patient in sitting or standing position.
  - Ask the patient to do retraction. Suggest patient imagine “holding a quarter between the shoulder blades”. The patient should not extent the shoulders or elevates the scapulae.
  - Hold for 5 sec, repeat- 5times.

C) **Stretching-**

  - To stretch the pectoralis major muscle-(manual stretch)

  Patient position: Sitting on treatment table, with the hand behind the neck.

  Kneel behind the patient and grasp the patient’s elbows.

  Hold the elbows at this end-point. No forceful stretch is needed against the elbows, because the rib
cage is elongating the proximal attachment of the pectoralis major muscles bilaterally.

Be sure the patient maintains the head and neck in the neutral position, not forward.

Repeat - three times, hold for 15 seconds.

• To stretch the pectoralis minor muscle-(manual stretch)

Patient position and procedure: Sitting, place one hand posterior on the scapula and the other hand anterior on the shoulder just above the coracoid process. As the patient breathes in, tip the scapula posteriorly by pressing up and back against the coracoid process while pressing downward against the inferior angle of the scapula; then hold it at the end-position while the patient breathes out.

• To stretch the upper trapezius muscle-

Patient in sitting position with the back in neutral position.

Stand behind the patient and place one hand over the top of shoulder on the side of tightness and other hand on the top of head.

Slightly rotate the head on the side of tightness and gently pull the head to the side so that the patient’s ear approaches the opposite shoulder.

Hold for 15 seconds, repeat- 3 times.

• To stretch levator scapulae-

Patient in sitting position with the back in neutral position.

Stand behind the patient and place one hand over the top of shoulder on the side of tightness and other hand on the top of head.

Turn the head opposite to the side of tightness and gently pull the head towards the chest wall.

Hold for 10-15 seconds, repeat- 3 times.

• To stretch Scalene Muscle-

Patient position and procedure: Sitting. The patient first performs axial extension (tucks the chin and straightens the neck) and then side-bends the neck opposite and rotates it toward the tight muscles.

Stand behind the patient and stabilize the shoulder with one hand on the side of tightness and stabilize the head with the other hand around the side of the patient’s head, holding the head against the trunk.

The patient inhales and exhales; stabilize the shoulder with a downward pressure as the patient inhales again. This is a gentle, hold–relax stretching maneuver.

Hold for 10-15 seconds, repeat- 3 times.

• To stretch Suboccipital Muscle-( Manual Stretching)

Patient position and procedure: Sitting. Identify the spinous process of the second cervical vertebra and stabilize it with your thumb.

Have the patient slowly nod, doing just a tipping motion of the head on the upper spine.

Guide the movement by placing the other hand across the patient’s forehead.

D) Strengthening of deep cervical flexors-

Isometric exercise- (Self resistance)

The intensity of the isometric exercise can be light to strong, depending on the patient’s symptoms.

Flexion- Have the patient places both hands on the forehead and press the forehead into the palms in a nodding fashion while not allowing motion.

E) Myofascial release technique-

Subcranial inhibitive distraction (SID) is a myofascial technique. Patient Position: Supine lying

Therapist position: Sitting at the head end of the bed

Procedure: Place the hand at the base of the occiput, be sure that the patients head will eventually drop into your hand

Rest the back of your hand on the table, use traction equal to the weight of the patients head, hold and weight for the release
When release occurs, you will feel the full weight of the patient head on your hands.

The final stroke is performed with both hands at the same time, ending with the heel of the hands just under the curve of his skull with the fingers extended along the neck.

**Figure-3**

Outcome measures- The two outcome measures used are:-

a) VAS  
   b) NDI

---

### STATISTICAL ANALYSIS

This chapter deals with analysis of data collected with VAS and NDI of 30 subjects. Suitable statistical analysis test was used in order to verify the investigation of the study. Statistics was performed using the software GraphPad. The characteristics of the data are presided through tables. Pre and post test scores of VAS and NDI were analyzed using paired t-test within the group and unpaired t-test between the groups. Significant level was defined at P<0.05.

### RESULT

A sample of 30 patients was selected and allocated randomly into 2 groups of 15 subjects using random sampling method. Experimental group received MFR along with conventional therapy and the control group received only conventional therapy for a period of 6 weeks. In this study VAS and NDI scale were used. The collected data was statistically analyzed.

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>Mean</th>
<th>S.D.</th>
<th>t value</th>
<th>P value</th>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>Post</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Group</td>
<td>4.33</td>
<td>0.98</td>
<td>3.6207</td>
<td>0.0011</td>
</tr>
<tr>
<td>Experimental Group</td>
<td>3.13</td>
<td>0.83</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table-2: Comparison between Pre and Post test Scores between the Groups Using NDI Scale-

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>Mean</th>
<th>S.D.</th>
<th>t value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Group</td>
<td>19.60</td>
<td>4.32</td>
<td>0.2256</td>
<td>0.8232</td>
</tr>
<tr>
<td>Experimental Group</td>
<td>19.27</td>
<td>3.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Group</td>
<td>7.13</td>
<td>1.41</td>
<td>3.6586</td>
<td>0.0010</td>
</tr>
<tr>
<td>Experimental Group</td>
<td>5.27</td>
<td>1.39</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### DISCUSSION

This study is based on the research hypothesis that MFR along with conventional therapy will be more effective for cervicogenic headache patients than with conventional therapy alone and was completed with 30 patients. Two groups were selected of 15 patients each, in experimental and control group. Both the groups had similar baseline values. The research hypothesis was proved that MFR with conventional...
therapy is effective than conventional therapy alone. The patients selected in this study were between the ages of 25 to 45 years and had symptoms due to cervicogenic headache.

The dependent variables used in this study (NDI) has 10 sections. Each of the sections is scored from 0-5. Section includes pain intensity, personal care, lifting, reading, headaches, concentration, work, driving, sleeping, and recreation. The maximum score is therefore 50. Other dependent variable is VAS which ranges from min 0 to max 10. The patient is instructed to mark the line at the point that corresponds to the degree of pain that is experienced.

The independent variable used in this study is MFR along with conventional therapy.

In this study we observe the effectiveness of the MFR along with conventional therapy in the management of cervicogenic headache. Our finding demonstrated that a 6 weeks treatment protocol with a frequency of 5 sessions per week leads to reduction in pain and neck stiffness, improvement in physical function and quality of life of person suffering from CGH.

The results obtained suggested that both group demonstrated significant improvements in all 10 sections of NDI and VAS scale at the end of 6 weeks treatment. In this study the pre treatment values of VAS and NDI have shown that there is no significant difference between both the groups.

Therefore comparing experimental and control group we see that experimental group is better than control group in decreasing patients VAS and NDI scores.

Subjects in experimental group received MFR along with conventional therapy showed improvement than the control group who received only conventional therapy.

There are some reasons for the improvement- 

- Increase blood/ lymph flow,
- Increase flow of nutrients,
- Removal of waste products/ metabolites,
- Increase extensibility of tissues,
- Increase joint ROM etc.

Nidhi, Gupta; Narkeesh, Divya in their study found that Myofascial Release Techniques are more effective than Cervical Therapeutic Exercise Program me in reducing Cervicogenic Headache symptoms.

Soft tissue therapy to the muscle and fascia of the cervical region is aimed at releasing generally tight muscle and fascia (commonly the cervical extensors).

CONCLUSION

Results of this study suggest that a combination of MFR and conventional therapy for a period of 6 weeks is more effective for decreasing symptoms of patient sufferings from CGH than conventional therapy alone.

FUTURE RESEARCH

A large sample size, by conducting individual studies over individual techniques a precise knowledge as to which technique plays a major role in the reduction of its frequency and intensity can be obtained.

Follow up can be extended to study the long term benefits of MFR.

Acknowledgement: We are thankful to all our subjects who participated with full cooperation.

Conflict of Interest/ Source of Funding- Nil

Ethical Clearance: We certify that this study involving human subjects is in accordance with the regulations stated by ethical committee.

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Health Related Quality of Life among Patients with Parkinson’s Disease Attending the Institute of Neurology National Hospital of Sri Lanka

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ABSTRACT

Background: Parkinson’s disease (PD) is a slowly progressive disease of the nervous system marked by tremor, muscular rigidity, and slow, imprecise movement. Those patients with PD are confronted with physical, psychological, and psychosocial issues that impact quality of life (QoL).

Aims: To assess the health related QoL among PD patients attending the Institute of Neurology National Hospital of Sri Lanka (NHSL). The main domains assessed were mobility, activities of daily living, emotional wellbeing, stigma, social support, cognitive impairment, communication and bodily discomfort.

Method: This descriptive study was conducted with 96 PD patients who are attending the PD clinic of the Institute of Neurology NHSL. The Parkinson’s Disease Questionnaire (PDQ 39) was used as the study instrument.

Results / Procedure Details: In PD patients, their ability to engage in leisure activities, household work, walking and getting around in public are the highest affected. (Mobility domain: Mean = 52.76). Secondly affected domain is the communication. (Mean = 50.00) which includes speech and communication skills. The activities of daily living are also affected with highest impact on the skills of writing and cutting up food. Stigma and cognition are moderately affected. The least affected domain is the social support (mean = 25.17) which indicates the support from spouse and family.

Conclusion: Mobility and communication have the highest negative impact on QOL in PD patients. Level of depression has negatively affected on emotional wellbeing. PD patients do not lack family and social support much.

Keywords: Parkinson’s disease, Quality of Life.

INTRODUCTION

Parkinson’s disease (PD) is a slowly progressive disease of the nervous system marked by tremor, muscular rigidity, and slow, imprecise movement, chiefly affecting middle-aged and elderly people. It is associated with degeneration of the basal ganglia of the brain and a deficiency of the neurotransmitter dopamine¹.

Early in the course of the disease, the most obvious symptoms are movement-related; these include shaking, rigidity, slowness of movement and difficulty with walking and gait. Later, thinking and behavioral problems may arise, with dementia commonly occurring in the advanced stages of the disease, whereas depression is the most common psychiatric symptoms². Parkinson’s disease...
invariably progresses with time. Motor symptoms, if not treated, advance aggressively in the early stages of the disease and more slowly later.

It is evident that Parkinson’s disease has a major adverse impact on patient’s lives. Patients not only experience functional impairment, but are confronted with physical, psychological, and psychosocial issues that impact quality of life. Quality of life (QoL) is used in healthcare to refer to an individual’s emotional, social and physical wellbeing, including their ability to function in the ordinary tasks of living. The study by Kuoppio et al. reveals that the factors most closely associates with Quality of Life was the presence of depression. The postural instability and cognitive impairment has additionally contributed to poor quality of life.

Studies conducted in this area for PD, is not very common in Sri Lankan settings and it’s very hard to find any coping strategies to enhance quality of life. Therefore current study becomes important and this aims to find out the most significant areas which has got affected in quality of life with PD patients. The current study aims at assessing the QoL from the areas including mobility, activities of daily living, emotional well-being, stigma, social support, cognitions, communication and bodily discomfort using the Parkinson’s disease Questionnaire – 39, which has designed to address aspects of functioning and well-being for those affected by PD.

**MATERIAL & METHOD**

This descriptive study was conducted over a period of 6 months with the aim of assessing the quality of life among patients with Parkinson’s disease attending the Institute of Neurology National Hospital of Sri Lanka. 96 patients who are diagnosed as having Parkinson’s disease by the medical specialist in charge was included to the study and the unconscious patients, patients in severe discomfort, those who are in confusion and psychiatric patients were excluded.

The Parkinson Disease Questionnaire-39 (PDQ-39) was used as the study instrument to evaluate health related quality of life. PDQ-39 comprises 8 dimensions (1. Mobility; 2. Activities of daily living; 3. Emotional well-being; 4. Stigma; 5. Social support; 6. Cognitive impairment; 7. Communication; and 8. Bodily discomfort) while each dimension comprises 3 to 10 questions. Each question is rated on a Likert scale with the score ranging from 0 (never) to 4 (always). The mean value and standard deviation was computed for each question while each dimension was calculated as a scale of 0 (no problem at all) to 100 (maximum level of problem). The score for each dimension was derived using the formula:

Sum of scores of each question in dimension x 100/ 4 (max. score per question) x nos. questions in dimension Statistical Package for Social Science (SPSS) version 17.0 was used to analyze the data.

**FINDINGS**

Among the study sample of 96 PD patients, the gender distribution is unequal having the majority of males, with the percentage of 56.25 % of the total study sample. When considering the age distribution, most PD patients belong to 70 < years age group while very less percentage of patients (9.37 %) are reported from < 50 years age group (Table 1).

The Quality of Life was assessed using the Parkinson’s Disease Questionnaire - 39 (PDQ 39). Table 2 indicates the mean values and the respective standard deviation of the different components of the eight sub scales. In the first sub scale of mobility, Parkinson patients have the biggest difficulty in doing leisure activities (mean = 2.37). The difficulty in looking after home and walking half a mile are both equally difficult with a mean value of 2.21 each. Among the components of mobility scale the least affected is their ability to walk 100 yards. Among the Activities of Daily Living which are in table 1 the highest affected one is the cutting up of food (mean = 2.23). They have problems in writing (mean = 2.19) as well as difficulty in holding a drink without spilling it. Those indicate that performing fine movements have got disturbed in Parkinson patients.

Components of emotional well being have equally got affected in Parkinson patients with the highest impact on feeling worried about future. With relates to stigma they mostly have problems in eating and drinking in public (mean = 1.94). As a consequence they tend to hide the disease from others (mean = 1.92). Having social support is less affected associated with PD. With relates to cognitive impairment Parkinson disease patients are having
problems with memory with the mean score of 2.27 compared to other components. Difficulty with speech is a major problem the Parkinson’s disease patients have (mean = 2.25) which negatively affects on their communication.

Finally each dimension is calculated as a scale from 0 to 100, considering 0 = no problem at all and 100 = maximum level of problem. When taken all sub scales together it can be stated that Parkinson’s disease patients are having the biggest problems in mobility with a mean score of 52.76. Communication is also a problem causing area for them when compared to other components (mean = 50.00). The least affected aspect is the social support (mean = 25.17) which indicates that most individuals are happy about the close relationships and they receive good support from family and friends.

**DISCUSSION**

Research conducted worldwide reveals that PD has physical, psychological, and psychosocial issues, which has significant negative effects on QoL. The current study comes under very few studies conducted in Sri Lankan setting using PD patients.

When considering the gender distribution the majority are male patients with a percentage of 56.25 %. A study titled “Quality of Life and Attitude in Individuals with Parkinson’s Disease with and without Deep Brain Stimulation” reports similar findings with a great majority of male participants. Furthermore in our study there was a significant difference in the age distribution of PD patients and the highest number of participants are reported from 70 < years. Similarly Quelhas et al. also have found the mean age as 72 years. In comparison, de Boer et al. reported the mean age of Parkinson’s patients as 67.1 years.

When considering the mobility component, we found consistency in clinical symptoms, which worsens perception of the quality of life in patients and it was the biggest issue the Parkinson patients are having with the highest sub scale score (mean = 52.76). When considering the individual components, they are having great barriers in doing the leisure activities (mean = 2.37). Similarly the study by Slezakova et al. has found that problems with mobility worsen the perception of the quality of life in PD patients.

Another study has revealed that mobility was the only domain reported to be getting clinically significant worsening over time. However, when we studied the heading, “accompaniment by another person when walking long distances”, we found that they expect less support by others (mean = 1.96). Similarly Slezacova et al. stated that out of the total number of respondents, only a least number of respondents needed accompaniment reflecting their subjective endeavor of not burdening family and loved ones.

With relates to ADL, the current study findings show that they have difficulties in functions like cutting up food (mean = 2.23), writing clearly (mean = 2.19) and holding a drink without spilling it (mean = 2.17), where as they perform the functions like washing and dressing with less difficulty. Those findings are closely correlated with the study by Slezacova et al. who have found that majority of participants having difficulty in cutting up food and drinking without spilling. Furthermore Savci et al. have stated that the beginning symptoms of PD most frequently experienced were hand tremors, and slowness in movement which affect negatively on their ADL.

The subscale for emotional wellbeing has reported a mean score of 42.44 indicating that PD patients are moderately affected in that aspect, with its highest impact on the feeling of worried about future (mean = 1.87) and feeling of depression (mean = 1.75). In contrast, the study by Schrag et al. has revealed that, the strongest predictor of QoL in Parkinson’s disease was the presence of depression. Furthermore in the study by Quelhas et al. has found that feeling tense, experiencing excessive worrying thoughts, an inability to relax, and restlessness were the main characteristics of anxiety.

With relates to stigma, a survey by Moore S showed that there is a significant stigma perceived to be associated with PD, as well as significant misconceptions about the course and outcomes of the disease. Keeping the illness hidden from others can be a reflection of perceived stigma associated with the illness. In accordance with that, the current study findings also reveals that PD patients tend to conceal the disease from others (mean = 1.92). Also they try to avoid situations which involve eating and drinking in
the public (mean = 1.94) due to the same reason. The social support domain, is reported as the least problematic aspect with the minimum sub scale scoring (mean = 25.17). They do not have much problems with support they receive from family, close friends (mean = 0.83) and spouse (mean = 0.94). They are content of their personal relationships as well.

When considering the cognitive impairment the most affected component is the memory (mean = 2.27). In comparison, researchers have found that PD patients have difficulty remembering information, or have trouble finding the right words when speaking. Many people with Parkinson’s are surprised to find that they feel distracted or disorganized, or have difficulty planning and carrying through tasks\textsuperscript{11}. Communication is the second highest affected component in PD patients with a mean score of 50.00. In that subscale, the highest affected segment is the speech (mean = 2.25). As a result they are unable to communicate with people properly and are ignored by people. Researches have stated that, communication changes are almost inevitable for people with Parkinson’s disease (PD)\textsuperscript{13}.

Bodily discomfort which is the presence of aches and pains in joints of the body (mean = 1.98) is the most highlighted problem the PD patients have with relates to bodily discomfort. In accordance with our findings, Slezacova et al has reported that the majority of participants reported joint pain all over the body\textsuperscript{9}.

\textbf{Table 1: Socio demographic characteristics of Parkinson’s disease patients (n = 96)}

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>54</td>
<td>56.25</td>
</tr>
<tr>
<td>Female</td>
<td>42</td>
<td>43.75</td>
</tr>
<tr>
<td>Age Group (years)</td>
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<td></td>
</tr>
<tr>
<td>&lt;50</td>
<td>9</td>
<td>9.37</td>
</tr>
<tr>
<td>50–69</td>
<td>35</td>
<td>36.45</td>
</tr>
<tr>
<td>70&lt;</td>
<td>52</td>
<td>54.16</td>
</tr>
</tbody>
</table>

\textbf{Table 2 - Mean scores for different components of sub scales in PDQ – 39 questionnaire for Parkinson’s disease patients (n = 96)}

<table>
<thead>
<tr>
<th>Components of sub scale</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty doing the leisure activities</td>
<td>2.37</td>
<td>0.861</td>
</tr>
<tr>
<td>Difficulty looking after home</td>
<td>2.21</td>
<td>1.004</td>
</tr>
<tr>
<td>Difficulty carrying bags</td>
<td>2.15</td>
<td>1.026</td>
</tr>
<tr>
<td>Problems walking half a mile</td>
<td>2.21</td>
<td>1.065</td>
</tr>
<tr>
<td>Problems walking 100 yards</td>
<td>1.85</td>
<td>1.026</td>
</tr>
<tr>
<td>Problems in getting around the house</td>
<td>2.00</td>
<td>0.940</td>
</tr>
<tr>
<td>Difficulty getting around in public</td>
<td>2.15</td>
<td>1.005</td>
</tr>
<tr>
<td>Needed someone else to accompany</td>
<td>1.96</td>
<td>1.004</td>
</tr>
<tr>
<td>Felt frightened or worried about falling over in public</td>
<td>2.15</td>
<td>0.940</td>
</tr>
<tr>
<td>Been confined to the house more than like</td>
<td>2.06</td>
<td>1.014</td>
</tr>
<tr>
<td>Activities of Daily Living</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty in washing</td>
<td>1.37</td>
<td>1.078</td>
</tr>
<tr>
<td>Difficulty in dressing</td>
<td>1.31</td>
<td>1.029</td>
</tr>
<tr>
<td>Problems in doing up shoe laces</td>
<td>1.71</td>
<td>1.123</td>
</tr>
<tr>
<td>Problems in writing clearly</td>
<td>2.19</td>
<td>1.155</td>
</tr>
<tr>
<td>Difficulty in cutting up your food</td>
<td>2.23</td>
<td>1.147</td>
</tr>
<tr>
<td>Difficulty in holding a drink without spilling it</td>
<td>2.17</td>
<td>1.167</td>
</tr>
<tr>
<td>Emotional well being</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Felt depressed</td>
<td>1.75</td>
<td>1.056</td>
</tr>
<tr>
<td>Felt isolated and lonely</td>
<td>1.67</td>
<td>1.073</td>
</tr>
<tr>
<td>Felt weepy or tearful</td>
<td>1.62</td>
<td>1.039</td>
</tr>
</tbody>
</table>
Felt angry or bitter 1.63 0.976
Felt anxious 1.65 0.973
Felt worried about your future 1.87 0.954
Stigma
Conceal your Parkinson’s from people 1.92 0.914
Avoided situations which involve eating or drinking in public 1.94 1.054
Felt embarrassed in public due to having Parkinson’s disease 1.83 1.012
Worried by other people’s reaction 1.50 0.894
Social Support
Problems with your close personal relationships 1.25 0.696
Lacked support from your spouse or partner 0.94 0.831
Lacked support from your family or close friends 0.83 0.777
Cognition
Unexpectedly fallen asleep during the day 1.71 0.983
Problems with concentration 1.69 0.898
Felt memory was bad 2.27 1.061
Had distressing dreams or hallucinations 1.77 0.923
Communication
Difficulty with speech 2.25 1.114
Unable to communicate with people properly 2.15 1.124
Felt ignored by people 1.60 0.912
Bodily Discomfort
Had painful muscle cramps or spasms 1.85 0.940
Had aches and pains in your joints or body 1.98 0.951
Felt unpleasantly hot or cold 1.35 0.929

Table 2 - Mean scores for different components of sub scales in PDQ – 39 questionnaire for Parkinson’s disease patients (n = 96)  (Cont...)

Table 3 - : Overall mean scores for different sub scales in PDQ – 39 questionnaire for Parkinson’s disease patients (n = 96)

<table>
<thead>
<tr>
<th>Sub scales</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobility</td>
<td>52.7604</td>
<td>20.64257</td>
</tr>
<tr>
<td>Activities of daily living</td>
<td>45.7465</td>
<td>23.40668</td>
</tr>
<tr>
<td>Emotional well being</td>
<td>42.4479</td>
<td>23.76567</td>
</tr>
<tr>
<td>Stigma</td>
<td>44.9219</td>
<td>20.74502</td>
</tr>
<tr>
<td>Social Support</td>
<td>25.1736</td>
<td>16.62183</td>
</tr>
<tr>
<td>Cognitive impairment</td>
<td>46.4844</td>
<td>19.10438</td>
</tr>
<tr>
<td>Bodily discomfort</td>
<td>43.2292</td>
<td>21.05800</td>
</tr>
<tr>
<td>Communication</td>
<td>50.0000</td>
<td>24.48296</td>
</tr>
</tbody>
</table>

CONCLUSIONS

Majority of PD patients are males and the commonest age group is 70 < years. Mobility is the component which has the highest negative impact on QoL in PD patients. The second highest affected component is the communication and the difficulty in speech has the highest impact on this issue. Furthermore there is a defect in memory, causing a significant cognitive impairment in PD patients. The least affected aspect is the social support they receive which indicates that most individuals are happy about the close relationships and they receive good support from family and friends.
Acknowledgement: I would like to thank Professor Ranjanie Gamage, the Consultant Neurologist and the Head of Institute of Neurology, National Hospital of Sri Lanka.

Conflict of Interest : The authors declare no conflict of interest.

Source of Funding- Self or other source.

There was no any source of funding for this study.

Ethical Clearance : Ethics clearance to carry out this study was obtained from the Ethics Review Committee of the National Hospital of Sri Lanka. Informed written consent was obtained from the participants. No identification details were obtained.

REFERENCES

Horticulture Therapy for the Improvement of Self Concept in Adolescents with Locomotor and Hearing Impairment

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ABSTRACT

Objective: The purpose of the study was to determine the effects of a horticulture therapy programme on the self-concept of children with physical disabilities.

Sample: 36 adolescents (15 girls and 21 boys) with locomotor and hearing impairments in the age group of 12-18 years old from 2 rehabilitation centres participated in the study.

Methodology: The horticulture therapy programme included goal specific activities, four 2-hour interactive sessions for 30 minutes every day for 20 days over the course of 9 weeks. Pre and post test horticulture therapy sessions were conducted using standardised self concept rating scales.

Statistical Analysis: The data were statistically analysed using paired sample ‘t’ test, which was done by a bio-statistician with the help of statistical software.

Results: The participants showed significant improvement in self-concept over the period of the programme.

Discussion: The results indicate that a basic horticulture activity such simple as learning how to maintain a plant and taking individual responsibility of one can have a positive impact upon children’s self-concept.

Conclusion: The paper concludes with a suggestion that horticulture therapy could be implemented in the routine rehabilitation programme for children with physical disabilities to improve their self-concept

Keywords: horticulture therapy, children with physical disability, Self-concept.

INTRODUCTION

Horticulture therapy has been recognised as a treatment modality that utilises plants and gardening activities for the improvement of individuals’ quality of life. Its benefits are widely reported as having a positive impact upon the emotional, cognitive and sensory, motor and functional development of individual1. A review by Lohr2 indicated psychological benefits such as reduced stress, increased pain tolerance, and improved mental functioning in people as a result of their frequent interaction with plants. Another systematic review of controlled and observational studies by Annerstedt and Währborg3 reported similar results. More recently, horticulture therapy has been used in treatment and rehabilitation programmes for people in all walks of life including with physical, intellectual or visual disabilities, people who are developmentally delayed, and those who are socially disadvantaged4 5 6. None of the studies identified for the literature review of this paper have reported any negative impact of horticulture therapy on human beings with various disabilities and difficulties7.

Nevertheless, it is important to acknowledge...
that a higher level of attention has been given in the West and many other developed countries to show that horticulture has been used as therapy or as an adjunct to therapy in the treatment of diseases. For example, Flick showed evidence of the therapeutic benefits of horticulture for pre-school with autism in Western contexts. A study conducted by Söderback, Söderström, & Schälander in Sweden reports that horticulture therapy encourages emotional, cognitive and/or sensory motor functional improvement, increased social participation, health, well-being and life satisfaction. Some other studies (for example, Ruth and Elizabeth) showed evidence of social benefits of horticulture therapy such as improved interaction within groups and with members outside of the group; an increased consideration of self and other individuals. However, in India, limited information is available with regard to horticulture therapy, which necessitated the study reported in this paper. Search terms were the free-text concepts ‘healing garden’, ‘horticultural therapy’, and ‘restorative garden’ which were combined with ‘children with physical disabilities’.

The present study worked on the basis of the common assumption in India that adolescents with disabilities have poor self-concept or feelings about oneself. It is believed to be due to the very nature of disabilities, lower level of social acceptance and possible peer rejection. Several studies reported that peer acceptance plays an important role in developing self-concept among children. It is not only in India, many other countries have reported poor self-concept among children with disabilities. Due to the poor self-concept, these children are reported as liable to limited functioning and ended up with a sense of inferiority and maladjustment. At the same time, research reported elsewhere highlighted the fact that there are positive benefits such as social integration, increase in self-concept, self-esteem, concentration, learning of practical skills, reduced level of stress and mental fatigue, enhanced physical activities and improved social cohesion as a result of the application of horticulture therapy in children with disabilities. Here again, there is little information available in the context of India. The purpose of current research project in Kerala was to assess the impact of horticulture therapy on the self-concept of adolescents with physical disabilities.

**MATERIALS & METHOD**

The self-concept of the adolescents with physical disabilities was measured using a rating scale questionnaire or Self-Concept Rating Scale (SCRS). It consists of two parts focusing upon; a) the socio-economic characteristics of the sample and b) aspects specifically related to self-concept. Each part contains six sub-divisions with 14 questions each. This is a five point rating scale. The tool was adapted from the standardised self-concept scales. The scale was initially prepared by collecting the statements and edition statement for the pre-test. Later the pre-test was carried out with 50 young people of 12-18 years old. The score of the rating scale was in an ascending order from 0 to 4. The items in the scale were analysed and edited based on the pre-test.

The sample for the study comprised 36 adolescents with physical disabilities in the age group of 12-18 years. 15 girls and 21 boys participated in the study. They belonged to different socio-economic backgrounds. 16 students have locomotor disability and 20 have hearing impairments. They were selected from two rehabilitation institutions in the Thiruvananthapuram district of Kerala using purposive sampling methods. This means that all 36 young people were deliberately selected upon the aims and objectives of the enquiry.

The reliability of the scale was assessed and the reliability coefficient of the self-concept scale is 0.82. The scale was constructed by keeping in view of the face validity requirements. Hence the investigation included in-depth interview of 50 respondents for validation of the self-concept scale. A total score of more than 210 was considered as having a normal self-concept, a score between 150-210 as moderate and scores below 105 as low.

**The Study:** The study was carried out in the following steps:-

I Pre Horticulture Therapy

II Horticulture Therapy Session

III Post Horticulture Therapy

**Pre Horticulture Therapy** : During this process, the personal and socio-economic characteristics of the sample children were assessed with the help of
their teachers. In addition, a self-concept scale was administered to assess their self-concept.

**Horticulture therapy session**

i. **Training on Horticulture Production**

This session included imparting training on raising, maintaining and protection of the horticulture therapy garden. The classes were handled by horticulture faculties from Kerala Agricultural University.

ii. **Raising special child’s garden or horticulture therapy garden**

The place where the garden was located was easily accessible to the children with physical disabilities. The garden area was ploughed well and a grass path of 90 feet was kept so that children with physical disabilities could walk through. Keeping in mind the difficulties of the children associated with their disabilities, plants in the garden were raised in clay pots, gunny bags, glass containers and hanging baskets under a ‘No Dig Concept’ which does not require digging with a spade.

Potting mixture was prepared using river sand with red loam, dried cattle manure and bone meal in the ratio 1:2:1 respectively. Later this mixture was filled in polyethylene bags, clay pots, gunny bags and hanging baskets with the help of a skilled labourer. After filling the sacks, they are kept apart at a distance of 50 cm each so as to enable easy intercultural operations. Seeds were first sown in the polyethylene bags and after two weeks the sprouted seedlings were transplanted to clay pots, gunny bags and hanging baskets filled with potting mixture. In addition to the seeds, stem cuttings were also planted. The children regularly irrigated. The staff and the children periodically monitored the horticulture therapy garden.

The plants grown in the Horticulture therapy garden

a. Ornamental plants: Rose, Orchid, Begonia, Marigold, Zenia, Portulaca


c. Fruits: Papaya, Banana

d. Tubers: Sweet Potato, Tapioca

e. Medicinal and Aromatic plants: Ocimum Sarictum, Panikurka (coleus aromaticus), Phyllanthum, Aloevera, Neela amari (Indigoteratinctoria), Chittaratha (Alpiriyacalcarata), Asparagus (Asparagun racemosus) Brahmi (Bacopa monnieri), and Turmeric (curcumia domestica) etc.

iii. **Horticulture therapy activities**

The children were involved in the following horticulture therapy activities:

1. **Naming the plants** to develop and fixing a name board alway with the child’s name. Each child was allotted a plant and the child was asked to suggest a name for the plant. The children were also informed that they will be responsible for the plant that has been allotted to them in order to develop sense of belongingness and responsibility.

2. **Interaction with plants: people-plant connection** is encouraged and children are given opportunities to interact with plants.

3. **Watering the plants everyday**: the children with physical disabilities were asked to water the plants by squeezing a sponge so that the action of squeezing the sponge enables them to improve their motor skills.

4. **Weeding and pruning**: after one month, poultry manure, coir pith compost, and vermin compost were applied. The children did fortnightly weeding and pruning.

5. **Protection of the plants**: botanical pesticides such as neem oil, bar soap, garlic extract, chilly powder, kerosene and tobacco decoction were applied for controlling pests of the plants.

6. **Harvesting**: at the correct maturity stage of each plant, harvesting was done by the children.

**III Post Horticulture Therapy Session**

The sample is subjected to the standardised self-concept scale.

**RESULTS AND DISCUSSION**

Self-concept scores were statistically analysed
by a bio-statician to determine whether there is any change in the Pre & Post Horticultural Therapy. Paired ‘t’ test was used to find out the differences in self-concept. The results of the study are outlined in the following table that shows the differences in the self-concept of two groups of individuals with locomotor disability and hearing impairment with the difference of the significance.

### Table 1: Pre and Post Horticulture therapy scores on self concept

<table>
<thead>
<tr>
<th>Type of Disability</th>
<th>Test</th>
<th>Mean</th>
<th>N</th>
<th>t value</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locomotor Disability</td>
<td>Self concept pre</td>
<td>97.125</td>
<td>16</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Self concept post</td>
<td>111.12</td>
<td>16</td>
<td>-7.58</td>
<td></td>
</tr>
<tr>
<td>Hearing Impaired</td>
<td>Self concept pre</td>
<td>89.600</td>
<td>20</td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Self concept post</td>
<td>104.05</td>
<td>20</td>
<td>-7.16</td>
<td></td>
</tr>
</tbody>
</table>

It can be seen in the table that young people with locomotor disability have shown an improvement in their self concept from 97.125 (mean value) to 111.12. At the same time, adolescents with hearing impairment showed their self concept improvement from 89.600 (mean value) to 104.05. However, adolescents with locomotor disability had higher scores on self-concept (M=97.125 for the pre-test and M=111.12 for the post test) than did adolescents with hearing impairment (M=89.600 for the pre-test and M=104.05 for the post test). The differences in the self-concept of these two groups were not individually studied for a comparison as it was not the primary intention of the study. Another issue may be gender wise comparisons which were also not the focus of the study. However, further studies may be needed to explore these issues.

Table also shows the descriptive statistics of the study, which clearly demonstrates that the mean of the self-concept scores of the post horticulture therapy session is higher than the pre horticulture therapy session.

As can be seen in the table, self-concept scores of pre and post test indicated differences in the self concept of the two groups before and after application horticulture therapy. The result shows that significant value (=17.9350 for adolescents with Locomotor disability and 18.6757 for adolescents with hearing impairment) is greater than that of test value (=10.0650 for adolescents with Locomotor disability and 10.2243 for adolescents with hearing impairment). This clearly demonstrates that there is a significant difference in the self-concept of adolescents with disabilities. This undoubtedly means that horticulture therapy has increased the self-concept of children with physical disabilities.

Studies showed that children with physical disabilities have low self-concept and this may be reflected throughout their lives. The present study reveals that children who underwent the horticulture therapy programme had significant changes in their self-concept. 1) Children observed the vegetables/fruits growing from the plants they have seeded, 2) children felt proud when they saw their efforts becoming productive, 3) children were able to share their experiences and achievements with their peers and other people, and 4) children had a feeling that they were capable to endure. It is therefore right to argue that all these testimonials could have enhanced their self-concept.

**CONCLUSION & IMPLICATIONS**

The findings of the present study reveal that horticulture therapy can improve the self-concept of children with physical disabilities. It is therefore worthwhile to consider horticulture therapy for these children at hospitals, rehabilitation centres, vocational training centres, nursing homes, schools, botanical gardens, health resorts. The whole horticulture project was a team work of three groups of professionals such as child development experts, horticulturists and special educators. This is very beneficial for children as the adults around them are working together as team for their development and
welfare through horticulture therapy.

The findings have a number of implications for intervention with children and adolescents with physical disabilities. Horticulture therapy could be one of the intervention techniques for improving their self-concept. To foster self-concept, therapists and individuals working in the disability sector should promote opportunities for adolescents with disabilities to engage in gardening activities. This makes them take some responsibilities for looking after the environment and involvement in the group activities would promote their social skills that lead to further improvements in their self-concept. This may involve teachers and children with disabilities engaging collaboratively in horticulture therapy activities as part of their school curriculum.

Enthusiastic professionals and educators should promote gardening activities in schools and rehabilitation centres to ensure that children and young people with disabilities are coming out with a similar self-concept to other children of their age group. Useful horticulture activities include planting flowers, vegetables, fruits, tubers and medicinal plants, clay modelling and flower arrangement, involving the young people with disabilities in these activities will benefit them positively to develop their self-concept including decision making, problem solving, goal setting and the acquisition of competencies. This would also provide opportunities for motivation to acquire behavioural and social competencies. Lack of such opportunities may lead them to further dependency and social isolation.

Future research should attempt to replicate the findings here, and extend them by examining the reasons behind the lower self-concepts in children with disabilities and how horticulture therapy improves their self-concept. Once reasons are known such interventions could be used more often in schools, hospitals and rehabilitation centres.

Acknowledgement: We are extremely thankful to St. Peters LMS

Conflict of Interest- Nil

Source of Funding- Kerala State Council for Science Technology and Environment (KSCSTE)

Ethical Clearance- Director of Research” Kerala Agricultural University approved the research project before the submission to KSTEC. A panel of scientists scrutinized the research design.

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Prevalence of PMS in Adolescent Girls of 18 to 26 Age Group

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ABSTRACT

Background and Purpose: Premenstrual syndrome refers to distressing physical, psychological and behavioral symptoms not caused by organic disease, which regularly occur during the same phase of menstrual cycle and significantly regress or disappears during the remainder of the cycle.

Objective: To investigate the prevalence of premenstrual syndrome among the girls between 18 to 26 year age group.

Method: A cross sectional study was carried out in 2013-14 among female students of university, aged 18-26 year. Over all 500 participants were asked to fill up the Premenstrual Syndrome Screening Tool.

Results: From 500 students, who participated in this study 83.40% have mild to moderate, 14% have moderate to severe and 2.60% have severe symptoms of PMS. Most common symptoms were feeling of fatigue (61.05%), decrease interest in work, social activity and home activity (59%, 57.1%, 56%), physical symptoms which include breast tenderness, headaches, joint/muscle pain, bloating and weight gain (55.5%). Severity of symptoms was significantly higher for the younger women (18-20 year) compared to the older women (21-23, 24-26 years).

Conclusion: Prevalence of premenstrual syndrome in focus group of university students was found to be low but comparable to the result reported from the studies done in other countries.

Keywords: Prevalence, Premenstrual syndrome, Premenstrual Dysphoric disorder, premenstrual symptoms screening tool.

INTRODUCTION

Premenstrual disorder has been variously defined as psycho-neuro-endocrinal disorder of unknown etiology¹ that consists of a myriad of physical and psychological symptoms. Premenstrual syndrome includes a range of disorder from mild premenstrual syndrome (PMS) to Premenstrual dysphoric disorder (PMDD)². Premenstrual syndrome is cyclic recurrence of distress with somatic and affective symptoms in the luteal phase of menstrual cycle and in few days of the next follicular phase. The most important somatic symptoms are feeling overwhelmed, food craving, insomnia or hypersomnia, headache, pelvic pain and discomfort, breast tenderness, joint pain, bloating; and the most common and distressing affective symptoms are irritability, anxiety, depression, mood swing, hostility, poor concentration, confusion, social withdrawal and interpersonal conflicts.³ First, Frank in 1993 described this clinical phenomenon and used the term “premenstrual tension”⁶. The American College of Obstetrics and Gynecology (ACOG) guidelines for PMS adopted the diagnostic criteria developed by the University of California at San Diego (UCSD) and National institute of mental health (NIMH). According to American college of Obstetrics and Gynecology (ACOG) guideline, PMS include one or more affective or somatic symptoms that negatively impact a woman’s function and lifestyle, occur during the five days prior to menses, and are present in each of three previous menstrual cycles.⁷ The symptoms are relieved within four days.
of the onset of menses and do not recur until at least thirteenth day of next cycle day. The American Psychiatric Association has established criteria for the diagnosis of PMDD. The cyclic nature of depressive symptoms that occur in PMDD should help differentiate PMDD from other depressive disorder that occurs throughout the cycle.

Reports on prevalence of PMS differ in different studies are for example, one study on female students showed that out of 100% of participants, 98.2% reported at least one mild to severe premenstrual symptoms. Derman et al. (2000) a conducted study in Turkey that showed 61.4% of adolescent girl met criteria for PMS. Among women samples up to 85% have reported one or more premenstrual symptoms. Dean et al. (2000) concluded that regardless of criteria used, PMS prevalence ranges from 19% to 30%.

As the reviewed literature indicates, significant group of women experience various degrees of PMS. In addition, PMS symptoms can have debilitating effects on women’s quality of life and work production. However, competition, society and culture may control expression of premenstrual symptoms and their severity. Most current studies on PMS have been conducted in western countries. Thus, it is imperative to investigate prevalence, severity, and most common symptoms of PMS among various populations to promote quality of life, health and well being of reproductive age women. The current study investigated the prevalence of premenstrual symptoms in age group of 18 to 26 age group of girls.

The questionnaire which is used in study Premenstrual Syndrome Screening tool (PSST) consists of two parts. The first part included 14 questions about psychological, physical and behavioral symptoms and second part measured the effects of these symptoms on personal life that includes five questions. There are four parameters for each questions including: a) not at all (symptoms not present at all) b) mild (the symptoms are noxious but they don’t affect the interpersonal relationship or routine activity), c) moderate (the symptoms are noxious and affect some of interpersonal relationship or routine activities) d) severe (the symptoms are very noxious and affect completely on interpersonal relationship or routine activity. Scoring method in this questionnaire was that the people were divided into 4 categories based on the severity: First: includes women who don’t have this syndrome and didn’t have PMS symptoms. Second: includes those who have slight symptoms of syndrome. Third: includes those who have medium to severe symptoms of this syndrome.

**METHODS**

a) **Design**: Cross sectional study

b) **Setting**: University students

c) **Sampling method**: Convenient sampling

d) **Sample size**: 500

e) **Inclusion and exclusion criteria**:

1. Inclusion criteria:
   - Age: 18 to 26 years
   - Marital status: single and willingness to participate

2. Exclusion criteria:
   - Married women
   - Irregular menstrual cycle
   - Current major medical and psychological problem
   - Receiving any hormonal therapy.

g) **Data collection tools**

Premenstrual symptoms screening tool survey questionnaire

**Procedure**

The university students were recruited through personal contact for initial response. An explanatory discussion about the disorder was given using a power point presentation in order to make them aware about the syndrome so that the questions could be accurately understood later on informed consent and premenstrual syndrome screening tool was asked to be filled up.

Participants were not given any incentives to get involved in the study and those who participated were assured about the confidentiality of their response. They were given freedom to express their symptoms by allowing them to mention personal comments.
SUBJECTS AND METHOD

This survey study was conducted between December 2013 and January 2014 on female students of Ashok & Rita Patel institute of Physiotherapy, Indukaka Ipcowala pharmacy college, and S.M Patel Ipcowala collage of commerce after obtaining approval from the respective authorities. Overall, 500 female students were randomly recruited. Participation in study was voluntary and if a student refused to participate, no objection was taken. Questionnaires and consent form were handed out to the students in class room and collected after being filled.

Premenstrual symptoms screening tool (PSST) is considered among the most important inventories. The design of this questionnaire is to gain simple and easy screening tool for the determining the women who suffer from premenstrual syndrome.

DATA ANALYSIS

Descriptive analysis using mean and percentage values to determine the average age of the participants along with the total percentage of female with PMS symptoms

RESULTS

The age of 500 students who participated in this study ranged from 18 to 26, with mean age of 22 years. In total 500 participants all reported experiencing various degrees of at least one symptom of 14 symptoms included in the questionnaire. The most prevalent symptoms were feelings of fatigue (61.05%), decreases interest in work, social activity and home activity (59%, 57.1%, 56%), physical symptoms which include breast tenderness, headaches, joint/muscle pain, bloating and weight gain(55.5%), difficulty in concentrating (53%), anger and irritability (48.85%), depressed (46.85%), hypersonnia (44.65%), tearful (41.45), anxiety and tension (41.5), feeling out of control (39.2%), insomnia (38.9%), over eating (35.7%).

The symptoms of PMS, both psychological and physical according to the age group. Instead of these 14 symptoms there are 5 more questions which show the interference of these 14 symptoms. The most prevalent ones to be affected are social life activities (50.15%), work efficiency and productivity (50.2%), home responsibility (43.75%), relationship with family (42.15%), relationship with co-workers (42.4%).

A significant difference in symptoms severity was observed in 3 age groups, with the 18-20 year old age group having the highest figure.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Range (score)</th>
<th>Total No.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>moderate</td>
<td>19-38</td>
<td>70</td>
<td>14%</td>
</tr>
<tr>
<td>severe</td>
<td>39-57</td>
<td>12</td>
<td>2.40%</td>
</tr>
<tr>
<td>mild</td>
<td>58-76</td>
<td>418</td>
<td>83.60%</td>
</tr>
</tbody>
</table>

Table 1: Symptoms severity of PMS

Table 2: Comparison of symptoms severity of PMS by age group

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-20</td>
<td>280</td>
<td>56%</td>
</tr>
<tr>
<td>21-23</td>
<td>120</td>
<td>24%</td>
</tr>
<tr>
<td>24-26</td>
<td>100</td>
<td>20%</td>
</tr>
</tbody>
</table>

DISCUSSION

The present study conducted on 500 university student showed that all the participants had at least one premenstrual syndrome of minimal severity. The total symptoms scoring of the study is 76 accordingly the score is divided in following range and variable set as follow- mild 19-38(25-50%)score , moderate 39-57 (50-75%)score , severe 58-76(>75 %) score were grouped.

Dermanet a conducted study in turkey that showed 61.4% of adolescent girl met criteria for PMS. Among women sample up to 85% have reported one or more premenstrual symptoms 7, 11. Nour Mohammad Bakhshani et al (2009) had done study to find prevalence and severity of premenstrual symptoms among Iranian female university students. The study done on 300 students from 18 to 27 age and concluded backache, tiredness, mood changes, depressed mood and anxiety were most prevalent and with the 18-20 years old age group having the highest figure 17. A study done in Hong Kong indicated a
comparable prevalence rate of PMS is 19% \(^\text{20}\).

Finally, studies have not consistently confirmed a strong association between PMS and demographic risk factors. In our study age was the only demographic factor that contributed to severity of PMS. The symptom severity in younger participants (18-20 years old) was significantly higher than that of the other group (21-23 and 25-26 year old). Our findings are comparable to the study by Nour Mohammad Bakhshani et al who found more symptoms in age group 18-20 years compared to 21-24 years \(^\text{10}\). The same study stated no difference in the females who were married to the unmarried counterparts which abolishes the influence of marriage on presence of symptoms \(^\text{10}\).

The prevalence in our study showed 83.40% females having mild, having 14% moderate and 2.40% having severe complain of PMS. The result shows that, prevalence of mild symptoms was maximum compared to other studies. Severe symptoms of PMS indicate the premenstrual dysphoric disorder which greatly affects the lifestyle and ADL of females. In our present study the syndrome was not found to be present as the maximum score was 62/76. Presence of PMS among females depends on culture, education, ethnicity health status and age of participant. Sternfeld at al found that Hispanics reported greater severity than Asians \(^\text{7}\).

Moreover PMS symptoms are maximum evident in one week before the menses and subside after 3 days of cycle due to the drastic hormonal imbalance in this period but due to practical considerations it was not possible to collect data of the participants during their individual menses period which can obscure the result due to recall bias and is the limitation of this study. We do feel that this can affect the total prevalence rate of our study population.

**CONCLUSION**

Prevalence of premenstrual syndrome in focus group of university students was found to be low but comparable to the result reported from the other countries.

**Acknowledgement:** I also take this opportunity to express a deep sense of gratitude to my Principal Dr. M. Balaganapathy (PT)(PhD). I also take opportunity to express my deep regards to Dr. Rajesh Modi, Principal of S.M. Patel college of Commerce.

**Conflict of Interest:** It has been assured while doing the study that no financial help has been maintained with any one of the person involved in the study and the author did not have any kind of relationship with them.

**Statement of Informed Consent:** The participants were informed about the purpose of the study and informed consent was taken maintaining the dignity of their response.

**Source of Support:** Self and Institute (Ashok & Rita Patel Institute of Physiotherapy, CHARUSAT, CHANGA, ANAND GUJARAT).

**Ethical Clearance:** Ethical clearance was obtained from the Ethical Clearance Committee of Ashok & Rita Patel Institute of Physiotherapy prior to the study.

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Assessment of Scapulohumeral Rhythm in Scapular Plane in Subjects with Shoulder Pathology

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ABSTRACT

Background & Objectives: Assessing the presence or absence of altered scapulohumeral rhythm in shoulder pathology in clinical setting is important for better evaluation and rehabilitation. Given the critical role of scapula in optimal functioning of shoulder, the aim of this study was to develop better understanding of the coordinated movement of scapula and humerus over the entire arc of shoulder elevation and to ascertain to which percentage scapula was involved in shoulder pathologies.

Method: Forty subjects with unilateral repetitive or overuse shoulder pathologies were recruited in the study. A modified digital inclinometer was used to measure the scapular upward rotation of the subjects with unilateral shoulder pathology. Scapular upward rotation was measured as the subjects performed relevant amount of shoulder elevation in the scapular plane. Scapular rotation was assessed over the entire arc of motion and over a series of shoulder elevation increments. The percent contribution of scapular and glenohumeral joint to shoulder elevation was calculated. The scapulohumeral rhythm was assessed and represented in the ratio of glenohumeral motion to scapulothoracic motion

Results: Scapulohumeral rhythm for the entire arc of shoulder elevation in scapular plane in subjects with shoulder pathology was equal to 4.33:1(0°-120°) and ranged from 56.69:1 to 2.31:1(0°-30° to 90°-120°) when assessed across the different increments of humeral elevation. The total scapular motion increased over the arc of humeral elevation. The scapula contributed 1.73% for the first 30 degrees of shoulder elevation, between 23.73% and 25.2% for 30-90 degrees of shoulder elevation, and 30.13% for 90-120 degrees of shoulder elevation. Statistically significant differences in scapular upward rotation were identified across the shoulder elevation increments (F =1.185, P < 0.05).

Conclusion: Clinically, the altered scapulohumeral rhythm could be assessed and the extent of scapular contribution at varying humeral angles could be calculated. In 90-120 degrees the scapula demonstrated with 9.04° SUR with 30.13% scapular contribution to overall shoulder elevation increment in the subjects with shoulder pathologies. Since 90-120 degrees show higher scapular rotation contribution than other shoulder elevation increments in scapular plane therefore, the clinicians can use overhead rehabilitation exercises for better outcome in patients with shoulder pathologies.

Keywords: Scapulohumeral rhythm; scapular plane; scapula; shoulder.

INTRODUCTION

The scapula is considered to move synchronously with the humerus during the dynamic arm movement, where it functions as such to provide appropriate congruency between both the structures i.e the glenoid fossa of the scapula and the humeral head. This appropriate congruency is not only important for
establishing or maintain adequate scapulothoracic or glenohumeral muscle length tension relationship but also works to provide a stable base for transformation of kinetic energy, thus energy is transferred to the distal segments via proximal segments of

Due to anatomical quality of this joint, the scapulothoracic joint is most vulnerable to the pathological motions and leading to increased dependency of the shoulder joint on the surrounding musculature for its normal movements as well as for its stability(2,3).

The most commonly found glenohumeral dysfunctions or pathologies are shoulder impingement, rotator cuff pathology or biceps tendinitis or tendinopathy. The abnormal positioning of scapula on thorax at various humeral angles and its control during gleno-humeral motion can be an indication of alteration in the scapulohumeral rhythm and thereby these changes can affect the functioning of the upper extremity at high amount therefore, it becomes very essential to clinically evaluate or assess the scapular position and its movements in respect to glenohumeral joint.(9,3) The ratio of the scapulohumeral rhythm in healthy individuals, while performing 180° of humeral elevation is considered to have 2:1 ratio i.e. 120° of movements it is said to be contributed by glenohumeral joint and 60° by scapulothoracic joint(4). It is considered that the prevalence of shoulder pain and various other glenohumeral pathologies in certain sorts or occupations has reached up to 40% or even higher and it is related to altered scapulothoracic kinematics to a greater extent than that of clavicular kinematics. Thus, it becomes important to investigate the contributing factors for glenohumeral pathology and that is possible only by adequate examination of both joints movements. In this view, the following factors could be considered while evaluating the shoulder kinematics which can lead to biomechanical alteration in the glenohumeral joint functioning and thus it could be tight soft tissue structures, shoulder or scapular musculature inactivity, delayed muscle co-activation and even strength imbalances are the favorable factors(8).

**METHOD**

Forty subjects (33.42±5.01 years, 1.71±0.08 meters, 67.02±5.66 kg; 11 females; 29 males) presenting with a history of shoulder/glenohumeral pathology were recruited in the study. Nineteen subjects present with left sided and twenty one with right sided shoulder pathology.

All participants completed an informed consent form approved by the Institution and provided there demographic details and orthopedically diagnosed prescription.

The study was a Non-experimental design (observational study). Patients were included in the study if they had Orthopedically determined shoulder pathology, presented with overuse or repetitive type of shoulder pathologies and where: pain or dysfunction persisted in one shoulder with 6 or more than 6 months(7) Additionally patients should have had at least 120° of active arm elevation. Both males and females aged 25-40 years(16) were included in the study. Patient’s were examined by a physical therapist (normal include AROM measurement for shoulder elevation).

Subjects were excluded if they presented with history of trauma e.g. Fractures, history of pervious shoulder surgery, presence of any spinal abnormalities, any neuromuscular disorders, sprenge’s deformity known scapular congenital defect and history of diabetes and hypertension.

Non-probability convenient sampling method was used.

A Digital Inclinometer (Pro360, Precise, Sudershan Measuring & Engineering Pvt. Ltd., Delhi) was used. Johnson et al (16) validated the use of the digital inclinometer and with its use one can quantify the scapular upward rotation contributions associated at various shoulder elevation increments (r=0.66 to 0.89). The following modifications were made to the inclinometer as per Johnson et al:

2 wooden locator sticks were attached to the base of the instrument and they measured approximately 10 cm in length. The wooden sticks ends were made of Y-shaped, where the locator sticks permitted the rotational adjustments at the distal end for its better placement. The wooden locator sticks were adjusted along the length of the spine of scapula; the Y shaped ends were placed over the posterolateral corner of the acromion process and over the root of
spine of scapula. A bubble level was attached to the instrument in order to maintain the instrument in its appropriate position i.e. the perpendicular orientation to the horizontal plane of the digital inclinometer. A guiding pole heighted of 2.13-m (7-ft) pole was used during shoulder elevation. Markers at selected angles were placed on the pole and the selected angles were as (30°, 45°, 60°,75°,90°,120°). A goniometer was used for measuring the 40° angle thus ensuring the glenohumeral elevation in the scapular plane.

The individual was instructed to stand with feet shoulder width apart, arms relaxed at the sides and heel placed on a line marked on the floor. During arm movement the subject must point the thumb towards the ceiling in order to avoid glenohumeral rotation. The subject was asked to use their affected arm for the testing procedure and to move when asked and to place at selected angles. The guiding pole was used and was placed at scapular angle i.e. 40° anterior from the frontal plane. The selected humeral angles were determined by using the digital inclinometer, where the instrument was placed at the mid-shaft of the upper-arm along the lateral border to hence the glenohumeral angle was obtained and was marked on the guiding pole. The scapular positions were measured at 7 angles of humeral elevation i.e. at rest (30°,45°,60°,75°,90°,120°). The scapular upward rotation was measured by palpating the root of spine of scapula and the posterolateral corner of the acromion. The two locator arms (the medial and the lateral arm) was adjusted over root of spine of scapula and over the posterolateral aspect of acromion respectively. The digital inclinometer was maintained at a right angle to the horizontal plane where the position was retained by the help of bubble level. In order to secure the reading the tester presses the hold button of the inclinometer and that’s how the scapular rotational degrees were recorded. Randomization was done with the variable before the each testing session and its order of testing was documented on the data collection form i.e. the testing position of shoulder elevation. At each inspecting position two measurement trails were taken and thus mean scapular upward rotation were considered.

**RESULTS**

Table 1: Shoulder elevation increments, mean scapular upward rotation measures, scapulohumeral rhythm ratios, glenohumeral motion and percentage scapular contribution

<table>
<thead>
<tr>
<th>Shoulder elevation increments(degrees)</th>
<th>Mean + SD</th>
<th>Scapulohumeral rhythm</th>
<th>Glenohumeral motion(degrees)</th>
<th>% scapular contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-120</td>
<td>22.49 + 0.92</td>
<td>4.33:1</td>
<td>22.49</td>
<td>18.74</td>
</tr>
<tr>
<td>0-30</td>
<td>0.52 + 0.48</td>
<td>56.69:1</td>
<td>29.48</td>
<td>1.73</td>
</tr>
<tr>
<td>30-45</td>
<td>3.56 + 0.48</td>
<td>3.21:1</td>
<td>11.44</td>
<td>23.73</td>
</tr>
<tr>
<td>45-60</td>
<td>3.26 + 0.40</td>
<td>3.60:1</td>
<td>11.74</td>
<td>21.73</td>
</tr>
<tr>
<td>60-75</td>
<td>2.33 + 0.43</td>
<td>5.43:1</td>
<td>12.67</td>
<td>15.53</td>
</tr>
<tr>
<td>75-90</td>
<td>3.78 + 0.43</td>
<td>2.96:1</td>
<td>11.22</td>
<td>25.2</td>
</tr>
<tr>
<td>90-120</td>
<td>9.04 + 0.79</td>
<td>2.31:1</td>
<td>20.96</td>
<td>30.13</td>
</tr>
</tbody>
</table>

Table 2: Scapular upward rotation across the humeral elevation increments

<table>
<thead>
<tr>
<th>Shoulder elevation increment</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean square</th>
<th>F Value</th>
<th>significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>1629.58</td>
<td>5</td>
<td>325.91</td>
<td>1.185</td>
<td>.00</td>
</tr>
<tr>
<td>Within Groups</td>
<td>64.35</td>
<td>234</td>
<td>0.275</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1693.93</td>
<td>239</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[df=\text{degree of freedom}\]
Table 3: Multiple comparisons analyses for scapular upward rotation per 30 and 15 degree increments of shoulder elevation

<table>
<thead>
<tr>
<th>(I) increment</th>
<th>(J) increment</th>
<th>Mean Difference (I-J)</th>
<th>Sig.</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower Bound</td>
<td>Upper Bound</td>
<td></td>
</tr>
<tr>
<td>0-30</td>
<td>30-45</td>
<td>-3.04°</td>
<td>0.00</td>
<td>-3.37</td>
</tr>
<tr>
<td></td>
<td>45-60</td>
<td>-2.74°</td>
<td>0.00</td>
<td>-3.07</td>
</tr>
<tr>
<td></td>
<td>45-60</td>
<td>-1.80°</td>
<td>0.00</td>
<td>-2.14</td>
</tr>
<tr>
<td></td>
<td>75-90</td>
<td>-3.26°</td>
<td>0.00</td>
<td>-3.59</td>
</tr>
<tr>
<td></td>
<td>90-120</td>
<td>-8.52°</td>
<td>0.00</td>
<td>-8.85</td>
</tr>
<tr>
<td>30-45</td>
<td>0-30</td>
<td>3.04°</td>
<td>0.00</td>
<td>2.70</td>
</tr>
<tr>
<td></td>
<td>45-60</td>
<td>0.29</td>
<td>0.11</td>
<td>-0.03</td>
</tr>
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<td></td>
<td>60-75</td>
<td>1.23°</td>
<td>0.00</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>75-90</td>
<td>-0.21°</td>
<td>0.42</td>
<td>-0.55</td>
</tr>
<tr>
<td></td>
<td>90-120</td>
<td>-5.48°</td>
<td>0.00</td>
<td>-5.81</td>
</tr>
<tr>
<td>45-60</td>
<td>0-30</td>
<td>2.74°</td>
<td>0.00</td>
<td>2.40</td>
</tr>
<tr>
<td></td>
<td>30-45</td>
<td>-0.29</td>
<td>0.11</td>
<td>-0.63</td>
</tr>
<tr>
<td></td>
<td>60-75</td>
<td>0.93°</td>
<td>0.00</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>75-90</td>
<td>-0.51°</td>
<td>0.00</td>
<td>-0.85</td>
</tr>
<tr>
<td></td>
<td>90-120</td>
<td>-5.77°</td>
<td>0.00</td>
<td>-6.11</td>
</tr>
<tr>
<td>60-75</td>
<td>0-30</td>
<td>1.80°</td>
<td>0.00</td>
<td>1.46</td>
</tr>
<tr>
<td></td>
<td>30-45</td>
<td>-1.23°</td>
<td>0.00</td>
<td>-1.57</td>
</tr>
<tr>
<td></td>
<td>45-60</td>
<td>-0.93°</td>
<td>0.00</td>
<td>-1.27</td>
</tr>
<tr>
<td></td>
<td>75-90</td>
<td>-1.45°</td>
<td>0.00</td>
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<td></td>
<td>90-120</td>
<td>-6.71°</td>
<td>0.00</td>
<td>-7.05</td>
</tr>
<tr>
<td>75-90</td>
<td>0-30</td>
<td>3.26°</td>
<td>0.00</td>
<td>2.92</td>
</tr>
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<td></td>
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<td>0.21</td>
<td>0.42</td>
<td>-0.11</td>
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<tr>
<td></td>
<td>45-60</td>
<td>0.51°</td>
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<td>0.18</td>
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<td></td>
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<td>1.11</td>
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<tr>
<td></td>
<td>90-120</td>
<td>-5.26°</td>
<td>0.00</td>
<td>-5.59</td>
</tr>
<tr>
<td>90-120</td>
<td>0-30</td>
<td>8.52°</td>
<td>0.00</td>
<td>8.18</td>
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<td></td>
<td>30-45</td>
<td>5.48°</td>
<td>0.00</td>
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<td></td>
<td>60-75</td>
<td>5.26°</td>
<td>0.00</td>
<td>4.92</td>
</tr>
</tbody>
</table>

* significantly different
DISCUSSION

Assessment of Scapulohumeral Rhythm (SHR) is an important component in the clinical examination of patients with shoulder joint pathologies. Robert Manske et al suggested that observing the SHR was a critical component for the assessment of scapular muscle strength and even motor control. The author suggested that normal SHR tends to become altered or dysfunctional when an individual exhibits pain, generalized weakness, and inhibition, loss of motor control and loss of muscle strength or endurance of shoulder musculature.

The present study quantified the contribution of scapular upward rotation to the humeral elevation in scapular plane for various shoulder pathologies and thus calculated the SHR, glenohumeral motion and the percentage of scapular contribution at various humeral increment elevations. The SHR and amount of SUR for various shoulder pathologies thus presented with a SHR ratio as 4.33:1(0 – 120 degrees). Our results have been compared with the previous study which was conducted on healthy subjects and documented the SHR as 2.34:1(0 – 120 degrees).

We observed an increasing SUR as the glenohumeral joint achieved greater amount of elevation in the scapular plane across the entire arc of humeral elevation which is considered consistent with the role of the scapula as it is related to maximize the functioning of the glenohumeral joint during overhead activity in normal or unaffected individuals whereas various studies related to shoulder pathologies suggested the cause for increased scapular rotation in upward fashion to be as a positive compensatory mechanism in order to maximize the overall ROM in the presence of decreased mobility.

Normally the SHR ratio for the unaffected subjects ranges from 40.05:1 to 0.90:1 (0 – 30 to 90 – 120 degrees), where the present study observed the SHR ratio as 56.69:1 to 2.31:1 (0 – 30 to 90 – 120 degrees) for various shoulder pathologies for the entire shoulder elevation arc. These ratios are subjected to an increase or decrease during the various increment elevation thus depending on specific shoulder pathologies.

When assessing the mean difference at 0° – 30° increments which were compared with all other increment were found to have a significant difference as the scapula rotated to a limited degree or minimal contribution during the setting phase. Paula M suggested that decreased scapular upward rotation is noted at the completion of the first phase, that is, 60° of humeral elevation in subjects with shoulder impingement is to gradually compensate the scapular rotation early proper to painful arc (60° – 120°). Thus this could be the reason for further decrease SUR in our observed finding.

Whereas the mean difference for 90° – 120° increments was also found to have significant difference when it was compared with all other increments. The scapula showed more mobility beyond 90° of humeral motion. Thereby such range was presented with lowest SHR, it is considered that scapular stabilizing muscle work more thus increasing scapular control is required.

Finally the pattern of SHR we observed during shoulder elevation in pathological subjects would include: (1) setting phase of the scapula and minimal scapular contribution (2) followed by a relative increase or decrease but an inconsistent scapular rotation contribution to humeral angles and finally followed by (3) an increasing scapular upward rotation whereas increased contribution of the scapula is depicted.

The shoulder pathological subjects showed decreased degree of SUR than that of healthy subjects. Therefore, the contribution of scapula to shoulder elevation reflected both inconsistencies in the SHR and variability in scapular movements.

Since 90 – 120 degrees shows higher scapular rotation contribution than the other shoulder elevation increments in scapular plane therefore clinicians can use overhead rehabilitation exercises for better outcome in patients with shoulder pathologies.

In conclusion the scapulohumeral rhythm for the subjects with shoulder pathologies was determined with 4.33:1 and 18.74% of scapular contribution from 0- 120 degrees to the arc of humeral elevation in the scapular plane. Therefore, one can calculate the scapulohumeral rhythm and can document the extent of scapular contribution at varying humeral angles in the shoulder pathologies by using a clinically reliable and available instrument.
REFERENCES


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Ideal Pen for Writer’s Cramp Like Symptoms – A Clinical Trial

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ABSTRACT

Background and Objectives: This study intended to find out the effect of type of ink and size of pen on writing aptitudes in subjects with symptoms of WC.

Method Materials: 40 subjects, systematically allocated to groups A to E, intervened with large diameter ballpoint, gel, ink pens and small diameter gel and ink pens. Subjects had small diameter ballpoint pen as habit pen. They were made to write with habit pen on the first day and then with one of the five intervention pens the next day. Outcome measures were pain, fatigue, speed of writing and duration for the onset of discomfort.

Results: The large diameter pens exhibited decreased pain and delayed onset of discomfort over small diameter and habit pens. The small diameter ink pen group showed significant fatigue over habit pen.

Conclusion: Large diameter pens proved to be superior of all. Further research needs to be considered.

Keywords: Pens, Writing, Occupational cramps, Diameter, Ink.

INTRODUCTION

Writing helps us to communicate better by allowing us to get out our point across without saying a word and express ourselves in a better way. Our hand performs this skill along with other functions like typing, playing music, stitching, mechanical work etc. Thus, human hand may well surpass all body parts except the brain as a topic of universal interest. Harty M has characterized human hand as “symbol of power”. Hazelton FT gave hand as “extension of intellect”. The hand of a man is a remarkable instrument, capable of performing countless actions; owing to its essential function i.e. prehension.

Prehension activities of hand involve the grasping of an object between any two surfaces in the hand. Prehensions can be broadly classified as Power grip and Precision grip. Precision grip is skillful placement of an object between fingers or fingers and thumb. The position that is assumed to hold the pen is termed as ‘three jaw chuck’ or ‘Tridigital grip’. Writing results from movements of the shoulder and hand with the to and fro movements of the are produced by the extrinsic and intrinsic muscles of hand.

Any sort of injury to the hand will hamper all these functions of the hand. One of many conditions that affect our hand is Writer’s Cramp (WC). WC is the most common dystonia occurring in the set of repetitive movement disorders. WC is a form of task specific focal dystonia. WC primarily occurs when the patient is performing specific task that require either highly repetitive movements or extreme motor...
precision. These TSDs include professions like clerks, typists, surgeons, dentists, tailors, musicians, golfers, snookers etc.6

WC is also included under the broad heading of Repetitive Strain Injuries or cumulative trauma disorders. This is defined as a chronic pain syndrome affecting the hand and/or forearm and which usually occurs in the context of activities of repetitive nature, often requiring controlled posture associated with pain in hand and wrist with weakness of grip and tight muscles.7

Most of the cases are Idiopathic.8 Chen RS (1995) stated that reciprocal inhibition is reduced in patients with WC and thus there is co-contraction of both agonist & antagonist group of muscles using Electromyography 9,10. The clinical features of WC include aching, discomfort and cramping of fingers and wrist, fatigue, impeded speed of writing, affected legibility of handwriting, in-coordination of hand with task specific movements in early stage.10 Epidemiological studies are few in number which suggest that these prevalence rates are an underestimation because of most patients never seek medical assistance.11

Diagnosis is based on a careful occupational and clinical history with the ergonomic assessment accompanying physical examination of the musculoskeletal and peripheral nervous systems.7

Various treatments have been advocated in the treatment of WC. The management of WC includes NSAIDs, splints, Physical Therapy, and Rehabilitation in the initial stage. Physical Therapy and Rehabilitation includes electrotherapy, relaxation exercises, biofeedback and ergonomic measures.

Many authors suggest ergonomic measures as the first line of management for WC. This includes avoidance of pain-inducing activities, rest periods, and change in pen holding grip, using special mould or splints to hold a pen, teaching to write by shoulder /other hand and to use different type (ink) and size (diameter) of pen. It is said to improve efficacy of writing. However, there is hardly any study that provides us with evidence that supports the advice of change in the type of pen and whether this measure actually helps in reducing the discomfort thereby increasing skill of writing. Hence, the present study was undertaken with an objective to study the effect of size and type of pen on writing skills in subjects with symptoms of WC.

MATERIALS & METHOD

It was a clinical trial with a convenient sampling design. The source of data was Students, teaching and non-teaching staff working at KLE Society’s Health science colleges. 40 subjects were recruited for the study. The subjects selected for the study were allocated systematically to 5 groups viz. Group A = Large Diameter Ballpoint Pen (LDBP), Group B = Large Diameter Gel Pen (LDGP), Group C = Large Diameter Ink Pen (LDIP), Group D = Small Diameter Gel Pen (SDGP) and Group E = Small Diameter Ink Pen (SDIP).

Inclusion criteria
- Pain and discomfort while writing within 30minutes
- Subjects with any of the symptoms of WC
- Literate who know kannada, marathi, hindi or english
- Subject willing to participate

Exclusion criteria
- Surgeries on dominant hand and wrist
- Paralysis of dominant hand muscles.
- Recent trauma or fractures in dominant hand and wrist.
- Infections and burns of dominant hand.
- Subjects using the pen, which is used in present study.
- Any other clinical disorder that affects writing except WC.

5 different types of pens were selected. Three of them were large diameter (10.5-11 mm) and two were small diameter (7-8 mm). Three types of ink were used as ballpoint, ordinary ink pen and gel ink pen, with each of them having both large and small diameter.(refer fig1)
Hand dynamometer was used for assessing the strength of the hand in units of kilograms or pounds. Stopwatch was used to record the time for dynamometer hold time. (Figure 2)

**Outcome Measures**

**Pain intensity:** Measured by means of Visual Analogue Scale (VAS). A 10cm line marked with numbers 0 to 10 was used where 0 symbolized no pain and 10 as maximum pain. Patient was asked to mark his pain on this line as per the severity.

**Fatigue:** Measured by means of Hand Dynamometer which measured hold time (in seconds) with shoulder in 90 degrees of flexion, neutral adduction and external rotation, elbow extended, forearm supinated and wrist neutral. (Figure 3)

**Speed of writing:** Measured by number of words written per minute

**Duration of writing:** Noted to compare the onset of symptoms

Consent to carry out the study was granted by the institutional ethical clearance committee. After briefing subjects about the study, written informed consent was taken. The demographic data were noted. Incidentally, for all subjects small diameter ball point pen was habit pen. On first day, the subjects were asked to write with Habit pens while on the second day they were asked to write with the intervention pen (according to the group to which the subject was allotted). Both the days’ evaluation was done for all outcome measures before and after writing. The maximum time for writing was 30 minutes. A printed paragraph (in English/ Kannada/ Marathi/ Hindi) was given to the subject to write in the preferred language. The subjects were informed to stop writing as soon as they had any discomfort or pain in the hand and the time was noted. After writing, the speed of writing was calculated.

**RESULTS**

Statistical analysis was done using the statistical software “Graph Pad Prism” 0.4 version. Paired ‘t’ test was used to compare the readings before and after writing and to measure the difference between the habit pen and intervention pen. ANOVA was used, as there were more than 2 groups so as to compare the difference between each group. Age of the subjects was between 21 to 60 years. There were a total of 18 males and 22 females in the study. All subjects matched for age, gender and duration of symptoms. The p value of <0.05 was considered to be statistically significant.

The mean difference between the VAS score of habit pen and intervention pen was (t=5.816, p=0.048) statistically significant. The average increases in VAS scores were compared between all 5 groups. For habit pen, results being not significant (F=1.004, p=0.419) and for intervention pen, results were significantly differing between the 5 groups with group E being highly significant compared to group C (F=6.768, p=0.004). (Refer Graph 1)
Fatigue score was the maximum hold time of dynamometer. Comparison of mean scores before and after writing for habit pen and intervention pen were statistically insignificant for all groups. The comparison of mean reduction in dynamometer hold time between habit pen and intervention pen was statistically significant only in group E. The scores when compared between all 5 groups for both habit pen and intervention pen showed to be statistically insignificant. (Refer Table No.1)

Table 1: Dynamometer hold time between habit and intervention pens

<table>
<thead>
<tr>
<th>Groups</th>
<th>Habit pen</th>
<th>Intervention pen</th>
<th>Value</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>A</td>
<td>-0.72</td>
<td>1.39</td>
<td>0.11</td>
<td>0.92</td>
</tr>
<tr>
<td>B</td>
<td>-0.62</td>
<td>0.87</td>
<td>-0.62</td>
<td>0.87</td>
</tr>
<tr>
<td>C</td>
<td>-0.80</td>
<td>1.52</td>
<td>-0.42</td>
<td>0.55</td>
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<tr>
<td>D</td>
<td>0</td>
<td>0.84</td>
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</tr>
<tr>
<td>E</td>
<td>0.01</td>
<td>1.26</td>
<td>-1.57</td>
<td>1.04</td>
</tr>
</tbody>
</table>

SS = Statistically Significant; NS = Not Significant

Improvement in the speed of writing was indicated by increase in the score. Comparisons were made between habit and intervention pens. The results were statistically insignificant. (Refer table 2)

Table 2: Speed of writing between habit and intervention pens

<table>
<thead>
<tr>
<th>Groups</th>
<th>Habit pen</th>
<th>Intervention pen</th>
<th>Value</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>A</td>
<td>19.13</td>
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<tr>
<td>B</td>
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<td>C</td>
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<td>D</td>
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<td>7.51</td>
<td>15.98</td>
<td>7.79</td>
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<tr>
<td>E</td>
<td>22.99</td>
<td>3.30</td>
<td>22.59</td>
<td>2.66</td>
</tr>
</tbody>
</table>

Improvement in the duration of writing was indicated by increase in the time taken for writing. The comparison of the mean duration of writing between the habit and intervention pen was statistically significant for groups A, B and C. For intervention pen, the results were not significant statistically when compared between the groups (F=2.059, p=0.107). (Refer Graph 3)
DISCUSSION

Results of the present study showed that large diameter pens were superior to small diameter pens. There was less discomfort and it took more time duration for the onset of pain when subjects used large diameter pens as compared to small diameter pens. However, speed of writing and fatigue scores were same for both large diameter and small diameter pens. All the subjects had been using SDBP prior to the study. Hence, SDBP was habit pen for all subjects.

Pain reduction in the present study was noteworthy in subjects with large diameter pens (LDBP, LDGP, LDIP) and SDGP showing a pattern of LDGP = LDIP > LDBP > SDGP. The better results with large diameter pens could be because of the larger diameter of the pens which allows for easy gripping thereby reducing the muscle work required while writing. Ball point pens use ink that is oil based and are resistant to smudging. It is suggested that a pen that has a rubber grip will make writing easier as it conforms to the user’s hand. Significant reduction in pain score was seen with small diameter gel pen also. This may be due to the smooth flowy ink which causes lesser trouble than ball point pen. Andrew Bamji (2002) stated that ball pen forces itself to be gripped tightly and that the resistance from friction or drag between the pen and paper increases the intensity of contraction of intrinsic muscles of hand, thereby provoking pain and loss of control. Few doctors also suggested that a pen with a wider grip make penmanship easier.

The current study showed significant increase in duration of onset of discomfort with large diameter pens showing a pattern of LDBP>LDIP>LDGP. The delay in the duration of onset of pain can be attributed to the wider grip diameter of the pens used which ranged from 10.5 mm to 11 mm while the small diameter pens had a diameter range from 7 mm to 8 mm. Similar results were found in a study which was done to compare two different types of ball point pens with one hour writing in 12 students without cervicobrachial disorders. The authors compared their newly made ball point pen (with cylindrical grip area that flares out at the pen tip with diameter of 11.9 to 13.6 mm along with a thick silicon rubber sleeve) and a conventional ball point pen made up of hard plastic with 8.3 mm diameter. The variables were EMG and subjective pain scores. The results suggest that after continuous writing, the new pen reduces the muscle load on the upper limb and mitigates fatigue in this area. In the current study, fatigue was shown to be occurring only with the small diameter ink pen when compared to the habit pen (SDB pen). These results can be due to uncomfortable grip and small diameter of the ink pen. The pen had no rubber grip and was made of plastic body and thus more slippery. The results of the present study cannot be attributed to fatigue per se as the time given for the subject to write was only 30 minutes.

The speed of writing calculated was not significant with any of the groups when compared between the habit pen and intervention pen. This can be attributed to the 30 minutes of writing which is a short duration to induce fatigue like symptoms, which could have in turn affected the speed of writing. Hence, the type of pens per se affecting the speed of writing cannot be commented upon and in questionable.

The present study had a few limitations. Firstly, the sample size needs to be larger for better validity of the study. Secondly, the pens were not tailor made but custom (ready) made. Thus there was no uniformity in diameter or grip was possible. Thirdly, there was no purely objective method employed in study like needle electromyography of the upper limb muscles. This could have helped to confirm the results. Lastly, long term effect or follow up was not done.

CONCLUSION

All the large diameter pens irrespective of the type of ink have been found to have better effects in improving the writing performance than the small diameter pens. However, further clinical research has to be considered trying to overcome the limitations of the study. Hence, it can be concluded that along with other ergonomic measures for subjects with WC like symptoms, an advice to use large diameter pen must be considered.

Acknowledgement: My heartfelt gratitude to all the participants and the department of Physiology for providing me with the dynamometer and the electronic chronoscope equipments.
Conflict of Interest: None Declared

Source of Support: Self funded

Ethical Clearance: Was obtained by the institutional ethical review board

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Health Related Quality of Life in Females Suffering from Polycystic Ovary Syndrome (PCOS)

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ABSTRACT

Aim of the study was to see health related quality of life in females suffering from Polycystic Ovary Syndrome PCOS. It was observational cross-sectional with diagnosed cases of PCOS between age 18–45 years. Main Outcome Measure was The Health-Related Quality of Life Questionnaire (PCOSQ) for women with polycystic ovary syndrome. The results of the study showed that in both married and unmarried females the most affected domain was found to be body weight followed by infertility. In unmarried females body hairs was also one of the most affected domain along with increased body weight and infertility. In married females infertility was the most affected domain followed by increased body weight. The present study concluded that health related quality of life is greatly affecting in females suffering from PCOS. Primarily PCOS affects body weight and followed by infertility & others issues.

Keywords: PCOS, HRQOL, Questionnaire, Quality of life.

INTRODUCTION

POLYCYSTIC ovary syndrome (PCOS) is the most common endocrine disorder among women of reproductive age in the developed world, affecting 8–18% of this population⁷. The term polycystic ovaries describes ovaries that contain many small cysts (about twice as many as in normal ovaries), usually no bigger than 8 millimeters each, located just below the surface of the ovaries. These cysts are egg-containing follicles that have not developed properly due to a number of hormonal abnormalities. PCOS is defined as the lack of ovulation caused by hormonal deficiencies. It is called Polycystic Ovarian Syndrome because many women with this disorder have multiple non-ovulated follicles on their ovaries. The disorder exhibits a variety of symptoms including oligomenorrhea, hirsutism and obesity, not all of which are necessarily present in any one woman. The disease can cause long term health defects such as diabetes, cardiovascular disease, and infertility. PCOS is also the leading cause of infertility, making the disorder an important health issue that is heavily researched.

Women with PCOS exhibit:

Amenorrhea,
Anovulation
Oligomenorrhea, and infertility due to lack of ovulation.

This can be caused by the gonadotropins LH, FSH, or the steroid hormone estradiol.

Because women with PCOS have a high level of testosterone and suffer from hyperandrogenism they tend to have excess hair growth, or hirsutism, and are more prone to oily skin and severe acne.

Three symptoms associated with PCOS:

Insulin resistance (diabetes), Obesity, and cardiovascular problems. The symptoms typically associated with polycystic ovary syndrome (PCOS) such as acne, hirsutism, irregular menses, amenorrhea, obesity and sub fertility are a major source of psychological morbidity and can negatively affect quality of life (QoL).

Overall, PCOS has a negative impact on the HR QoL of adolescent girls with the condition. Emotional
and social functioning appeared to be most affected rather than areas of physical functioning. Overweight and obesity are associated with higher odds of PCOS in adolescents.

The risk of PCOS is only minimally increased with obesity, although the degree of obesity of PCOS patients has increased, similar to that observed in the general population. These data indicate that obesity in PCOS reflects environmental factors to a great extent. As there is currently no cure, the management of PCOS is directed towards improving the patients’ health-related quality of life (HRQoL) by means of symptomatic alleviation and prevention of long-term complications (including development of the metabolic syndrome and associated sequelae, i.e., cardiovascular disease and type II diabetes mellitus).

HRQoL is defined as a multidimensional concept that encompasses physical, emotional and social aspects associated with a specific disease or its treatment (Colwell et al., 1998). HRQoL measurement therefore provides important information on the benefits of medical therapies or interventions from the patient’s perspective. This is particularly important given that subjective clinical data do not correlate with HRQoL. HRQoL measurement also has an important role in measuring the impact of chronic disease and in evaluative research as a measure of outcome, particularly in clinical trials where health status tools can assist in clinical decision-making regarding treatment choice and policy decisions.

Prior research has suggested that PCOS and its associated symptom profile have a negative effect on HRQoL. For example, acne and hirsutism have been identified as major causes of social and emotional stress and psychological morbidity. Irregular menses and infertility issues have been suggested to cause tensions within the family, altered self-perception, impaired sexual functioning and problems in the workplace.

Need of study: PCOS is one of the leading causes of fertility problems in women, if not properly managed, can lead to additional health problems in later life, can affect a woman’s appearance and self-esteem.

Complex Management of PCOS is necessary to provide comprehensive care, including nutrition, exercise, psychological counseling, and emotional support for the complex management of PCOS.

Successful treatment of PCOS that would reduce the burden of the symptoms and associated psychosocial stress should also have an important impact on woman’s HRQoL.

AIM AND OBJECTIVE

Aim: To study health-related quality of life in females suffering from Polycystic Ovary Syndrome (PCOS).

Objective: To find the maximum affected among the 5 domains of PCOS in married & unmarried females.

METHODOLOGY

Study design & Methodology:

Study design: observational cross-sectional

Study population: women with polycystic ovary syndrome (PCOS).

Location: SKNMC & GH

Sample size: 80 samples

Sampling: Purposive sampling.

Inclusion criteria-

Diagnosed case of PCOS

Age 18–45 years.

Exclusion criteria

Another major illness that substantially influenced the woman’s quality of life.

Linguistic or cognitive difficulties preventing reliable completion of the questionnaire.

Participants were excluded for abnormally elevated thyroid stimulation hormone (TSH), prolactin, and/or FSH values

No chronic disease outside PCOS.
METHODOLOGY

Aim of the study was to see health related quality of life in females suffering from Polycystic Ovary Syndrome (PCOS) and the objective was to find the maximum affected domain among the 5 domains of PCOS in married & unmarried females. It was observational cross-sectional study with 80 women with polycystic ovary syndrome (PCOS) from SKNMC & GH Narhe Pune. Purposive sampling was done. Diagnosed case of PCOS between age 18–45 years were included in the study and subjects having another major illness that substantially influenced the woman’s quality of life, linguistic or cognitive difficulties preventing reliable completion of the questionnaire, abnormally elevated thyroid stimulation hormone (TSH), prolactin, and/or FSH values were excluded.

Permission from principal of SKNCOPT & HOD of obstetrics & gynecology to conduct project was taken. Ethical clearance was taken. After taking consent from the patient questionnaire was given to the subject (PCOSQ) along with instructions.

PCOS HRQL

Successful treatment of PCOS that would reduce the burden of the symptoms and associated psychosocial stress should also have an important impact on woman’s HRQL. Therefore, the assessment of HRQL could add vital information to the evaluation of treatment effectiveness in clinical trials in PCOS, as well as to natural history studies. The PCOS HRQL questionnaire represents a new measure for women with PCOS and includes five domains: emotional, body hair, infertility, weight, and menstrual problems.(10) Instructions. This questionnaire is designed for women with Polycystic Ovary Syndrome.

RESULT & ANALYSIS

- Standardization of data is done by mean and standard deviation.

- During the course of six months 80 women with PCOS participated. The mean age of this sample was 23.5yr – (SD 2.86). The mean duration of suffering was 2.81yrs (SD 2.55). The majority of women was married and most had some education beyond high school. Many women amongst were employed.

- Table 1 explains five domains of the questionnaire which are emotion, body hair, body weight, infertility, menstrual problems. The mean score of emotion was 38.77(SD 8.33), body hair 19.95 (SD 4.07), body weight 12.16(SD 2.07), infertility 11.37 (SD 7.90), menstrual problems 16.63 (SD 2.77). This table also shows mean score of total impairment which is 98.9 (SD 12.27).

- Total data is distributed into married and un-married, out of which 40% were un-married (32 samples) 60% were married (48 samples) which is shown in fig 1.

- Fig 2 gives the summary of overall impairment amongst 80 samples under 5 domains as per PCOSQ. Higher the score, the greater the negative impact on HRQL. In order of importance from least to greatest concern were the scores for 1.( emotions), 2.(menstrual problems), 3.(body hair),4.(infertility),5. (body weight), which was the highest HRQL concern reported in this sample of 80 women with PCOS.

- Fig 3 and 4 shows impairment among un-married and married subjects respectively. Amongst un-married order of importance from least to greatest concern were the scores for1. (Emotions), 2.(menstrual problems), 3.(body hair),4.(infertility),5. (body weight), which was the highest HRQL concern reported in this sample of 32 women with PCOS.

- Amongst -married order of importance from least to greatest concern were the scores for1.( emotions), 2.(body hair), 3.(menstrual problems),4.(body weight),5.(infertility), which was the highest HRQL concern reported in this sample of 48 women with PCOS.

- Weight was the greatest concern reported by PCOS women which were un-married. Items for weight subscale included “trouble dealing with weight” and “frustration in loosing weight.” Amongst married infertility was the greatest concern reported. Items for the infertility subscale included “sadness and worry about not having children and feeling out of control.”
Table 1: Describing mean & standard deviation of the collected data

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard deviation</th>
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</thead>
<tbody>
<tr>
<td>Age</td>
<td>23.52</td>
<td>2.86</td>
</tr>
<tr>
<td>Duration of suffering</td>
<td>2.81</td>
<td>2.55</td>
</tr>
<tr>
<td>Domains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotion</td>
<td>38.77</td>
<td>8.33</td>
</tr>
<tr>
<td>Body Hair</td>
<td>19.95</td>
<td>4.07</td>
</tr>
<tr>
<td>Body Weight</td>
<td>12.16</td>
<td>2.07</td>
</tr>
<tr>
<td>Infertility</td>
<td>11.37</td>
<td>7.90</td>
</tr>
<tr>
<td>Menstrual Problems</td>
<td>16.63</td>
<td>2.77</td>
</tr>
<tr>
<td>Total impairment</td>
<td>98.9</td>
<td>12.27</td>
</tr>
</tbody>
</table>

Distribution of Data

**Figure 1**

*Overall Impairment*

**Figure 2**

*Total Data*

**Figure 3**

*Impairment among unmarried subjects*

**Figure 4**

*Impairment among married subjects*
DISCUSSION

In present study course of 6months total 80 subjects participated amongst them body weight was domain which was highly impaired i.e 27% since among females with PCOS greater deposition of visceral fat around internal organs in the abdominal region. Abdominal fat distribution is associated with increased due to lipid abnormalities followed by infertility 25%, body hair18%, menstrual problems 17% & least was emotions 13%.

In this study we also found out that, there were 32 unmarried and 48 were married females, among unmarried females body weight 23%, body hair 22%, infertility 21%, menstrual problem 19%, emotion 16%.

While in married females infertility 24%, body weight 23%, menstrual problem 22%, body hair 21%, emotion 10%.

In the previous study conducted by Judy Griffin McCook, 158 subjects suffering from PCOS participated & among them impairments they found out was in the order of Body weight, Menstrual problem, Infertility, Emotions, Body hair.

A study published in Oxford journal of medicine and health stated weight concerns have a particular negative impact upon HRQoL, although the role of body mass index in affecting HRQoL scores is inconclusive from the available evidence. Acne is the area least reported upon in terms of its impact upon HRQoL.

All of the studies have concluded that PCOS has a negative impact upon HRQoL. When compared with healthy controls (i.e. without gynaecological disorders) or normative data, it appears that women with PCOS have a worse HRQoL than their peers, with all four studies showing a worse HRQoL for the women with PCOS compared with these control groups.

Overall, the symptoms typically associated with PCOS; amenorrhoea, oligomenorrhoea, hirsutism, obesity, subfertility, anovulation and acne have all been shown to lead to a significant reduction in QoL. However, it is weight gain which appears to exert greatest negative influence upon HRQoL in PCOS.

Five cross-sectional studies that used the PCOSQ all found the weight domain to be the area most negatively affected. On a scale where 1 represents poorest functioning and 7 optimal functioning, mean PCOSQ weight scores were 2.1 (Coffey et al., 2006); 2.85 (Guyatt et al., 2004); 2.33 (McCook et al., 2005); 2.86 (Ching et al., 2007) and 2.94 (Jones et al., 2004).

McCook et al. in 2005 completed a cross-sectional, correlational study observing the influence of obesity, fertility status and androgenism scores on HRQoL in 128 adult women with PCOS in the USA (mean age: 30.4 ± 5.5 years). Body Mass Index (BMI), Waist-Hip Ratio (WHR) Ferriman-Gallwey (F/G) scores, fertility status and biochemical evaluation of hyperandrogenism were obtained from each participant. Although the demographically homogenous nature of the participants may not be representative of the PCOS population (the study sample mainly consisted of Caucasian (96.9%) and married (78.1%) women, recruited from a private reproductive medicine practice) it was found that for the five domains of the PCOSQ, the most significant was weight, followed by menstrual problems, infertility, emotions and body hair.

Metabolic Syndrome is a symptom of PCOS. Obesity in women suffering from PCOS can be associated with the high concentration of androgens in the body.

Cardiovascular disease is a health concern for women with PCOS because they tend to have high concentrations of low density lipid (LDL) cholesterol in their blood stream. Symptoms of cardiovascular disease include hypertension, and obesity.

HIRSUTISM

The negative impact of hirsutism upon both PCOS and non-PCOS women’s daily lives and well-being has been well-reported and qualitative studies in particular have highlighted the negative impact of excessive hair growth on self-image and esteem .A recent quantitative cross-sectional study, UK study, assessed the psychological and behavioural burden of unwanted facial hair in 88 women (mean age = 33.0 years) with suspected PCOS.

The studies identified in this review have shown that PCOS is a major cause of psychological morbidity
and a vast contributor to an overall diminished HRQoL. This has been supported by the qualitative research which has been carried out in this area.

The majority of studies in which the PCOSQ was applied observed that the most adversely affected domain was weight. The infertility domain of the PCOSQ was also identified as being one of the areas of poorest functioning for women with PCOS. In contrast, the domains of body hair, and emotions were frequently identified as the areas least affected by PCOS. The symptom that was least reported upon was acne. Dramusic et al. 1997 found that 87.5% of 50 adolescents with PCOS in Singapore reported being ‘unhappy about their body weight’.

**CONCLUSION**

PCOS has a significant negative impact on a woman’s HRQoL.

Health related quality of life is greatly affecting in females suffering from PCOS.

Primarily PCOS affects body weight and followed by infertility & others issues.

A greater comprehension of HRQoL in PCOS adolescents may aid in clinical decision-making with regard to the management, treatment and supportive interventions implemented. Early and effective management of PCOS may result in the improvement of HRQoL in adolescence and the transition to adulthood.

Future scope of the study

Along with PCOSQ various interventions to diagnose obesity, androgenesity can be included

Questions regarding acne can be included in further studies

**Acknowledgement** - Nil

**Conflict of Interest** – Nil

**Source of Funding** – Self

**Ethical Clearance** – Taken from Institutional ethical committee

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15) NADIR R. FARID, Evanthia Diamanti-Kandarakis; Diagnosis and Management of Polycystic Ovary Syndrome; page no 182
To Compare the Cardiovascular Fitness in Active and Sedentary Subjects Using 6 Minute Walk Test

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ABSTRACT

Background: It is well documented in literature that exercise has a beneficiary effect on cardiovascular fitness. This concept is applicable to different life styles as well. A change in life style is expected to produce a positive change in cardiovascular fitness. But not many studies have been reported which provide a quantitative data in support of this relationship. Therefore, this study was undertaken to compare the cardiovascular fitness of active and sedentary individuals using 6 minute walk test.

Design: Observational, pre-test and post-test study

Subjects and method: A Sample of 60 subjects (30 males and 30 females) took part in the study. Subjects were assigned to two groups viz. Group A (Active subjects; n=30) and Group B (sedentary subjects; n =30).

Results: The result of the study showed that there was a difference in the cardiovascular parameters between the 2 groups. The mean difference of pulse rate, systolic blood pressure and diastolic blood pressure in group A was 8.49, 15.57 and 6.81 respectively and in group B was 4.81, 5.66 and 3.65 respectively. It was also seen that the distance covered by group A was 662.5±75.06 meters, which was significantly more, as compared to that covered by group B which was 651.20±72.8 meters. Also, the results showed that the subjective feeling of exertion, after the test was greater in sedentary individuals (13.73±3.21) as compared to active individuals (12.63±2.26).

Conclusions: Based on the results of the present study, it can be concluded that active individuals are healthier as compared to sedentary individuals as far as cardiovascular fitness is concerned. Thus, the experimental hypothesis that “Cardiovascular fitness of active subjects is better as compared to sedentary subjects” holds true.

Keywords: Active, Sedentary, Cardiovascular fitness, 6MWT

INTRODUCTION

Cardiovascular fitness is the ability of the heart, lung and other organs to consume, transport and utilize oxygen. The Center for Disease Control and Prevention reported that lack of adequate exercise is most prevalent risk factor for chronic heart disease and that more than 60% of adults do not perform the minimum recommended amount of physical activity. Various exercise tests are used for diagnosis, assessment and evaluation of cardiovascular fitness. Some commonly used protocols are bicycle ergometer, METS, O2 ml/kg/min wt. and treadmill protocol (Bruce Kattus, Balke, Stanford). The most popularly used clinical exercise tests in order of increasing complexity are stair climbing, a 6MWT, a shuttle walk test, detection of exercise-induced asthma, cardiac stress test (Bruce protocol) and cardiopulmonary exercise testing.

A recent review of functional walking tests concluded that “6MWT” is easy to administer, better tolerated, and more reflective of activities of daily living than other walk tests. The 6MWT is a practical and simple test that requires a 30m hallway but requires no exercise equipment or
advanced training for technicians. This test measures the distance that a patient can quickly walk on a flat, hard surface in a period of 6 minutes (6MWD). A moderate level of physical activity reduces the risk of stroke, independent of other factors. Even mild physical activities have an important role in the primary prevention of Type 2 diabetes mellitus, through its direct effect on increased tissue sensitivity to insulin.

Furthermore, in older people regular physical activity has an important role in preventing chronic disease and prolonged end of life suffering. Moderate physical activity, which does not have to be strenuous or prolonged, includes leisure activities such as gardening and walking and is also associated with marked health benefits. It is well documented in literature that exercise has a beneficiary effect on cardiovascular fitness. This concept is applicable to different life styles as well. A change in lifestyle is expected to produce a positive change in cardiovascular fitness. But not many studies have been reported which provide a quantitative data in support of this relationship. Therefore, this study was undertaken to compare the cardiovascular fitness of active and sedentary individuals using 6 minute walk test.

AIMS AND OBJECTIVES

To compare the cardiovascular fitness in active and sedentary subjects using 6 minute walk test.

METHODOLOGY

A Sample of 60 subjects (30 males and 30 females) took part in the study. Subjects were assigned to two groups viz. Group A (Active subjects; n=30) and Group B (sedentary subjects; n =30). The subjects of this study were students of Banarsidas Chandiwala Institute of Physiotherapy, Kalkaji, New Delhi.

SELECTION CRITERIA

(A) INCLUSION CRITERIA

1. Age Group of 20-25 years.

2. Active individuals (who perform at least 20 min vigorous exercise 3 or more times per week) and sedentary individuals (who do not perform any exercise)

3. Healthy asymptomatic individuals.

4. The subject must be ready to take the Physical tests, during the course of study.

(B) EXCLUSION CRITERIA

1. Any History of cardio respiratory system disease.

2. The subject must not be having Fever or common cold on the day of examination.

3. Any history of substance abuse such as cigarette smoking or tobacco use.

4. The subject must not be previously declared unfit for any type of exercise or physical activity.

5. Any history of recent lower limb injuries or diseases.

6. Subjects having heart rate <50 beats per minute or> 100 beats per minute at rest and BP> 140/90 mm.

Design of the Study: The study was observational in nature to compare the cardiovascular fitness in active and sedentary subjects using 6 minute walk test.

PROCEDURE

The purpose of the study was explained to the subjects and they were encouraged to participate in the study. Subjects were taken in the study, only if they met the inclusion criteria.

The study was initiated only after taking an informed consent from the subject. Verbal description of the procedure was given to the subject. After this, the demographic data was collected, which included Age (years), Weight (kg), Height (cm), etc.

A base line assessment of the subject was done prior to the start of the study by evaluating the parameters such as: Exertion; (by Borg scale), Blood pressure (systolic & diastolic measured by sphygmomanometer), Pulse rate. Following this, the 6 minute walk test was conducted according to the standardized protocol. Subjects were instructed to inform immediately in case of any discomfort during the test. After completion of the test, the subjects were again evaluated for the outcome variables such as
blood pressure, pulse rate, exertion and distance covered during the 6 minute walk test. The data thus collected was recorded.

**FINDINGS**

**TABLE-1.1 Comparison of Demographic Data of Group A and GROUP B**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>VARIABLES</th>
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<th>GROUP B</th>
<th>MD</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td>MEAN</td>
<td>S.D</td>
<td>MEAN</td>
</tr>
<tr>
<td>1</td>
<td>Age (in years)</td>
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<td>2</td>
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<td>5</td>
<td>Gender ratio (M:F)</td>
<td>15:15</td>
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</table>

**TABLE 1.2 Comparisons of Pre and Post Test Measurements of Outcome Variables between Group A and B**

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<td>POST</td>
<td>MD</td>
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<td>SYSTOLIC BP (mm hg)</td>
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<td>DIASTOLIC BP (mm hg)</td>
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<td>PULSE</td>
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<td>BORG EXERTION</td>
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<td>5</td>
<td>DISTANCE COVERED(m)</td>
<td>662.52</td>
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**DISCUSSION**

Cardio vascular fitness is the ability of heart, lung, and organs to consume, transport and utilize oxygen¹⁰. Clinical assessment of individual’s response to exercise is important, as it provides global examination of the respiratory, cardiac and metabolic system. Therefore it is necessary to assess cardio vascular fitness of individuals with risk factors such as persons with sedentary lifestyle. Various tests are used clinically to assess cardio vascular fitness, the most popular cardiac tests in order of increasing complexity are stair climbing, a 6 MWT, shuttle walk test, cardiac stress test (Bruce protocol). And cardio pulmonary exercise test.
6 MWT is used as a clinical tool to predict morbidity and mortality from cardio respiratory disease. There are many studies done clinically to determine the cardio vascular fitness in diseased individual, but not much is done to determine this factor in high risk individuals and healthy individual. Therefore, this study was undertaken to provide a statistical data regarding any variation in amount of cardiovascular fitness in active and sedentary individuals.

It was found that there was a slight difference in the outcome variables (systolic and diastolic blood pressure, and exertion values) between the two groups at the start of the study .This might be attributed to the different life style of active and sedentary individuals.

The result of the study showed that there was some difference in the cardiovascular parameters between the 2 groups. (Active –group A, and Sedentary-group B).The mean difference of pulse rate, systolic blood pressure and diastolic blood pressure in group A was 8.49, 15.57 and 6.81 respectively and in group B was 4.81, 5.66 and 3.65 respectively. It was also seen that the distance covered by group A was 662.5 meters, which was significantly more, as compared to that covered by group B which was 651.20 meters. Also, the results showed that the subjective feeling of exertion after the test was greater in sedentary individuals(13.73) as compared to active individuals (12.63).

The possible reason for such result can be attributed to the fact that physiological changes occur with exercise in cardio vascular, respiratory and other systems of the body. These changes are reflected both at rest, during and after activity. It is important to note that all these training effects cannot result from one training program. It is seen that there is reduction in resting pulse rate in some individuals because of decrease in sympathetic drive with decreasing levels of nor epinephrine and epinephrine. And an apparent increase in parasympathetic(vagal) tone secondary to decreased sympathetic tone. It is also seen that a decrease in blood pressure occurs in some individuals with a decrease in peripheral vascular resistance and an increase in blood volume and hemoglobin also occurs. This facilitates the oxygen delivery capacity of the system. In some individuals there is an increase in oxygen extraction by the working muscle because of enzymatic and biochemical changes in the muscle. Greater VO₂ maximum, results in greater work capacity. The increased cardiac output increases the delivery of oxygen to the working muscle. The increased ability of the muscle to extract oxygen from the blood increases the utilization of available oxygen. There is decreased myocardial oxygen consumption (pulse rate times systolic blood pressure) for any given intensity of exercise because of decreased pulse rate, with (or without) modest decrease in blood pressure .The product can be decreased significantly in the healthy subject without any loss of efficiency at a specific workload. It is evident that during exercise, increased stroke volume occurs as a result of the increase in myocardial contractility and increase in ventricular volume which leads to muscle hypertrophy and increased capillary density. The number and size of mitochondria are increased ,increasing the capacity to generate ATP aerobically .The other possible reason could be that there is a decrease in body fat ,blood cholesterol and Triglyceride levels and also increase in heat acclimatization, breaking strength of bones ligaments and tensile strength of tendons occurs.

The findings of this study are in agreement with the findings of a study done by Aparna Sarkar, Shaily Razdan et al . They did a study to assess the cardio vascular fitness of non exercising healthy adults, using standardized 6 minute walk test. They took 15 healthy men and 15 healthy women aged 40-50 years in the study. They concluded that 6 MWD was significantly less for men and women who were heavier and shorter.

Thus, on the basis of this study, it can be inferred that cardiovascular fitness of active individuals is better as compared to sedentary individuals’ .Therefore, it is recommended to follow a regular exercise program to improve one’s cardiovascular fitness.

Future researches should use sophisticated instruments to get more accurate results and studies should be done on different age groups to provide statistical data which could be used to compare the diseased or high risk individual’s data with healthy individuals.
CONCLUSION

Based on the results of the present study, it can be concluded that active individuals are healthier as compared to sedentary individuals as far as cardiovascular fitness is concerned. Thus, the experimental hypothesis that “Cardiovascular fitness of active subjects is better as compared to sedentary subjects” holds true.

Acknowledgement: I would like to thank Dr Sanjeev Gupta, Director, Banarsidas Chandiwala Institute of Physiotherapy for his Guidance & support & Dr Abha Khurana, Ex-officio, Faculty BCIP, New Delhi for her constant support and inputs during the course of the study.

Conflict of Interest: I did not had any personal relationships that might had inappropriately influenced my actions, such as dual commitments, competing interests, or competing loyalties.

Source of Funding: The study was self financed.

Ethical Clearance: All the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was taken from the subjects prior to the study.

REFERENCES


Relationship of Age, Gender & Anthropometric Factors on Forward and Lateral Functional Reach in Standing in Normal Indian Adults

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¹Neurophysiotherapist, Kokilaben Dhirubhai Ambani Hospital,
²Additional Lecturer, All India Institute of Physical Medicine & Rehabilitation, Mumbai

ABSTRACT

Objective: To study the relationship of age, gender & anthropometric factors on forward and lateral functional reach in standing in normal Indian adults

Materials and Method: This study was conducted on 360 Indians (180 males & females) above 21 years from all regions of the country staying in Mumbai (60 subject each in the age group 21-40, 41-69, 70-87 years for both males & females), An attempt was made to include people from all parts of the country. They were evaluated by Functional Reach Test (FRT) in Forward Reach (FR) and Lateral Reach (LR) along with factors of age, gender, and anthropometric characteristics (Height, Shoulder height, Arm length, Trunk length, Leg length, Foot length, Foot breadth)

Result: In both males and females:

1. There was no significant difference (p = 0.029) in the FR and LR measures of subjects selected from the different regions of the country for each age group

2. A strong negative correlation between age and FR as well as LR (r= 0.567, p=<0.0001)

3. A strong positive correlation between FR as well as LR was found (r=0.568, p=<0.0001) for Height, shoulder height, arm length except foot length and trunk length in LR

4. A strong positive correlation between FR and LR (r=0.59, p=<0.0001)

Conclusion: Since factors of age gender & anthropometric measures affect the forward & lateral reach in adults, these factors should be given due consideration while interpreting the values.

Keywords; Balance, Adult, FRT (Functional Reach Test), FR (Forward Reach), LR (Lateral Reach).

INTRODUCTION

Postural Control is the ability to maintain the body’s center-of-gravity over the base of support during quiet standing and movement. It is a complex process involving the coordinated actions of biomechanical, sensory, motor, and central nervous system.¹ Age-related changes are observed in the postural control system, with 1/3rd of the population above 65 years reporting falls each year.² Population of Indians above 60 years has increased from 5.06% of total population in 1961, to 7.70% in 2001 and is estimated to be double (12.30%) in 2025.³

Duncan et al (1990).⁴ described that upper extremity movements during standing require preserved postural control mechanisms. The Functional Reach Test (FRT).⁴ is a reliable and valid, clinical, & inexpensive tool for standing balance.⁵,⁶ It is the maximal distance one can reach forward beyond arm’s length while maintaining balance over a fixed base of support. FRT is a measure of dynamic postural control and the margin of stability similar to center of pressure excursion.⁴ Similarly lateral
functional reach on right and left side tests balance in the coronal plane as described by Brauer et al7 & Takahashi et al8.

Duncan, et al4 found out that FR is highly reproducible, thus it is a feasible tool to use in the clinics for patients with balance problems which measures antero-posterior stability. Giorgetti et al30, Brauer et al7 and Takahashi et al8 found that lateral FR has good test-retest reliability for measuring medio lateral stability

Takahashi et al8 found that elderly people frequently experience lateral falls and suffer fractures of the femoral neck as a result. Therefore, he suggested that it is also important to examine balance in this coronal plane.

Duncan et al1 reported that in adults, age, gender, height, weight, trunk length and arm/foot length were all associated (r > 0.80) with the Forward Reach (FR) distance, the most significant being height and age.

Depending on the geographical locations, climatic and environmental conditions anthropometric detail varies (Jacobs, 1994)8,30 Differences in normative values for FR & LR has been reported as per the geographical regions9,10 thus there is a need to study the effect of age, gender and anthropometric factors on the functional reach test scores in forward and lateral direction in standing in normal Indian adults.

**MATERIALS & METHOD**

360 Indians (180 males & females) above 21 years from all regions of the country staying in Mumbai were evaluated by FRT in FR and LR. (60 subject each in the age group 21-40, 41-69, 70-87 years) were selected for both males & females. An attempt was made to include people from all parts of the country. Mumbai is one of the big metropolitan cities in India, which has a diverse range of people migrated from all over India coexisting in the city. The 10 males and 10 females subjects were selected from regions of India as categorised by National health and family survey (NHFS) namely; south, west, north, central, east and north-east as per their geographical place of origin for analysis.

Only subjects with Normal range of motion (ROM) of trunk, shoulder, hip and ankle, with no history of fall in the previous 6 months, and without any clinical manifestation of orthopaedic or neurologic condition were selected.

**Assessment:** Assessment of subjects was initiated after approval by ethical committee and university. Each of the subjects was briefed on how the test would be done and was asked to sign consent.

Measurements were taken in standing using measuring tape (in centimetres) for the following:
- Height (Relaxed standing with head level),
- Shoulder height (From the acromion process to the floor),
- Arm length (Distance from the tip of the acromian process to the head of third metacarpal),
- Trunk length (Distance between the 7th cervical and 2nd sacral vertebra),
- Leg length (From anterior superior iliac spine to the floor),
- Foot length (Length traced on a butter/white paper from the heel to the tip of the big toe),
- Foot breadth (Traced on butter/ white paper from 1st to 5th ball of foot).

**Procedure:** The Forward Reach test was done as described originally by Duncan et al, 1990.4 and lateral reach test as described by Brauer et al, 1999.7 On right upper extremity.

**Forward Reach and Lateral Reach:** The maximal distance reached beyond arm’s length, in the forward and Lateral direction.

**Method:** Subject stand with feet comfortably apart (approximately 10cm) beside the tape measure taped at the subject’s shoulder height on the wall.

The test arm is raised to 90 degrees of shoulder flexion with the elbow extended and hand fisted (figure 1.2) and the tester reads off the level of the 3rd metacarpal head positioned on the tape measure.

![Figure 1. Forward Reach](image-url)
Scores are determined by assessing the difference between the start and end position is the reach distance, usually measured in centimetres. Three trials were done and the average was noted.

Analysis of the data was using Predictive Analytic Software (PASW) Statistics 18. Baseline differences between groups were assessed using one-way ANOVA (normally distributed data), Comparison using unpaired t test and correlation using Pearson product-moment correlation coefficient statistics.

**RESULTS**

Table 1: comparison between different regions using ANOVA

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>d.f.</th>
<th>Mean</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>between</td>
<td>201.7</td>
<td>5</td>
<td>40.35</td>
<td>2.714</td>
<td>0.029</td>
</tr>
<tr>
<td>error</td>
<td>802.9</td>
<td>54</td>
<td>14.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>1005.9</td>
<td>59</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Correlation of Age with Reach values (FR and LR)

<table>
<thead>
<tr>
<th>Variables</th>
<th>r value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (21-90 yrs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR</td>
<td>-0.54</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>LR</td>
<td>-0.62</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Female (21-90 yrs)</td>
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<td></td>
</tr>
<tr>
<td>FR</td>
<td>-0.47</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>LR</td>
<td>-0.64</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Comparison of Reach between Male and Female

<table>
<thead>
<tr>
<th>Reach</th>
<th>Age group (yrs)</th>
<th>Male</th>
<th>Female</th>
<th>t-value</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR</td>
<td>21-40 (n=60)</td>
<td>38.64±5.36</td>
<td>35.74±4.06</td>
<td>4.9634</td>
<td>0.0001</td>
</tr>
<tr>
<td></td>
<td>41-69 (n=60)</td>
<td>36.51±4.44</td>
<td>32.54±4.81</td>
<td>5.7111</td>
<td>0.0001</td>
</tr>
<tr>
<td></td>
<td>70-87 (n=60)</td>
<td>30.80±2.91</td>
<td>26.57±4.61</td>
<td>6.8815</td>
<td>0.0001</td>
</tr>
<tr>
<td>LR</td>
<td>21-40 (n=60)</td>
<td>26.79±5.06</td>
<td>24.53±2.83</td>
<td>5.7964</td>
<td>0.0001</td>
</tr>
<tr>
<td></td>
<td>41-69 (n=60)</td>
<td>25.50±4.65</td>
<td>23.11±2.82</td>
<td>4.5222</td>
<td>0.0001</td>
</tr>
<tr>
<td></td>
<td>70-87 (n=60)</td>
<td>20.42±3.56</td>
<td>18.67±3.14</td>
<td>3.1786</td>
<td>0.0019</td>
</tr>
</tbody>
</table>

Table 4: Correlation of Reach with Anthropometric measures.

<table>
<thead>
<tr>
<th>Anthropometric measurements</th>
<th>Gender</th>
<th>Reach (y)</th>
<th>r-value</th>
<th>p-value</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>Male</td>
<td>Forward</td>
<td>0.81</td>
<td>0.0001</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lateral</td>
<td>0.84</td>
<td>0.0004</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>Forward</td>
<td>0.86</td>
<td>0.0001</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lateral</td>
<td>0.87</td>
<td>0.0005</td>
<td>High</td>
</tr>
<tr>
<td>Shoulder Height</td>
<td>Male</td>
<td>Forward</td>
<td>0.41</td>
<td>0.0001</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lateral</td>
<td>0.43</td>
<td>0.0004</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>Forward</td>
<td>0.48</td>
<td>0.0002</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lateral</td>
<td>0.49</td>
<td>0.0001</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
Table 4: Correlation of Reach with Anthropometric measures. (Cont...)

<table>
<thead>
<tr>
<th>Arm Length</th>
<th>Gender</th>
<th>Age group (yrs)</th>
<th>Mean±SD</th>
<th>r-value</th>
<th>p-value</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>FR</td>
<td>LR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>21-40</td>
<td>38.64±5.36</td>
<td>26.79±5.06</td>
<td>0.49</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>41-69</td>
<td>35.28±4.71</td>
<td>25.50±4.65</td>
<td>0.50</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70-87</td>
<td>30.80±2.913</td>
<td>20.42±3.56</td>
<td>0.65</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>21-40</td>
<td>35.74±4.06</td>
<td>24.43±2.83</td>
<td>0.46</td>
<td>&lt;0.0002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>41-69</td>
<td>32.54±4.81</td>
<td>23.11±2.82</td>
<td>0.59</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70-87</td>
<td>26.24±4.56</td>
<td>18.67±3.14</td>
<td>0.72</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

DISCUSSION

In view of diverse geographical nature in India (heterogeneous population), an attempt was made to include people representing population from different regions of the country.

Since, Analysis indicated that there was no significant difference in the FR and LR values between the different regions for all the three age groups for both males and females (Table 1). Hence reach values of all the regions were combined for all the three age groups

1. Reach v/s age: In this sample there was significant negative correlation in reach values as the age progress for both FR and LR (Table 2) This reflects the decrease in balance as age progress. Balance disturbances may be due to slow reaction time, reduction in nerve conduction velocity and decrease in sensory-motor and proprioceptive response. A decline in proprioceptive response, in turn, may be due to a decrease in neurons, decrease in muscle strength and postural abnormalities. All these changes affect the reaching capability of a person\textsuperscript{14,15,16} Isles et al.\textsuperscript{14} found from a study that the decline in balance with age. The decline is significant by the fourth and fifth decades, well before attention is generally paid to testing of balance or to considering strategies to maintain or improve balance performance.

2. Reach v/s gender: As seen in (Table 3) there was a statistically significant difference between males and females in forward and lateral reach in all the three age groups with reach of males better than those of females in all the age groups.

Magtoto et al.\textsuperscript{11} found that there was a significant difference in the reach values between males and females. Reach test values between Filipinos males and females show that males have greater FR values than the females. This may be due to the difference between the average heights. Therefore, taller individuals will tend to have higher FR values.

Silveira et al.\textsuperscript{12}, Duncan et al.\textsuperscript{4} reported that the men were taller and showed larger values of FR and LR in 128 volunteers, ages 21 to 87 years.

The different body heights of men and women have been assumed to contribute to the poorer
postural stability of women compared to men (Kinney LaPier et al.), and it is possible that the balance differences between men and women are mainly due to their different anthropometrics.

The presence of gender differences in sway amplitudes or velocities differs between studies (Ekhdahl et al.) the balance performance of 78 women and 74 men with some traditional functional balance tests and a force platform and found men to be more stable than women. This finding was also supported by Ojala et al., Juntunen et al. and Overstall et al. found in their study women to be less stable than men. Further, there are many studies that failed to find significant relationships with gender (Black et al.).

3. Reach v/s Anthropometric Measures: Since the reach values decrease after 40yrs (Table 4), in order to verify the effect of anthropometric measures on the FR and LR values only the individuals in the age group of 21-40yrs was considered

The present study showed a positive High to Moderate correlation for all measures considered except for foot length, trunk length in LR

Duncan et al. reported that height, trunk length, arm length were all associated (r=0.80) with the FR distance the most significant predictors were height and age.

Similarly Magtoto et al. has reported a strong positive correlation (r= 0.827) for FR and LR for Height, age, arm’s length, trunk length, and shoulder length

Silveira et al. reported that all the variables had an influence on FR, except arm length, and body weight. The variables exerting greatest influence were the individual’s gender, age and height. For LR, the height, weight, foot length and arm length variables were not significant determinants.

The total height and shoulder height of the individuals showed an influence on the mean obtained in FRT (Mary Thompson et al.). This occurred because the standing functional reach allowed greater limits of stability in a vertical posture are traditionally considered to depend on the longer lever arm longer height would have greater amplitude of movement than a shorter height (Nashner et al.).

4. Forward Reach V/S Lateral Reach: In this study a positive moderate correlation between FR and LR was found (Table 5). Hence a person with good antero-posterior stability would possess a good lateral stability as well.

FR and LR direction measures similar but unique aspects. Measurement in a single direction does not necessarily predict reach values in the other direction. Because falls occur in both directions, reach as a measure of the limit of stability needs to be asssed in both directions

Magtoto et al., Silveira et al. found that forward and lateral reach has a strong positive correlation (p>0.827) Forward reach appears to be associated with greater lateral stability.

CONCLUSION
Since factors of age gender & anthropometric measures affect the forward & lateral reach in Indian adults, these factors should be given due consideration while interpreting results.

Acknowledgement: Director, All India Institute of Physical Medicine and Rehabilitation, Mumbai for their kind support and facilities provided during the study.

Source of Funding- Self
Conflict of Interest - Nil

REFERENCES
Manual Therapy for the Management of Lumbar PIVD – an Innovative Approach

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¹Associate Professor, ²Assistant Professor, Department of Physiotherapy, Swami Vivekanand National Institute of Rehabilitation Training and Research, Cuttack, Odisha, India

ABSTRACT

Design: Experimental Pre-test – Post-test comparative analysis design

Objective: to find out the efficacy of thoracic mobilization and stretching of levator scapulae in cases of PIVD.

Methodology: 75 subjects (52 males and 23 females), (age range 25-45 years) with acute or sub-acute low back pain due to PIVD were recruited and randomly distributed in one of the three groups. Group I received Cyriax’s listing correction followed by stretching of Levator scapulae and Maitland’s rhythmic oscillatory central PA/bilateral PA mobilization of the upper thoracic spines that reproduced the original symptom and McKenzie Extension exercises. Group II received Cyriax’s listing correction – I followed by sustained lumbar. Group III received McKenzie listing correction followed by Extension exercises. Outcome Measures: Pain by Horizontal visual analog scale (VAS) and Functional outcome measure by Oswestry Disability Index (ODI). Measurements were taken before the treatment and after 4 weeks of treatment, for 5 days/week.

Results: Overall result of the study shows significant change in pain and function for all the groups after 4 weeks of treatment. At the end of treatment there was significant difference between the groups for function; however, Group II and III showed similar reduction in pain.

Conclusion: stretching of levator scapulae muscles and mobilisation of cervicothoracic spine that reproduced the original back pain with or without leg pain is found to be effective for the management of PIVD.

Keywords: Mobilisation, cervico-thoracic dysfunctions, myofascial pain syndrome, Prolapsed intervertebral disc, manual therapy, Maitland, Mckenzi, Cyriax.

INTRODUCTION

Low Back pain is one of the most common medical problems that cause a significant amount of disability and incapability. Lesions in an intervertebral disk are the most common cause of low back pain and sciatica (Pearce 1967). The annual incidence of low back pain is estimated at 5%, but only 1% develops radiculopathy. Lumbar disc prolapse is a disease most common between 30 and 50 years of age, with a male preponderance, as well as an association with repeated mechanical forces and smoking. It may occur at any level, but 95% occur at L4/5 or L5/S1 (Nick Haden 2005).

Symptoms of lumbar disc herniation are relatively common in the general population, although the prevalence rates vary widely between different studies. Symptom severity also varies and, in many patients, pain and loss of function may lead to disability and long periods of sick leave. (Gunilla Limbäck 2013)

Physiotherapy is the treatment of choice in patients with symptoms caused by a lumbar disc herniation. In clinical practice a broad range of physiotherapeutic modalities has been revealed to be helpful. During the acute stage the efficacy of the McKenzie-concept, mobilization therapies
and traction has been demonstrated in randomized controlled trials with a blind assessor.

Over the last decades there has been increasing evidence of links between manual therapy and its effect on acute low back pain due to prolapsed intervertebral disc. McKenzie developed a system of assessment and treatment for back pain based on symptom response to spinal loading. According to McKenzie, the structures will be a source of constant pain until the stress is removed either by reduction of the derangement or by an adaptive lengthening. A main parameter of evaluation is observing for centralization or peripheralization of the symptoms where centralization has shown to be a strong predictor for positive outcome of conservative care. Within session changes are presumed to occur and several studies also have confirmed that immediate changes do occur following manual therapy (Cassidy JD et al, 1992a, 1992b).

James Cyriax popularized lumbar traction during the 1950s and 1960s as a treatment for disc protrusions. Cyriax described three beneficial effects of traction - Distraction to increase the intervertebral space, tensing of the posterior longitudinal ligament to exert centripetal force at the back of the joint, Suction to draw the protrusion toward the center of the joint. Interesting effects of using traction in reducing the herniated nuclear material and low back pain have been reported in literatures (Geraldine L 1994).

However, it has been found during clinical evaluation of patients with low back pain that lateral PA pressure over L5 sometimes produces pain/discomfort over cervico-thoracic region; whereas PA pressure over upper thoracic vertebrae, compression and stretching of levator scapulae often reproduce leg pain in cases of low back pain with or without radiation. Maitland recommends rhythmic oscillatory mobilization techniques that reproduce the original pain for the management of painful spinal conditions. There are numerous studies on the effects of McKenzie extension and Cyriax concept in cases of PIVD. Therefore the aim of the present study is to find out the efficacy of thoracic mobilization and stretching of levator scapulae in cases of PIVD.

METHODOLOGY

Design: Experimental Pre-test – Post-test comparative analysis design.

Sample: 75 subjects (52 males and 23 females), (age range 25-45 years) with acute or sub-acute low back pain due to PIVD were recruited.

Inclusion Criteria:
1. Patient complain of low back pain with dermatomal pain distribution radiating down leg characterized by unilateral radiculopathy
2. Obliterated lumbar lordosis with trunk deviation away from the painful side
3. Acute or sub-acute low back pain less than 12 weeks of duration
4. Positive sciatic tension, limited straight leg raise
5. Lumbar flexion, extension and side flexion to the painful side reproduce original symptom
6. Patient’s symptoms centralizing with repeated extension movements
7. Myofacial pain syndrome of levator scapulae present, compression/stretching of which reproduce the original symptoms & Central PA pressure of upper thoracic spine also reproduce the original symptoms.

Exclusion Criteria: Contra indications to manual therapy

Sampling: Simple random sampling

OUTCOME MEASURES

Pain by VAS: Horizontal visual analog scale (VAS) was used. It is shown to be valid and sensitive (Murin and Rosen 1985, Kramer et al 1981) and has a reasonable degree of reproducibility (Revil et al 1976).

Functional outcome measure by Oswestry Disability Index (ODI)

It is composed of 10 sections (containing 10 functional activities). Each section has got 6 options, with scoring from 0-5. Patient had to mark in only one box that apply to them. This test has been shown to be reliable, valid and responsive functional outcome measure for evaluation of patients with low back pain with associated problems (Fairbank)
PROCEDURE

After the subjects fulfilling the inclusion and exclusion criteria they were assigned randomly into 3 groups after signing the written informed consent. All participants underwent an initial baseline assessment of pain by Visual analogue scale (VAS) and functions by Oswestry Disability Index. The intervention period was of 4 weeks, for 5 days/week. At the completion of 4 weeks all participants received a follow-up assessment.

1. Group I (25 subjects 17 M & 8 F) subjects received Cyriax’s listing correction followed by Levator scapulae stretching that reproduced the original symptom, Maitland’s rhythmic oscillatory central PA/bilateral PA mobilization of the upper thoracic spines that reproduced the original symptom to a greater extent and McKenzie Extension exercises.

2. Group II (25 subjects 17 male & 8 Female) subjects received Cyriax’s listing correction – I followed by sustained lumbar Traction in Prone with 40% - 50% of body weight was applied for 10 minutes.


DATA ANALYSIS

Data was analyzed using 3X2 ANOVA with one between factor (group) with three levels and one within factor (time) with two levels for ODI and VAS.

An alpha level of 0.05 of significance was set. Analysis was performed using SPSS package 16 version.

RESULTS

Oswestry Disability Index

3X2 ANOVA analysis for ODI reveals that there was main effect for time as \( F_{(2,72,0.05)} = 2.410 \) and \( p=0.000 \) (Table 1).

There was a significant effect for group as \( F_{(2,72,0.05)} = 11.599 \) and \( p=0.000 \).

There was a significant effect for time x group as \( F_{(2,72,0.05)} = 91.793 \) and \( p=0.000 \).

Tukey’s HSD analysis revealed that all the groups significantly improved with treatment. At the end of treatment, the groups were significantly different from each other (Table 2).

Visual Analog Scale

3X2 ANOVA analysis for VAS reveals that there was main effect for time as \( F_{(2,72,0.05)} = 4.578 \) and \( p=0.000 \) (Table 3).

There was a significant effect for group as \( F_{(2,72,0.05)} = 8.725 \) and \( p=0.000 \).

There was a significant effect for time x group as \( F_{(2,72,0.05)} = 33.776 \) and \( p=0.000 \).

Tukey’s HSD analysis revealed that all the groups showed significant reduction of pain with treatment. However, Group II and III showed similar reduction of pain (Table 4).

Table 1: ANOVA Table for Oswestry Disability Index (ODI)

<table>
<thead>
<tr>
<th>Between Subjects Effects</th>
<th>Sum of sq</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>754.253</td>
<td>2</td>
<td>377.127</td>
<td>11.599</td>
<td>0.000</td>
</tr>
<tr>
<td>Error</td>
<td>2340.920</td>
<td>72</td>
<td>32.513</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Subject Effect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>17604.167</td>
<td>1</td>
<td>17604.167</td>
<td>2.410</td>
<td>0.000</td>
</tr>
<tr>
<td>Time X Group</td>
<td>1341.293</td>
<td>2</td>
<td>670.647</td>
<td>91.793</td>
<td>0.000</td>
</tr>
<tr>
<td>Error</td>
<td>526.040</td>
<td>72</td>
<td>7.306</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Mean and standard error of mean (SEM in scores)

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre</th>
<th>Post</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>41.84 (0.790)</td>
<td>11.72 (0.677)</td>
<td>26.77 (0.733)</td>
</tr>
<tr>
<td>Group II</td>
<td>40.64 (1.011)</td>
<td>23.44 (0.938)</td>
<td>32.04 (0.974)</td>
</tr>
<tr>
<td>Group III</td>
<td>36.88 (0.987)</td>
<td>19.2 (0.903)</td>
<td>28.04 (0.945)</td>
</tr>
<tr>
<td>Total</td>
<td>39.786 (0.929)</td>
<td>18.12 (0.839)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Tukey’s HSD Post hoc analysis for ODI

Main effect for interaction between group and time

I Mean 1 - Mean 2 = Minimal significant difference
= q(√MSE/n)
= 4.10 (v7.306/25)
= 2.216

<table>
<thead>
<tr>
<th></th>
<th>Group I Pre (41.84)</th>
<th>Group I Post (11.72)</th>
<th>Group II Pre (40.64)</th>
<th>Group II Post (23.44)</th>
<th>Group III Pre (36.88)</th>
<th>Group III Post (19.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I Pre (41.84)</td>
<td>0</td>
<td>30.12*</td>
<td>1.2</td>
<td>18.4*</td>
<td>4.96*</td>
<td>22.64*</td>
</tr>
<tr>
<td>Group I Post (11.72)</td>
<td>30.12</td>
<td>0</td>
<td>28.92*</td>
<td>11.72*</td>
<td>25.16*</td>
<td>7.48*</td>
</tr>
<tr>
<td>Group II Pre (40.64)</td>
<td>1.2</td>
<td>28.92</td>
<td>0</td>
<td>17.2*</td>
<td>3.76*</td>
<td>21.44*</td>
</tr>
<tr>
<td>Group II Post (23.44)</td>
<td>18.4</td>
<td>11.72</td>
<td>17.2</td>
<td>0</td>
<td>13.44*</td>
<td>4.24*</td>
</tr>
<tr>
<td>Group III Pre (36.88)</td>
<td>4.96</td>
<td>25.16</td>
<td>3.76</td>
<td>13.44</td>
<td>0</td>
<td>17.68*</td>
</tr>
<tr>
<td>Group III Post (19.2)</td>
<td>22.64</td>
<td>7.48</td>
<td>21.44</td>
<td>4.24</td>
<td>17.68</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 3: ANOVA Table for VAS

Test of between subject and within subject effect

<table>
<thead>
<tr>
<th>Between Subjects Effects</th>
<th>Sum of sq</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>10.823</td>
<td>2</td>
<td>5.411</td>
<td>8.725</td>
<td>0.000</td>
</tr>
<tr>
<td>Error</td>
<td>44.658</td>
<td>72</td>
<td>.620</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Subject Effect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>1132.176</td>
<td>1</td>
<td>1132.176</td>
<td>4.578</td>
<td>0.000</td>
</tr>
<tr>
<td>Time X Group</td>
<td>16.705</td>
<td>2</td>
<td>8.352</td>
<td>33.776</td>
<td>0.000</td>
</tr>
<tr>
<td>Error</td>
<td>17.804</td>
<td>72</td>
<td>.247</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean and standard error of mean (SEM in scores)

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>8.436 (0.139)</td>
<td>2.0 (0.105)</td>
<td>5.218 (0.122)</td>
</tr>
<tr>
<td>Group II</td>
<td>8.396 (0.150)</td>
<td>3.312 (0.144)</td>
<td>5.854 (0.147)</td>
</tr>
<tr>
<td>Group III</td>
<td>7.872 (0.152)</td>
<td>2.908 (0.081)</td>
<td>5.39 (0.116)</td>
</tr>
<tr>
<td>Total</td>
<td>8.234 (0.147)</td>
<td>2.74 (.11)</td>
<td></td>
</tr>
</tbody>
</table>
**Table 4: Post hoc analysis for VAS**

Tukey’s HSD Post Hoc Analysis for VAS, Main effect for interaction between group and time

<table>
<thead>
<tr>
<th></th>
<th>Group I Pre (8.436)</th>
<th>Group I Post (2)</th>
<th>Group II Pre (8.396)</th>
<th>Group II Post (3.312)</th>
<th>Group III Pre (7.872)</th>
<th>Group III Post (2.908)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I Pre (8.436)</td>
<td>0</td>
<td>6.436*</td>
<td>0.04</td>
<td>5.124*</td>
<td>0.564*</td>
<td>5.528*</td>
</tr>
<tr>
<td>Group I Post (2)</td>
<td>6.436</td>
<td>0</td>
<td>6.396*</td>
<td>1.312*</td>
<td>5.872*</td>
<td>0.908*</td>
</tr>
<tr>
<td>Group II Pre (8.396)</td>
<td>0.04</td>
<td>6.396</td>
<td>0</td>
<td>5.084*</td>
<td>0.524*</td>
<td>5.488*</td>
</tr>
<tr>
<td>Group II Post (3.312)</td>
<td>5.124</td>
<td>1.312</td>
<td>5.084</td>
<td>0</td>
<td>4.56*</td>
<td>0.404</td>
</tr>
<tr>
<td>Group III Pre (7.872)</td>
<td>0.564</td>
<td>5.872</td>
<td>0.524</td>
<td>4.56</td>
<td>0</td>
<td>4.964*</td>
</tr>
<tr>
<td>Group III Post (2.908)</td>
<td>5.528</td>
<td>0.908</td>
<td>5.488</td>
<td>0.404</td>
<td>4.964</td>
<td>0</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Overall result of the study shows significant change in pain and function for all the groups after 4 weeks of treatment. At the end of treatment there was significant difference between the groups for function; however, Group II and III showed similar reduction in pain.

Function: All the three groups showed significant improvement in ODI with the mean improvement in Group I, II and III being 30.12, 17.2 and 17.68 respectively. The improvement in each group was significantly different from each other. The difference in improvement of ODI was most between Group I - II which was 11.72, lesser between Group I – Group III (7.48) and Group II – Group III (4.24).

Pain: All the three groups showed significant reduction in VAS score with the mean reduction in Group I, II and III being 6.436, 5.084 and 4.964 respectively. The reduction of pain in Group I (experimental group, treated by myofascial release, central PA mobilisation of Cervicothoracic spine) was significantly different from that in Group II and III which was 1.312 and 0.908 respectively. There was no significant difference in reduction of VAS score between Group II and III which was 0.404.

The thoraco-lumbar fascia acts as nature’s “back
“belt”. It spans the area from the iliac crest and sacrum up to the thoracic cage. The superficial lamina gets tensed by contraction of various muscles, such as the Latissimus dorsi, Gluteus maximus and Erector muscle. It has extensive attachments starting from posterior nuchal fascia, levator scapulae muscle cephalically to the biceps femoris and soleus muscle caudally. It also helps in transference of load through the trunk to lower extremities and as a result effectively deloads the spine if functioning appropriately (Maurit Van 1994).

Inefficient functioning of TL fascia can be due to many causes like weakness of muscles attached to fascia, fibrotic changes of muscle with loss of elastic properties. This leads to an increased load transferred through the spine gradually leading to extension loading & degeneration. Improving length of the fibrotic muscles will improve the mobility of the lumbar spine and may help in pain relief. Stretching of the levator scapulae in prone lying with the arms crossed across the chest helps the patients with low back pain with or without radiating pain by deloading the spine.

The more thoracic kyphotic curvature, the more lumbar and cervical lordosis or tendency for such (Robin Burgess 1999). With regard to the lumbar spine, the lower lumbar regions at L-4 and L-5 levels are most affected, primarily compression at the facet joints and posterior discs. Hypomobility and restriction of extension at proximal levels can lead to extension loading of lower lumbar spine giving rise to low back pain (Andrew Claus 2008). Central PA mobilization of the cervico-thoracic hypomobile segments, which reproduces the original back pain and/ or radiating pain, to increase thoracic extension helps in reducing the stress at lower lumbar spine having the disc lesion. Raymond & John Evans (1997) measured the intervertebral movements of the lumbar sacral spine produced by PA mobilization - an in vivo radiographic study, which strongly suggests that the spine is subjected to 3-point bending under the application of mechanical loads. Under the mobilization load the lumbar motion segments were found to extend. In a series of cadaveric studies, Lee and Evans (1997, 1994) noted that spinal PA mobilization produced extension moments and shear forces to lumbar motion segments. McCollam and Benson (1993) reported an increase in extension range of movement following spinal PA mobilization.

Hypomobility of spine results in compensatory segmental hypermobility of the segment above or below it. Cervico-thoracic and thoraco-lumbar spine are often found stiff with the limitation of extension range, which may lead to hypermobility of lumbo-sacral spine and progressive degeneration over time. Hypomobile spine must be mobilized so that an even distribution of movement is achieved (Andrew Claus 2008).

Drawback of myofascial release technique, central PA mobilisation of Cervicothoracic spine includes some found difficulty to tolerate the position and some complained of shoulder pain.

In Conclusion Low back pain with or without radiation to lower extremity due to PIVD is often associated with myofascial pain syndrome of periscapular muscles and cervicothoracic extension dysfunction. Though there is no anatomical link between the two, stretching of periscapular muscles and mobilisation of cervicothoracic spine is found to be effective for the management of PIVD by correcting the abnormal posture and restoring uniform spinal mobility.

Acknowledgement: All the participants of the study for their consent and co-operation

Ethical Committee approval was obtained prior to the study

Conflict of Interest – Nil

Funding - None

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Cognitive and Motor Rehabilitation in Rett’s Syndrome

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ABSTRACT

Rett’s syndrome, a pervasive development disorder, is a rare, neuro-developmental disorder that has been reported only in girl child. It is characterized by dysfunction in three core areas of early childhood development namely communication, language skills, social interaction, repetitive behaviour, and restrictive activities and interest. A case study of 7 year old girl with Rett syndrome is presented here. The girl had normal development till the age of 4 and half however, gradually over the few months, she lost her acquired, purposeful hand skills, expressive and receptive language and reciprocal social interaction. She gradually developed a broad base gait and typical stereotype hand movements. The patient is on medications for seizures. The patient is assessed on GMFM scale, Motor Assessment Scale; Brief Ataxia Rating Scale. For treatment a Comprehensive approach was used, which included help of music therapy, speech and language development program. Motor skill development with the help of hydrotherapy and hippo therapy and social rehabilitation.

Conclusion: By this case report we hope better understanding and necessity of rehabilitation in Rett’s syndrome patient for better results.

Keywords: rett’s syndrome, GMFM scale, MAS scale , Brief Ataxia Rating Scale, rehabilitation, cognition.

INTRODUCTION

Rett’s syndrome is an x linked neurodevelopmental condition characterised by loss of spoken words and development of distinctive hand stereotype. It was originally described in 1960’s by “Andrea’s Rett’s”. The clinical diagnosis is based upon consensus criteria. It is the most severely disabling syndrome of the autism spectrum disorders and its prevalence is one in 10000-15000 worldwide. It has all the features of autism, CP, Parkinson, epilepsy and anxiety disorder.

Case study: A 7 year old girl suffering from rett’s syndrome was reported in neurological outpatient department with Chief complaint of difficulty in walking, loss of purposeful hand movements, breathing abnormality and grinding of teeth. Birth History: she was a full term baby born in a normal delivery and there was no significant developmental problem. She has one elder brother. She started sitting at 8 months and walking at 15 months. She learned some single words by age of 20 months. After 24-28 months her mother reported deterioration, she have lost her speech, fine motor skills and hand movements.

The child’s present status is she screams and produce unintelligible sounds and her ability to comprehend speech was impaired .But it is possible to make eye contact with her. Bowel and bladder control was lacking and she doesn’t show any sign of voiding or urge to void. Her head circumference was 48 cm which signify microcephaly. She is also having physical deformity such as scoliosis which is convex towards left side and concave to the right. She is an endomorph by build due to poor feeding habits (only on semi-solids and liquids). She has a typical midline, purposeless hand movements- wringing, clapping. She also has episodic hyper ventilation, grinding of teeth, grimacing of face which increases with anxiety, fear or stressful activity. There is also history of seizures for which medication is going on. She is having waddling gait with wide BOS with lack of trunk rotations and pelvic movements. On examination her GMFM score was 43.58%, Brief Ataxia Rating Scale was 14/30 and Motor assessment scale was 16/30. Investigations revealed she was having MeCP2 genetic mutation present on x-
TREATMENT: Physiotherapy treatment includes three areas of intervention. In treatment

1) COGNITION: Music is used as mnemonic to teach specific academic information such as colour, numbers, letters and other factual information. In addition, customize consultation music kits for specific kits like brushing your teeth provide visual picture schedule with a motivating, fun song to rehearse and check for understanding of the skill.

2) SPEECH: Rett’s syndrome shows intense desire to communicate through their eyes, eyes gesture and their body language. There is often a delay in response to stimuli, eye gaze response, letter and word boards, touch on switch operated voice output devices, visual aids, pictures, sign language are in co operated to facilitate communication.

3) MOTOR SKILLS: aims at
   • Proprioceptive perception towards movement while improving body scheme.
   • Maintenance of spine ROM and midline perception. The movement opposite to the child natural scoliotic curve with the help of hydro therapy.

For breaking high guard posture hurdle walking, walking on different surfaces and textures was done along with arm swinging.

   • Maintaining walking ability, improving balance and equilibrium reaction with the help of hippotherapy.
   • Maintaining erect posture, sitting, standing and walking.
   • Strengthening of multifedus and abdominals on swiss ball.
   • Ataxia And Apraxia: A simple task was started that brought success and confidence and after building repo with the therapist we raise the difficulty of task.
   • Reaction Time: Rett’s syndrome has long reaction time which means several minutes can lapse between the actual performances when asking the girl to execute a certain task. She was allowed all the time she needed for active performance. It is only way by which she can process and assimilate body movement. At later time these became a movement scheme enabling her to initiate and complete motor task.

   • Rhythmic bilateral and rotational movement and breath control was introduced.

DISCUSSION

Muscle deteriotion is important characteristic of Rett’s syndrome. A comprehensive rehabilitation can help the child to maintain and can stop further deteriotion and worsening of motor features. The comprehensive treatment discussed above enabled us to shorten the treatment time at same time new treatment regime could be in-cooperated. The physical level of difficulty in treatment was raised and became more complex. E.g. working with avleen’s on protective extension was done during individual physiotherapy section. Only slowly from sitting position on mattress during this intervention it was performed with physiotherapy ball. The above physiotherapy protocol has shown improvement in breaking high guard posture and midline orientation of hand. The brief ataxia rating scale improved from 14-16, but no significance was seen in breathing pattern and bruxism.

CONCLUSION

Individuals with RS are usually extremely disabled. When physical therapy intervention is applied without atonement to the child’s emotional state she might react with lack of co operation and even obvious rejection. Such reactions can be avoided by introducing additional, motivational factors such as video films, food, animals and assistance of the child’s Family members. We believe that the treatment described in this article can open up a window of opportunity to advance treatment possibilities for children with RS exhibiting multiple disabilities. We also believe that this treatment approach can be implemented with other children exhibiting a competition of movement sensory, speech and motivational difficulties. This approach shows the even in a severe neurological disabling disorder such as RS there is always a possibility of excelling treatments and achieving additional functioning and
less disability.

**Ethical Consideration:** Ethical approval was taken from ethical committee and research Punjabi university. Special thanks to Avleen and to the parents who gave permission to use her story in this article.

**Conflict of Interest:** Was nil

**State of Funding:** Self

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The Effect of Position and Movement of the Contralateral Limb on Median Nerve Tissue Tension in Normal Asymptomatic Individuals

Swandha Majumdar¹, Rajashree Naik²

¹Masters of Physiotherapy, ²Professor and HOD, Physiotherapy Treatment & Teaching Centre, L.T.M. Medical College, Mumbai

ABSTRACT

Background: In neural tension testing, it is critically important to establish a method to investigate the relative contribution of different neuromuscular mechanisms to resistance developed during and at the limit of the upper limb tension test. There is inadequate evidence on the effect of contralateral arm on neurophysiological responses during and at the limit of median nerve tissue tension. Aim: To assess the effect of position and movement of the contralateral limb on median nerve tissue tension in normal asymptomatic young individuals. Setting & Design: This was prospective open study. 90 Normal asymptomatic individuals in age group of 18 to 25 years having unilateral Median nerve tissue tension were included in the study. Materials & Method: Plint, Goniometer & Assistant was taken to maintain the position of contralateral limb. The Median Neurodynamic test (MNT) was performed. Subject was instructed to report the first onset of pain (P1) and range of elbow extension was measured (R1). Then elbow was taken further to extension till subject’s felt submaximal pain (P2) and range of elbow extension (R2) was taken at that point. Pain was measured on visual analogue scale (VAS). Contralateral Median Neurodynamic test (CMNT) was performed and the position was maintained by the assistant. Then on the tested side Median Neurodynamic test was performed again. The parameters taken were pain at onset (P1’) and ROM of elbow extension (R1’) at that point. Elbow was taken into further extension till subject’s felt submaximal pain (P2’) and ROM of elbow extension (R2’) was taken at that point. Results: Effect of Contralateral Median neurodynamic position on intensity of pain elicited by Median Neurodynamic test at onset of pain and submaximal pain was statistically significant (p<0.001) and also on range of elbow extension was statistical significant (p<0.001). Conclusion: The contralateral limb position has an effect on ipsilateral median nerve tissue tension in terms of intensity of pain both at onset of pain & submaximal pain and elbow range of motion respectively.

Keywords: Median Neurodynamic test, Contralateral Median Neurodynamic test, submaximal pain.

INTRODUCTION

In neural tension testing, it is critically important to establish a method to investigate the relative contribution of different neuromuscular mechanisms to resistance developed during and at the limit of the upper limb tension test¹. According to Maitland’s movement diagram, it is essential to separate the different components that can be felt when a movement is examined. They therefore become essential for either teaching other people, or for teaching one’s self and thereby progressing one’s own analysis and understanding of treatment techniques and their effect on symptoms and signs².

Need of the study: The purpose of our study is to give an objective outcome measure to the tension in the neural tissue in terms of association between elbow extension range of motion and pain intensity on VAS in median nerve. Contralateral limb position is added to see its effect on these outcome measures.

Studies have not reported about any objective outcome measure to quantify their findings in their subject population. Some studies have referred to pain at onset and not maximal pain provoked, which
is mostly responsible for limitation in activities of daily living. These limitations were addressed in our study as we also considered the maximal pain provoked by the maneuver.

**AIM:** To assess the effect of position and movement of the contralateral limb on median nerve tissue tension in normal asymptomatic young individuals.

**MATERIALS & METHOD**

Materials used were

1. Plinth
2. Goniometer

Assistant was taken to maintain the position of contralateral limb.

**METHOD**

This was a prospective open study carried out in Physiotherapy O.P.D. of a tertiary care hospital. Sample size was 90. Normal asymptomatic individuals in age group of 18 to 25 years having unilateral Median nerve tissue tension were included in study. Any presence or histories of musculoskeletal dysfunction or neurological dysfunction were excluded in this study.

An advertisement was put up for enrolment of volunteers in the study. An informed written consent was taken from all the subjects who participated in this study and interviewed for any exclusion criteria. Subjects included in the study were asymptomatic and had no symptoms in their activities of daily living.

**PROCEDURE**

The Median Neurodynamic test (MNT) was described to each participant before the test was performed.

**Subject position:** supine position on a plinth with legs straight and arms by the side, shoulder at the edge of the plinth, no pillow was given, body was kept straight. Subject was requested to keep his/her eyes fixed at a point on the ceiling during the procedure, to standardized the neck position throughout the procedure.

**Therapist position:** Stride standing, facing cephalad and parallel to the subject with the near hip approximating the plinth. The near foot is placed forward.

**Therapist Hand holds:** The therapist’s near hand presses on the plinth above the subject’s shoulder, using the knuckles as a fulcrum. The therapist’s fingers then cup gently under the scapula but they are held straight and lie on the plinth. At this point, the therapist does not apply caudal pressure on the superior aspect of the shoulder. Instead, the therapist focuses on leaning firmly on their knuckles with a straight elbow, this to create friction between the knuckles and plinth so that the prevention of scapular elevation is provided by natural resistance of the therapist’s contact on the plinth rather than the therapist having to actively perform scapular depression on the subject.

The therapist’s distal hand holds the subject’s hand with a pistol grip with the subject’s thumb extended to apply tension to the motor branch of the median nerve. The therapist’s fingers wrap around the subject’s fingers, distal to the subject’s metacarpophalangeal joints.

**Sequence of Movements:**

1. Glenohumeral abduction up to 90° abduction in the frontal plane.
2. Glenohumeral external rotation up to 90°
3. Forearm supination, wrist and fingers extension
4. Elbow extension

Structural differentiation – if the symptoms were proximal, it was differentiated with release of wrist from extended position and if symptoms were distal, it was differentiated with contralateral neck flexion³.

With structural differentiation when there was change in symptoms they were labeled as for normal neurodynamic response.

The angle of elbow extension was measured with one degree calibrated goniometer. The goniometer was strapped to the upper limb with Velcro. To accommodate the subject’s position, the goniometer was aligned with the fulcrum over the medial...
humeral epicondyle, the stationary arm was aligned parallel to arm, and the moveable arm aligned with the ulnar styloid.

Subject was instructed to report the first onset of pain (P1) and range of elbow extension was measured (R1). Then elbow was taken further to extension till subject’s felt submaximal pain (P2) and range of elbow extension (R2) was taken at that point. Pain was measured on visual analogue scale (VAS).

The visual analogue scale (VAS) consists of line, 10 cm long whose ends are labeled as extremes (no pain and worst pain) the rest of the line is blank, the subject is asked to put a mark on the line indicating their pain intensity. The distance between the mark and the origin is measured in centimeter to obtain the subject’s score.

After the parameters were taken, the upper limb was taken back to starting position. Contralateral Median Neurodynamic test (CMNT) was performed and the position was maintained by the assistant. Then on the tested side Median Neurodynamic test was performed. The parameters taken were pain at onset (P1') and ROM of elbow extension (R1') at that point. Elbow was taken into further extension till subject’s felt submaximal pain (P2') and ROM of elbow extension (R2') was taken at that point.

**FINDINGS**

One-sample Kolmogorov-Smirnov test was used for testing normality of data. As the data was not normally distributed, Non parametric test, Wilcoxon signed ranks test is used for analysis of data.

**TABLE NO: 1: Wilcoxon Signed Rank test**

Effect of Contralateral Median neurodynamic position on intensity of pain elicited by Median neurodynamic test at onset of pain

<table>
<thead>
<tr>
<th></th>
<th>Mean + SD</th>
<th>Z value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNT (P1)</td>
<td>1.829 + .5060</td>
<td></td>
</tr>
<tr>
<td>CMNT with MNT(P1’)</td>
<td>1.322 + .6486</td>
<td>-6.867</td>
</tr>
</tbody>
</table>

Significant \( p = 0.000 \)

The above table shows that effect of Contralateral Median neurodynamic position on intensity of pain elicited by Median Neurodynamic test at onset of pain was statistically significant \( (p<0.001) \).

**TABLE NO: 2: Effect of Contralateral Median neurodynamic position on range of elbow extension elicited by Median neurodynamic test at onset of pain**

<table>
<thead>
<tr>
<th></th>
<th>Mean + SD</th>
<th>Z value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNT(R1)</td>
<td>142.90 + 10.279</td>
<td></td>
</tr>
<tr>
<td>CMNT with MNT(R1’)</td>
<td>149.76 + 11.274</td>
<td>-7.395</td>
</tr>
</tbody>
</table>

Significant 2 tailed \( p = 0.000 \)

The above table shows that effect of Contralateral Median neurodynamic position on range of elbow extension elicited by Median neurodynamic test at onset of pain was statistically significant \( (p<0.001) \).

**TABLE NO: 3: Effect of Contralateral Median neurodynamic position on range of elbow extension elicited by Median neurodynamic test at submaximal pain**

<table>
<thead>
<tr>
<th></th>
<th>Mean + SD</th>
<th>Z value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNT(R2)</td>
<td>158.92 + 11.725</td>
<td></td>
</tr>
<tr>
<td>CMNT with MNT(R2’)</td>
<td>170.89 + 10.457</td>
<td>-7.942</td>
</tr>
</tbody>
</table>

Significant 2 tailed \( p = 0.000 \)

The above table shows that effect of Contralateral Median neurodynamic position on range of elbow extension elicited by Median neurodynamic test at submaximal pain was statistically significant \( (p<0.001) \).
DISCUSSION

In this study 73.33% of population of the study felt stretching kind of symptoms in front of elbow and forearm and 26.66% of population felt symptoms over the thumb and index finger.

In this study, Contralateral Median Neurodynamic test was performed and the position was maintained by the assistant. Then on the tested side Median Neurodynamic test was performed. The parameters taken were pain at onset (P1’) and ROM of elbow extension (R1’) at that point. Elbow was taken into further extension till subject’s felt submaximal pain (P2’) and ROM of elbow extension (R2’) was taken at that point.

The data was analyzed with the Wilcoxon Signed test which shows the change in parameters was statistically significant p values < 0.001.

In this study, Out of 90 subjects 84.4% of population study showed improvement in symptoms i.e. decrease in pain intensity and increase in elbow extension angle and 15.5% of population showed no significant change in symptoms.

Effect of Contralateral Median neurodynamic position on intensity of pain elicited by Median Neurodynamic test both at onset of pain & at submaximal pain was statistically significant (p<0.001) and also on range of elbow extension was statistical significant (p< 0.001).

The proposed mechanism for the contralateral neurodynamic test to reduce the symptoms resides in the relationships between the angles of the nerve roots and the spinal cord movement³.

The nerve roots do not always have a straightforward exit from the spinal canal in the lower cervical and upper thoracic regions. There are persistent reports in the literature of angulated nerve roots between C3 and T9. Angulated or ‘ascending’ nerve roots mean the roots descend in the dural theca and then ascend to emerge from their respective intervertebral foramina⁵.

The cervical and lumbar nerve roots diverge from the spinal cord at an angle. This angle contains two component vectors, horizontal and vertical. The vertical vector is particular relevant because it is what produce the spinal cord movements necessary to reduce tension in the contralateral nerve root. As the contralateral neurodynamic test is performed, forces enter the spinal cord through the contralateral nerve roots. The vertical component force passing along the contralateral nerve root causes the spinal cord to descend in the canal. The downward movement of the cord is most likely small but is sufficient to transmit a reduction of tension through the vertical component of the ipsilateral held nerve root⁶.

Rubenach (1985) examined 116 asymptomatic subjects with most subjects (61.5%) reporting a decrease in symptoms to the existing ULTT1 with the addition of the CULTT. An increase was reported by 4% and 34.5% reported no change. Rubenach (1985) interpreted these findings as supporting a neuromeningeal diagnosis and stated: ‘If the response to the ULTT was due to stretch of musculoskeletal structures in the arm, it would not have changed with
movement of the other arm. 

Other possible mechanisms for the change in symptoms need to be considered. The Median Neurodynamic test involves glenohumeral abduction, which involves scapular outward rotation in order to maintain the humeral head in alignment with the glenoid fossa. The scapula articulates with the clavicle and is suspended by numerous muscles including the trapezius and rhomboids.

Mulligan has described that during shoulder girdle movement spinal movement occurs as a result of the muscle attachments from the scapula to the cervical and upper thoracic spines. The rhomboids and middle fibres of trapezius adduct the scapula and therefore would be stretched during abduction. It is possible that during the Contralateral Neurodynamic test tension is imparted to these muscles which may cause some movement at their origins which may in turn cause some movement at the spine. In the light of later research it appears that cervical spinal movement may influence the neuromeningeal tissues due to the connections between these tissues and other pain sensitive structures.

CONCLUSION

• The contralateral limb position has an effect on ipsilateral median nerve tissue tension in terms of intensity of pain and elbow range of motion.
• With contralateral limb positioning, both pain at onset and maximal pain provoked, occur later in the range of elbow extension (component of ipsilateral median nerve tissue tension), which was statistically significant (p<0.001).
• With contralateral limb positioning, improvement in pain intensity, on VAS scale, both at onset and maximal pain provoked was statistically significant (p<0.001).

CLINICAL SIGNIFICANCE

When neural tissue has high irritability, i.e. pain at rest or of high intensity, in conditions like radiculopathies, thoracic outlet syndrome etc; ipsilateral neural tissue mobilization can increase the symptoms. In these situations, contralateral neurodynamic positioning can be useful in reducing tension in ipsilateral nerve root.

With Contralateral Median Neurodynamic position we get greater range of movement in the sensitizing manoeuvres and also pain intensity is less and the patient is more comfortable and thus, it can be integrated into the rest of patient management.

Conflict of Interest: Nil

Acknowledgement: I am thankful to my guide & to the Physiotherapy department for the valuable support during the study.

Ethical Clearance: The study was approved by the ethics committee of the Municipal tertiary care hospital.

Source of Funding: Self

REFERENCES

Role of Calcaneal Frontal Plane Position and Congruence of the Medial Longitudinal Arch in Female School Teachers with and without Low Back Pain

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ABSTRACT

Introduction- Back pain is an extremely common human phenomenon; mankind has to pay to keep their posture upright. Almost 80% of persons in modern industrial society will experience back pain at some time during their life. Mechanical low back pain remains the predominant occupational health problem in most industrialized countries. Prevalence of musculoskeletal pain was 79.17% among school teachers. The most prevalent body site on which teachers reported pain was the back (63.8%). Prolonged standing was closely associated with back pain in teachers. Measurement of foot posture is widely considered to be an important component of musculoskeletal examination in clinical practice and research as variations in foot posture has been found to influence lower limb gait kinematics, muscles activity, balance and functional ability and predisposition to overuse injury.

Aim and objective-

1. To study calcaneal frontal plane position in female school teachers with and without mechanical low back pain.
2. To study congruence of medial longitudinal arch in female school teachers with and without mechanical low back pain.
3. To compare calcaneal frontal plane position and congruence of medial longitudinal arch in female school teachers with and without mechanical low back pain.

Methodology- 30 primary school female teachers fulfilling the inclusion criteria were selected. Group A (case subjects=15) consisted of teachers with mechanical low back pain and Group B (control subjects=15) consisted of the teachers without back pain. The low back pain and the feet posture were measured. A visual analog scale (VAS) was used to measure the intensity of low back pain. Calcaneal frontal plane position and height of the medial longitudinal arch were the observational equivalent of the measurements. With the patient standing in the relaxed stance position, the patient was instructed to stand still, with their arms by the side and looking straight ahead. The foot was then graded according to visual appraisal of the frontal plane position and the medial arch by observation made by taking both the arch congruence into consideration.

Results- Mean, T-value and p-value of both the groups were compared. T-value for arch height of Group A and Group B was 5.518 and for calcaneal plane position was 3.77. p-value was 1.761 for 14 degree of freedom at 5% level of significance. Therefore on the basis of overall statistical value it was found that there was significant effect of mechanical low back pain on foot posture in primary school female teachers having mechanical low back pain. The feet of female school teachers with mechanical low back pain were pronated (+2).

Conclusion- From the result of the study, it was concluded that there is a significant effect of mechanical low back pain on calcaneal frontal plane position and on the medial longitudinal arch.

Keywords- Mechanical low back pain, VAS, calcaneal frontal plane position, medial longitudinal arch Pronated foot.
INTRODUCTION

Back pain is an extremely common human phenomenon; mankind has to pay to keep their posture upright. According to a study, almost 80% of persons in modern industrial society will experience back pain at some time during their life. Prevalence of musculoskeletal pain was 79.17% among school teachers. The most prevalent body site on which teachers reported pain was the back (63.8%). School teachers represent an occupational group among which there appears a high prevalence of musculoskeletal disorders. Musculoskeletal complaints especially of the lower back are common among teachers.

Low back pain not only signifies poor quality of individual’s life, but also shows decrease in labor productivity due to off work, absenteeism and early retirement. Poor posture and improper techniques of lifting or carrying are the two very common causes of low back pain in teachers. Poor posture standing is major risk factor. This includes twisting such as turning from the board to the class and back again. Teachers prolonged posture; static works and repetition are the cause of repetitive strain injuries, which is one type of musculoskeletal disorders that directly affect the low back pain.

We all know teachers work long hours that involves standing continuously on a daily basis. This high performance daily activity leads to muscles fatigue and joints that have been over worked and over stimulated. Working in a standing position on a regular basis can cause general muscles fatigue, sore feet, swelling of the legs, varicose veins and other health problems. These are common complaints among whose jobs require prolonged standing keeping the body in an upright position requires considerable muscular effort that is particularly unhealthy even while standing motionless. Prolonged standing is closely associated with back pain in teachers. It effectively reduces the blood supply to the loaded muscles. Insufficient blood flow accelerated the onset of fatigue and causes pain in the muscles of legs and back. Measurement of foot posture is widely considered to be an important component of musculoskeletal examination in clinical practice and research as variations in foot posture has been found to influence lower limb gait kinematics, muscles activity, balance and functional ability and predisposition to overuse injury.

METHODOLOGY

Research design: Case control design

Protocol: A case control approach was used. Group A (case subjects=15) consisted of teachers with mechanical low back pain and Group B (control subjects=15) were the teachers without back pain. Low back was measured by VAS and calcaneal frontal plane position and medial longitudinal arch height were measured by The Foot Posture Index which consisted of six validated, criterion-based observations of the rear foot forefoot. The rear foot was assessed via the inversion/eversion of the Calcaneus. The observation of the forefoot consisted of assessing the congruence of medial longitudinal arch. With the patient standing in the relaxed stance position, the patients were instructed to stand still, with their arms by the side and looking straight ahead. The posterior aspect of the calcaneus was visualized in line with the long axis of the foot. The foot was then graded according to visual appraisal of the frontal plane position. Then curvature of the arch was observed from the medial side of foot. This observation was made by taking both the arch congruence into consideration.

Figure 1.1 Relaxed stance position

Figure 1.2 : Everted calcaneal position- pronated foot (+2)
Data Analysis: Mechanical low back pain and the foot posture were measured. We had measured the calcaneal frontal plane position and congruence of the medial longitudinal arch. The rear foot was assessed via the inversion/eversion of the Calcaneus. The observation of the forefoot consisted of assessing the congruence of medial longitudinal arch. A visual analog scale (VAS) was used to measure the intensity of low back pain.

GROUP-A (teachers with mechanical low back pain).

GROUP-B (teachers without mechanical low back pain).

RESULTS

Mean, T-value and p-value of both the groups were compared. T-value for arch height of Group A and Group B was 5.518 and for calcaneal plane position was 3.77. p-value was 1.761 for 14 degree of freedom at 5% level of significance. Therefore on the basis of overall statistical value it was found that there is significant effect of mechanical low back pain on foot posture in primary school female teachers having mechanical low back pain. The feet of female school teachers with mechanical low back pain were pronated (+2).

Arch height statistical values

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean (±S.D.)</th>
<th>t-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Right ft.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.With back pain</td>
<td>1.8 (0.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Without back pain</td>
<td>0.2 (0.560)</td>
<td>5.518</td>
<td>1.761</td>
</tr>
</tbody>
</table>

DISCUSSION

In this study, the foot posture of the primary school female teachers was analyzed in teachers who are having MLBP (mechanical low back pain) and who did not have MLBP using VAS (visual analog scale) for pain intensity and foot posture by the Foot Posture Index consists of six validated, criterion-based observations of the rear foot forefoot. The FPI (foot posture index) is a diagnostic clinical tool aimed at quantifying the degree to which a foot can be considered to be in a pronated, supinated or neutral position. The rear foot was assessed via the inversion/eversion of the Calcaneus. The observation of the forefoot consisted of assessing the congruence of medial longitudinal arch.

Poor posture and improper techniques of lifting or carrying were the two very common causes of low back pain in teachers. Poor posture standing is major risk factor. This included twisting such as turning from the board to the class and back again. Teachers prolonged posture; static works and repetition were the cause of repetitive strain injuries, which is one type of musculoskeletal disorders that directly affect the low back pain.

Teaching leads to stress which affects school teaching performance. The work of teachers not only involve teaching students but also preparing lessons, assessing student’s work and participating in different school work. But the present study indicated the pronated foot posture because of MLBP due to prolonged standing job of the teachers on the regular basis which can further lead to development of symptoms like plantar fasciitis refers to the inflammation of the fascia under the heel, it may lead to flat or tilted feet and bony spurs in the base of the ankle which can make the condition worse.

According to Biomechanics of low back pain by Michael A Adams, mechanical influences must be important because specific types of mechanical loading constitute the greatest known risk factors for
low back pain in general. Vertebral bodies resist most of the compressive force acting down the long axis of the spine, whereas the neural arch protects the spinal cord and provides attachment points for muscles and ligaments. The nucleus pulposus behaves like a pressurized fluid, and generates tensile ‘hoop’ stresses on the annulus so that excessive compressive loading of the spine can lead to tensile failure in the annulus. Damage is mostly located in the end-plate or in the trabeculae just behind it. Compressive damage arising from repetitive loading is probably a common event in life. Disrupted tissues give rise to localized stress concentrations which can be painful. Microscopic damage would accumulate most rapidly in tissues such as disc or tendons which are loaded severely and yet which have a poor blood supply and a low metabolic rate.

The approach of this study suggests that one should avoid prolong standing on the daily basis, teachers who are having MLBP as continuous standing can lead to severe harmful effects on the feet. Teachers who are used to stand for most of the day and having MLBP their foot posture become altered, they are having pronated foot as compared to those who do not have MLBP.

- **Limitation of the study**:
  - Small sample size.
  - Information about MLBP, musculoskeletal symptoms and other factors were obtained by self-reporting method.
  - Care should be taken during measurement of FPI.

- **Future scope of the study**:
  - It is important that future studies should compare the foot posture in females with males who are having MLBP.
  - Large sample size.

**CONCLUSION**

From the result of the study, it was concluded that there is a significant effect of mechanical low back pain on calcaneal frontal plane position and on the medial longitudinal arch.

**Acknowledgement:** I would like to thank Dr Sanjeev Gupta, Director, Banarsidas Chandiwala Institute of Physiotherapy for his Guidance & support & Dr Abha Khurana, Ex-officio, Faculty BCIP, New Delhi for her constant support and inputs during the course of the study.

**Conflict of Interest:** I did not had any personal relationships that might had inappropriately influenced my actions, such as dual commitments, competing interests, or competing loyalties.

**Source of Funding:** The study was self financed.

**Ethical Clearance:** All the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was taken from the subjects prior to the study.

**REFERENCES**

5. LizetteBorreli, Lower back pain linked to standing on your feet for just 25 minutes daily, September 24,2013.
Photographic Assessment of Upper Back Postures in Computer Users: A Validity Study

Dipti C Padole1, Trishna Korde2

1Associate Professor, Shree B.G. Patel College of Physiotherapy, J.P Road, Anand, Gujarat, 2Lecturer, Ashok and Rita Patel Institute of Physiotherapy, Charusat Education Campus, Petlad, Anand, Gujarat

ABSTRACT

Computers are firmly established as a part of everyday life for both, adults and children, in many countries as a part of ergonomics. However, prolonged static sitting is accompanied by discomfort and musculoskeletal complications due to sustained immobility. Objective of study: To test the validity of sitting postures using photographs in upright, neutral and slumped posture in computer users and justify which posture should be adopted by computer users. Need of study: There are various ways to measure the postural alterations in upper back using various equipment’s like goniometers, flexi ruler, inclinometer, radiographs. By this study we need to study the alterations in upper back posture using photographic measures and calculating the upper back angles using AutoCAD software. Inclusion criteria: Both gender between 18-35years with Right hand dominance and Undertaking computer or computype study for minimal 20hours / week were included. Exclusion criteria: subject with musculoskeletal disorders in neck or upper extremity, traumatic or post-traumatic conditions ,who compromise their ability to assume normal, upright or slumped position on the day of data collection and with Left hand dominance were excluded. Materials used: markers ,desktop computer unit with a mouse pad, desk, chair, stop watch, recording sheet, plinth/ table with books, Sony Digital camera(14.1 megapixel), AutoCAD software 32bits Methodology: A cross sectional observational study was done on 60 computer users(20/group)and were asked to play game on the computer which was a 30 min task. The pre and post NDI was assessed and sagittal head angle, cervical angle, protraction/retraction angle, thoracic angle and arm angle were assessed using AutoCAD software. Results: on the basis of intergroup comparison it was found that slumped posture showed more changes as compared to upright and neutral; while the intragroup comparison data on two-tailed ANOVA scale stated that cervical angle had maximum and protraction/retraction angle showed minimal variability (7.07 - 54.16) Conclusion: From the study conducted above it can be stated photographic measurement is a valid measure to assess the body angles. The result of this study concluded that neutral posture should be used, which may alter the developing neuromusculoskeletal disorders.

Keywords – Photographic, computer users, AutoCAD.

INTRODUCTION

The Computer Industry Almanac studied that more than 900million computers were used worldwide in 2006. Computers are used both at home and in workplaces.1 Regular computer users perform 50,000 and 200,000 keystrokes each day. About 75% users have this sedentary posture mostly computer users. However, prolonged static sitting is accompanied by discomfort and musculoskeletal complications due to sustained immobility.

There are various ways to measure the postural changes in a sitting posture. Goniometers are used to measure the angles of every joint. This is the most commonly used equipment in physiotherapy. Other ways include using a flexi ruler, inclinometer, radiographs2-4; portable ergonomic observational method and photographs for the assessment of upper back posture.

Photographic measurement of posture is considered a reliable study to measure the posture in standing; it is feasible that they would be appropriate to measure the sitting posture in adolescents.3
Ekberg et al, in 1995, stated that there is a substantial mental demand required by operating computer users as compared to the physical demands. The static load induced by these demands leads to an increase in the localised muscle fatigue which in turn results in pain and impaired muscle function.

Neck Disability Index is considered a reliable measure to study the functional limitations which impair the quality of life of people with pain. Neck disability index has a good statistical significance (Pearson’s $r = 0.89$, $p \leq 0.05$) the alpha coefficients were calculated from the questionnaire which scored of about 0.75.$^4$

**Objective of study:** To test the validity of sitting postures using photographs in upright, neutral and slumped posture in computer users and justify which posture should be adopted by them.

**Need of study:** There are various ways to measure the postural alterations in upper back using various equipment’s like goniometers, flexi ruler, inclinometer and radiographs. By this study we need to study the alterations in upper back posture using photographic measures and calculating the upper back angles using AutoCAD software.

**METHODOLOGY**

**Inclusion criteria:** • Both gender from 18-35yrs with right dominance, Undertaking computer study for minimal 20hours / week.

**Exclusion criteria:** Musculoskeletal disorders in neck, upper extremity, traumatic, post-traumatic conditions, inability to assume normal/upright/slumped position

**Study design:** Cross sectional observational study

**Study Population:** Computer users

**Selection method:** stratified random sampling

**Sample size:** Total 60 subjects (26M/34F; mean-25yrs,SD-0.338)(20/grp)

**Study centre:** As permitted by the College and University rules and regulations

**Materials used:** Markers, desktop computer with a mouse, desk, chair, stop watch, recording sheet, plinth/table with books, Digital camera (14.1 megapixel), AutoCAD software

**Procedure:** Subjects were included on the basis of the above mentioned criteria and evaluated for the baseline measurements. Informed consent was taken and patients were allocated groups (group A–upright posture, B–neutral posture, C–slumped posture). The study was conducted on the same day.

Anatomical markers were placed on seven external landmarks
1. Lateral canthus of the eye
2. Tragus of the ear
3. C7 Spinous process
4. Midpoint of the superior border of the manubrium
5. T8 spinous process
6. Lateral epicondyle of the elbow

Both C7 and T8 markers were placed with extension sticks for better visibility by the camera in lateral view. All markers were placed on dominant side and were kept until complete testing. The subjects played solitaire on the computer for 30 min and the respective postures assumed.

Pain was assessed using neck disability index before and after task.

**Procedure for data collection (validity study).**
1. Randomization for postural position done for 60 subjects. 20 subjects in each group.
2. Subjects changed into sports top (females)/take off shirt (males).
3. Markers were applied on the anatomical points of all subjects.
4. Photo was taken of name badge and subject asked to sit at the validity data collection station in randomly selected sitting posture.
5. Subject sat in same sitting posture for validity tests as allotted.
   a. To assess the accuracy of photographic measures (validity measurement)
6. Photo was taken of subject, and asked to sit at the same station in randomly selected sitting posture.
7. One photo was taken of the subject in the randomly selected sitting posture.
8. Subject stood up and walked 5feet took a turn
and sat back again in the same chair allotted, in sitting posture and photograph was again clicked.

9. Steps 7,8 were repeated until five successive photographs were clicked

Procedure of data collection (comparative study)

a. For comparative measurement:

10. Subjects sat in the same allotted sitting posture and were asked to play solitaire game.

11. One photo was taken immediately before the task then after 10 minutes and after the task was completed, i.e. after 30 minutes

12. All 60 subjects who participated in the validity study did not know about the time when the photographs were taken.

Camera positioning

For all tests, the camera was mounted on a steady surface and placed 2 metres away from the subject. The camera was positioned to get all anatomical markers in one image.

Test protocols

Approximately 6 subjects were tested per day. When they attended the testing session, subjects were randomly allocated to one of three sitting postures with forearm and hands supported on the desk in the assigned posture (upright, neutral, slumped), as outlined in Figure a, b, c respectively). Subjects who had to assume the slouched posture were given the told to “lean with arms on the table and back bend forwards”, subjects who had to assume the straight posture were asked to “sit up straight with head, shoulders and hips in line”, while subjects who assumed the normal posture were told to “sit as they would normally sit in front of a desktop computer” subjects were given two to three practice opportunities to accommodate to the assigned posture. Subjects were instructed to assume the same allocated sitting posture for all tests. The use of three postures served to ascertain whether the PPAM (Photographic posture analysis method) could validly test postural angles through sitting posture range.

Data capture from images

The photographic data was transferred to a laptop and was arranged in order. AutoCAD software was used to calculate the angles.
Statistical Analysis:- Performed with Microsoft excel, Graph pad Prism software.

Table 1:- Mean and SD for the neck disability index:

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>1.25</td>
<td>1.05</td>
<td>1.30</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.91</td>
<td>1.09</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Table 2:- Mean and SD of all angles in three different positions

<table>
<thead>
<tr>
<th></th>
<th>Upright</th>
<th>Neutral</th>
<th>Slumped</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
<td>RANGE</td>
</tr>
<tr>
<td>Sagittal Head Angle</td>
<td>4.85</td>
<td>4.37</td>
<td>(-)5-15</td>
</tr>
<tr>
<td>Cervical Angle</td>
<td>14.80</td>
<td>6.02</td>
<td>1-26</td>
</tr>
<tr>
<td>Protraction/retraction angle</td>
<td>6.50</td>
<td>10.39</td>
<td>(-)31-23</td>
</tr>
<tr>
<td>Arm angle</td>
<td>8.65</td>
<td>5.13</td>
<td>(-)7-16</td>
</tr>
<tr>
<td>Thoracic angle</td>
<td>7.65</td>
<td>6.20</td>
<td>(-)4-25</td>
</tr>
</tbody>
</table>

Table 3:- Intergroup comparison all angles in three different posture: Paired t test (t-value) and Pearson correlation (r)

<table>
<thead>
<tr>
<th></th>
<th>Group A-B</th>
<th>Group B-C</th>
<th>Group A-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>0.09</td>
<td>5.33*</td>
<td>5.11*</td>
</tr>
<tr>
<td>r</td>
<td>0.262</td>
<td>0.230</td>
<td>0.012</td>
</tr>
<tr>
<td>t</td>
<td>0.31</td>
<td>8.34*</td>
<td>11.87*</td>
</tr>
<tr>
<td>R</td>
<td>0.374</td>
<td>0.491*</td>
<td>0.331</td>
</tr>
</tbody>
</table>

Interpretation: Looking at the above mentioned tables, it can be concluded that two-tailed ANOVA test
was applied for all the angles, in various groups, cervical angle showed the maximum variation with column factor(54.16) and least variation was observed in protraction/retraction angle(7.07).

**DISCUSSION**

As concluded in the result the NDI was taken before and after the task and the mean value of difference ranged between 1.05-1.30 which showed that negligible changes were there in the pain index due to a short duration study. A similar study was conducted by Ariens GAM in 2000, ‘Are neck flexion, neck rotation and sitting at work risk factors for neck pain? A prospective cohort study’; concluded that sitting at work for more than 95% of working time seems to be a risk for neck pain and there is a trend for a positive relation between neck flexion and neck pain.

To assess the validity of photographic measurements, 5 photographs were taken as explained above and this measured angles had minimal errors which was justified by using Standard error of means. The SEM values are as:

- Upright : 0.11-0.86
- Neutral : 0.16-0.4
- Slumped : 0.14-0.5

The SEM values for all the different postures show minimal errors. The same was also concluded by Christopher Vaughan in his related article named ‘Photographic measurement of upper body sitting posture in high school student: A reliability and validity study’; published on August 20, 2008; that photographs provide valid and reliable indicators of the position of the underlying spine in sitting. Based on the results of this study, the PPAM can be used in practice as a valid measure of sitting posture.

On the statistical analysis of intergroup comparison of three different postures it can be stated as in case of all the angles individually that,

- There is no strong correlation when the groups are compared with each-other since all the R-value are< (0.5).

When upright and neutral posture was compared with each other, no statistical significance was obtained, while, when these two postures were compared with slumped posture, significant changes were found in between the postures. Hereby, we can thus conclude by stating that neutral posture should be assumed by computer users to avoid the musculoskeletal disorders as work activities should be performed with the joints at about midpoint of their range of motion. This applies particularly to the head, trunk and the upper-limbs.

As studied by San Diego, in ‘ The Active Principles of Qi Gong’ stated that, Healthy, neutral posture improves the function of internal organs, and helps harmonise the nervous system, by reducing the chronic muscle tension, lowering overall stress and decreasing tension throughout the body. The reduction of pain and sensory motor activity improves the function of nervous system. Correct posture delays many musculoskeletal degenerative disorders resulting from chronic overuse and inappropriate biomechanical relationships of joints. This adds years of positive health to persons’ life.

All the five angles were compared using two-tailed ANOVA. The column factor for all the angles altered which showed that there was a comparative change in all angles which ranged between 7.07 – 54.16.

Here the subjects were given a standardised position by placing their hands on the desk. Thus from the above results it can be concluded that the protraction/retraction angle changed minimally, this can be justified the thoracic spine is the least flexible region of the vertebral column. As, the body follows the path of least resistance, it can be explained why this angle showed mild to moderate changes. A study was conducted which showed that shoulder protraction/retraction may be biomechanically affected by the position of the arm in glenohumeral flexion and extension. This functional link could occur because of the structural linkage of multiple ligaments and muscles crossing the shoulder girdle complex.

On the other hand, the cervical angle altered maximally. This can be justified by stating that as the arm and spine was relatively stabilised, maximum changes were possible at the cervical angle, to visualise the screen. The visual display terminal
work typically involves remaining for a long time in a fixed position. A study was conducted by Szeto et al, who found that individuals increase their forward head posture during computer screen work, which involves an excessive anterior position of the head in relation to the plumb line perpendicular to the body’s center of gravity, in which the lower segment of cervical vertebrae are extended which increases the cervical angle.

Clinical implications of the study

On the basis of the results obtained we can say that as there are maximum changes in the cervical angle in upright posture as compared to neutral posture, we can interpret by stating that maximum stress would be placed on the cervical spine leading to cervical spine disorders. We should thus try to concentrate on preventive intervention for the cervical spine musculature and the ergonomics of the spine so that we can prevent the disorders occurring in the long duration.

Next, maximal changes were observed in the arm angle it may place stress on the stabilizers of the shoulder girdle and shoulder muscles leading to work related upper extremity disorders. We thus need to focus our attention on strengthening of the shoulder girdle and scapular muscles. We can thus reduce the harsh effects of weak shoulder girdle to progress towards neck disorders and distal extremities.

We need to clinically focus on the upper back as compared to lower back to avoid the harsh effects of prolonged sitting on computers.

Limitations of the study

- The markers were placed manually on all the external landmarks and the reliability was not tested.
- The chair compatibility of each person was not completely reliable.
- A more standardised digital camera with a laser beam, mounted on a tripod stand for more clear resolution.

CONCLUSION

There is no significant change in postures of upper back in upright, neutral and slumped posture using photographic assessment. From the study conducted above it can be stated photographic measurement is a valid measure to assess the body angles. The result of this study concluded that neutral posture should be used, which may alter the developing neuromusculoskeletal disorders.

Ethical Clearance: Taken from the ethical committee under Sardar Patel University

Acknowledgement: NIL

Source of Funding: Self

Conflict of Interest: NIL

REFERENCES

5. Dunk NM, Lalonde J, Callaghan JP: Implications


Effect of Aerobic Dance Exercise on Blood Pressure of Normotensive Pregnant Women Diagnosed with Gestational Diabetes at Federal Medical Centre, Owerri, South East Nigeria

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3Bachelor of Medical Rehabilitation (Physiotherapy), Federal Medical Centre, Owerri, Nigeria

ABSTRACT

Objective: To determine whether moderate intensity exercise will have any effect on the blood pressure of pregnant women with gestational diabetes.

Method: Volunteers from population of women diagnosed with gestational diabetes through the routine screening exercise for pregnant women attending antenatal in the hospital were recruited for the study and were screened further, using Physical Activity Readiness Medical Examination (PARmed-X for pregnancy), for inclusion into the study. Those that met the inclusion criteria were randomized into Exercise Group (EG) and Control Group (CG). The Exercise group participated in 8 weeks of aerobic dance exercise programmed performed three times a week at moderate intensity, with each session lasting 45mins – 60mins. The control did not participate in any organized exercise programme within the period of the study.

Result: Decrease in the blood pressure of the exercise group was observed as early as 4 weeks into the exercise programme (SBP, p = .004 and DBP, p = .001). At the end of the 8 weeks programme, the exercise group showed a significant reduction in the systolic blood pressure (p = .003), and in the diastolic blood pressure (p = .005) but within normal blood pressure range.

Conclusion: It was concluded that aerobic dance exercises could be used as non pharmacological means of preventing high blood pressure in pregnant women with gestational diabetes.

Keywords: Aerobic dance; blood pressure; pregnancy; gestational diabetes.

INTRODUCTION

Hypertensive disorders of pregnancy complicate 5–10 percent of all pregnancies and can result in a variety of maternal and fetal complications, including seizures, stroke, hepatic failure, renal failure, intrauterine growth retardation, fetal distress, premature delivery, and death. 

The pathophysiology of pregnancy-induced hypertension is poorly understood, but it is likely multifactorial; several lines of evidence suggest that glucose intolerance and insulin resistance have a role in the etiology of these diseases. Women with gestational glucose intolerance have an increased risk of developing gestational hypertension. Hypertension and diabetes are inextricably interlinked and are two major defining criteria for metabolic disorder.

Gestational diabetes Mellitus (GDM) increases the risk of hypertension and dyslipidaemia, and
hypertension in pregnancy is usually correlated with a constellation of complications classified as hypertensive disorders in pregnancy. These disorders include gestational hypertension and pre-eclampsia and they complicate up to 8% of all pregnancies.

Physical exercise has been shown to improve mild to moderate hypertension independent of weight loss or changes in body composition and can result in a decrease in both systolic and diastolic blood pressure, of 5 to 10 mm Hg.5,6

A recent meta-analysis of 54 randomized, controlled trials looking at the effects of aerobic exercise on blood pressure showed that aerobic exercise actually reduces blood pressure in both hypertensive and normotensive persons.7 Although the mechanism for this effect is not known, it is correlated with a decrease in serum insulin and triglyceride concentrations and may be related to reversing an effect of chronic hyper-insulinemia on renal sodium retention.8 There has been several studies investigating the effect of exercise on the blood pressure of women with gestational hypertension but few or no study has looked at the effect of exercise on the blood pressure of women with gestational diabetes who present with normal blood pressure. There is need to devise a preventive measure in the management of fatal conditions like gestational hypertension. Considering the fact that hypertension is a possible complication of gestational diabetes, this study investigated the possible effects of a structured aerobic exercise programme performed at moderate intensity on the blood pressure of women with gestational diabetes who have not developed hypertensive disorder, as a means of prevention of this problem. The main aim of this study is to determine the impact of aerobic dance exercise programme on the blood pressure of normotensive women with gestational diabetes.

MATERIALS & METHOD

Design: This was a randomized controlled trial to determine the effect of regular exercise on the blood pressure of women with gestational diabetes with normal range blood pressure. The study was conducted with approval from the ethical committee of the Federal Medical Centre, Owerri.
The exercise programme was led by a Physiotherapist who is also a maternal exercise instructor. The sessions held in the morning hours between 8am and 9am on Mondays, Wednesdays and Fridays.

All participants were encouraged to continue with their activities of daily living. The control group was not discouraged from their normal daily activities including physical activities as we considered discouraging them to be against current guidelines, however, they were advised against starting new unsupervised activities as all participants from the inclusion screen admitted to not having been involved in any planned exercise programme for the past 6 months. All participants underwent the same tests to ensure equal treatment and uniformity, except that the exercise group participating in the planned intervention.

**STATISTICAL ANALYSIS**

Descriptive statistics of means, standard deviations of the variables was computed. Repeated measures analysis of variance (ANOVA) was used to test the interaction within the test periods Independent sample t-test was used to compare the means of the variables between the exercise and control groups at each level. All statistical analyses were performed on an IBM compatible microcomputer, using statistical package for the social science (SPSS) (window version 15.0 Chicago IL, USA). The probability level of all tests was at P ≤ 0.05.

**FINDINGS**

Information regarding the background variables of the participants is shown on Table 1. There were no statistically significant differences in the demographic characteristics between the two groups prior to intervention at mean gestational week of 26.57 (0.96). The mean maternal age of participants was 32.00 (3.42) years for the Exercise group and 32.93 (4.61) years for the Control group.

The systolic Blood Pressure (SBP) at baseline did not differ significantly between the exercise and control groups. After 8 weeks of aerobic exercise, the SBP decreased significantly in the exercise group from 108.67 (8.84) to 104.00 (10.56) which is about 4.67mmHg (4.3%) decrease, whereas the control group demonstrated an increase from 110.67 (7.68) to 114.00 (7.36) which is about 3.33mmHg (3.0%) increase (Table 2).

Independent t test comparing the difference between the exercise and control SBP after 8 week exercise training showed that there was statistically significant difference in favour of the exercise group (t (28) =3.009, p = .003) Table 2.

The Diastolic Blood Pressure (DBP) at the baseline did not differ significantly between the exercise and control groups. After 8 weeks aerobic exercise training, the DBP decreased significantly in the exercise group by 9mmHg (11.6%) but increased by 3mmHg (5.5%) in the control group.

The DBP of the participants differed significantly after the 8 weeks training (t(28) 2.801, p = .005) in favour of the exercise group Table 3.

**DISCUSSION**

The result of this study suggests that structured aerobic exercises performed at moderate intensity could have lowering effect on the blood pressure of pregnant women with gestational diabetes. The 8-week aerobic moderate intensity (Borg scale 12-14) exercises resulted in 4.67mmHg (4.3%) decrease in SBP and 9.00mm Hg (11.6%) decrease in DBP of the experimental group. The subjects were consistent with their exercise appointments and the time duration of 45mins to 60mins for each exercise session was strictly maintained. Huang etal11 observed improvement in the SBP of sedentary older adults following 10week aerobic training. They also observed significant reduction in the DBP of their subjects.

Result of a meta-analysis12 suggested that aerobic exercise resulted in small reduction in the resting systolic and diastolic blood pressure among adult women. Another study13 observed improvement in both SBP (-7.8mmHg) and DBP (-9.6) only in high intensity exercise group but only the DBP (-8.4mmHg) was improved in moderate intensity group while the SBP was not significantly reduced (-5.2mmHg, P=0.25).13,14

This present study was conducted on pregnant women whose blood pressure were within normal range but who are at risk of gestational hypertension due to their being diagnosed with gestational...
diabetes. A study further revealed that women with gestational glucose intolerance have increased risk of developing gestational hypertension. The exercise in this study is proposed as a preventive measure against developing hypertension in pregnancy in high risk population.

The strength of this study is that it was conducted on pregnant women who are normotensive but at risk of gestational hypertension due to their diagnosis of gestational diabetes. Most studies on the effect of exercise on blood pressure were conducted on subjects with mild hypertension or established hypertension and we could not find studies in this area on pregnant population. Furthermore, there was consistency and adherence to the exercise intensity and duration. Weakness of this study is the small sample size which could not be helped as we had to make do with only those that met the inclusion criteria and complied with the rules guiding exercising in pregnancy. Despite the limitations, this study has demonstrated the benefit of exercising women with high risk for gestational hypertension and also that moderate intensity aerobic exercises could possibly reduce the risk for hypertension in women with gestational diabetes mellitus.

### Table 1: Demographic Information of the exercise and control groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exercise group (n = 15)</th>
<th>Control group (n = 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>32.00 ± 3.42</td>
<td>32.93 ± 4.61</td>
</tr>
<tr>
<td>Gestational Age (wk)</td>
<td>26.80 ± 0.94</td>
<td>26.33 ± 0.98</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>82.77 ± 14.62</td>
<td>85.23 ± 8.14</td>
</tr>
<tr>
<td>Parity</td>
<td>2.00 ± 1.50</td>
<td>2.67 ± 1.68</td>
</tr>
</tbody>
</table>

### Table 2: Changes in Systolic Blood Pressure of Exercise and Control groups

<table>
<thead>
<tr>
<th>Stage of Test</th>
<th>Exercise group (n = 15)</th>
<th>Control group (n = 15)</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>108.67 ± 8.84</td>
<td>110.67 ± 7.68</td>
<td>0.5623</td>
<td>.289</td>
</tr>
<tr>
<td>Week4</td>
<td>104.67 ± 7.43</td>
<td>112.67 ± 7.99</td>
<td>2.8397</td>
<td>.004</td>
</tr>
<tr>
<td>Week8</td>
<td>104.00 ± 10.56</td>
<td>114.00 ± 7.36</td>
<td>3.0089</td>
<td>.003</td>
</tr>
</tbody>
</table>

### Table 3: Changes in Diastolic Blood Pressure of Exercise and Control groups

<table>
<thead>
<tr>
<th>Stage of Test</th>
<th>Exercise group (n = 15)</th>
<th>Control group (n = 15)</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>77.40 ± 11.54</td>
<td>76.48 ± 10.63</td>
<td>.2271</td>
<td>.411</td>
</tr>
<tr>
<td>Week4</td>
<td>71.00 ± 10.04</td>
<td>82.00 ± 7.75</td>
<td>3.3590</td>
<td>.001</td>
</tr>
<tr>
<td>Week8</td>
<td>68.40 ± 13.46</td>
<td>80.67 ± 10.33</td>
<td>2.8008</td>
<td>.005</td>
</tr>
</tbody>
</table>

### CONCLUSION

Moderate intensity aerobic exercises could maintain normal systolic and diastolic blood pressure in normotensive pregnant women with gestational diabetes mellitus. This means that aerobic dance exercise could be used as a preventive means against gestational hypertension in women with gestational diabetes as these women are at high risk for hypertension in pregnancy.

**Acknowledgement** - Nil

**Ethical Clearance** - Was given by the Ethical Committee of the Federal Medical Centre, Owerri

**Source of Funding** - Self
REFERENCES


Effectiveness of Myofascial Release Versus Iontophoresis in the Treatment of Subjects with Plantar Fasciitis

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ABSTRACT

Objective – The purpose of the study was to compare the effectiveness of Myofascial release (MFR) and Iontophoresis in the treatment of subjects with plantar Fasciitis.

Methodology - The duration of the study was one and half year. 30 subjects were selected for the study and were divided into two groups Group A received Myofascial release technique with calf and plantar fascia stretching. Group B received Iontophoresis with calf and plantar fascia stretching. The treatment was given 10 sessions for 2 weeks and the readings were taken on VAS for pain and FFI.

Results: The result of this study shows that there is significant difference in VAS and FFI within the two groups. Inter-group analysis showed non significant difference between the two groups treatment on VAS and FFI.

Conclusion: The finding of the study support that the MFR and Iontophoresis are effective in reducing pain and functional disability in subjects with plantar Fasciitis.

Keywords: Plantar Fasciitis, Myofascial release, Iontophoresis.

INTRODUCTION

Plantar Fasciitis (PF), “the heel pain syndrome”, is a frequent cause of heel pain in the athletes as well as in non sports persons.¹ ² Plantar Fasciitis was originally described in 1812 by Wood who believed it to be the result of inflammation secondary to tuberculosis³. The common causative factors can be classified as biomechanical, environmental or anatomical.⁴ However, the most common causes of PF are overuse activities, or poor biomechanics, resulting in abnormal functional pronation.⁵ Plantar Fasciitis can occur among all age groups, sex, and ethnicity.⁶ Typically PF affect middle aged or older people, women slightly more often than men.⁷ Symptoms usually are insidious, with no history of trauma. The periods of sharp pain experienced upon taking the first few steps after arising from bed in the morning, but lessen as walking continues⁸. Prolonged weight bearing aggravate the pain, rest tends to decrease.⁹ The pain pattern lessens during day activity, but increases as the activity intensifies.¹⁰

In a study done by Suman Kuhar, concluded that MFR is an effective therapeutic option in treatment of PF¹⁰. Gudeman and et al in there study said that Iontophoresis is beneficial in the treatment of PF.¹¹

Studies have shown that both MFR and Iontophoresis are effective as individual approaches for the treatment of plantar fasciitis, but there are no specific studies done to compare the effect of both and find out which is more effective of the two. Hence the current study was done to compare the effectiveness of Myofascial release and Iontophoresis in the treatment of patients with plantar Fasciitis.

PURPOSE OF STUDY

The purpose of this study was to compare the effectiveness of Myofascial release (MFR) and Iontophoresis in the treatment of subjects with plantar fasciitis.

Objectives:

• To find the effect of Myofascial release
technique in reducing pain and improving function in subjects with plantar Fasciitis.

- To find the effect of Iontophoresis in reducing pain and improving function in subjects with plantar Fasciitis.

- To compare the effectiveness of Myofascial release and Iontophoresis in reducing pain and improving function in subjects with plantar Fasciitis.

**MATERIALS & METHOD**

The subjects were collected from the O.P.D of DAV institute of physiotherapy and rehabilitation, Jalandhar.

Quasi experimental study design used.

Duration of the study: one and half year.

**Inclusion Criteria:**

- Subjects age between 30-60 years
- Both males and females
- Pain for not less than 6 weeks
- Heel pain felt maximally over the plantar aspect
- Pain in the heel on the first step in the morning,
- Those that was willing to participate in the study

**Exclusion criteria:**

- Any infective conditions of foot, dermatitis
- Impaired circulation to lower extremities
- Arthritic conditions
- Any rigid foot deformities
- Tumour/ malignancy
- History of any foot fracture
- History of allergy to dexamethasone
- Diabetic foot
- Any bony infections
- Corticosteroids injection in previous month

**Protocol:** A written consent was taken. Total of 35 subjects participated according to inclusion criteria of which 5 dropped out. Remaining 30 subjects were assessed for functional disability with Foot Function Index (FFI) and pain intensity was measured on the Visual Analogue Scale (VAS). They were divided into two equal groups via convenient sampling:

GROUP A: Myofascial release technique, calf stretching, plantar fascia stretching.

GROUP B: Iontophoresis, calf stretching, plantar fascia stretching.

The treatment was given for 10 sessions in 2 weeks. The readings were taken on the 1st session (pre treatment), 4th, 7th and 10th (post treatment) session on VAS for pain and FFI.

**PROCEDURE**

**Myofascial Release Technique:** Patient in prone lying and feet’s off the table. Therapist standing at the foot end. Knuckles, fist, plantar cupping, or fingers were used to engage with the soft tissue just anterior of the calcaneus.[10,12] Line of tension was taken up in an anterior direction. Working progressively through to the ball of the foot as well as into deeper layers in subsequent passes, patient was asked to lift his toes, with the directions ‘lengthen the bottom of foot by taking toes under the table towards the knee cap.’ Dorsiflexion can also be used in conjunction with this.[12] The technique was given for 15 minutes.[10]

**Iontophoresis:** The patient prone lying with legs supported. Dexamethasone had negative polarity so was added to the delivering pad and connected to cathode (negative), and placed on the site of maximum tenderness on the plantar aspect of the foot. The other electrode was placed just above the treatment area over the Achilles tendon and connected to anode (positive) [6,13]. The negative electrode (cathode) used was two times larger than (anode) positive electrode size [14,13]. 0.4% dexamethasone was delivered using Chattanooga Intelect advance multi-current device version 3.9 which included Iontophoresis facilities. Current applied was up to 4 mA, depending on each patient’s sensitivity and a total dose of 40 mA.min was delivered.[16]

**Calf stretching:** Patient in standing position. Active calf stretching was done with the affected foot furthest away from the wall. Patients were instructed to lean forward, while keeping the heel on the floor until stretch was felt in the calf. To focus stretching on Soleus muscle, the affected knee was bent, whereas to focus on the Gastrocnemius muscle the affected knee was kept in full extension.[17]

**Plantar fascia stretching:** For this the patient was in sitting position, with the affected foot over the
contra-lateral thigh, the patient was asked to place the fingers over the base of the toes and was instructed to pull the toes up towards the shin.\textsuperscript{[17]}

Intermittent stretching was done with 20 seconds hold, followed by 20 seconds rest for a total of 3 minutes of each stretch. Hence the total self stretching will last for 9 minutes.\textsuperscript{[17]}

**Home protocol:** Patients were asked to do active calf and plantar fascia stretching once at home.

**Data analysis and results:**
The data was analysed using SPSS version 13. Intergroup and intragroup comparison was done.

**Table 1: Subject age description**

<table>
<thead>
<tr>
<th>GROUP</th>
<th>MEAN ± SD</th>
<th>t-VALUE</th>
<th>p-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>50.46 ± 10.46</td>
<td>.853</td>
<td>.401 (NS)</td>
</tr>
<tr>
<td>B</td>
<td>47.66 ± 7.30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2: Comparison within group A for VAS**

<table>
<thead>
<tr>
<th>SESSIONS</th>
<th>MEAN ± SD</th>
<th>t-VALUE</th>
<th>p-value (significance)</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session 1 vs session 4</td>
<td>70.66 ± 9.60, 58.66 ± 16.12</td>
<td>3.613</td>
<td>.003 (S)</td>
<td></td>
</tr>
<tr>
<td>Session 1 Vs Session 7</td>
<td>70.66 ± 9.60, 34.26 ± 13.86</td>
<td>11.319</td>
<td>.000 (S)</td>
<td></td>
</tr>
<tr>
<td>Session 1 Vs Session 10</td>
<td>70.66 ± 9.60, 13.13 ± 11.45</td>
<td>16.258</td>
<td>.000 (S)</td>
<td></td>
</tr>
<tr>
<td>Session 4 Vs Session 7</td>
<td>58.66 ± 16.12, 34.26 ± 13.86</td>
<td>9.979</td>
<td>.000 (S)</td>
<td></td>
</tr>
<tr>
<td>Session 4 Vs Session 10</td>
<td>58.66 ± 16.12, 13.13 ± 11.45</td>
<td>17.562</td>
<td>.000 (S)</td>
<td></td>
</tr>
<tr>
<td>Session 7 Vs Session 10</td>
<td>34.26 ± 13.86, 13.13 ± 11.45</td>
<td>8.299</td>
<td>.000 (S)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>148.730</td>
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</table>
Table 3: Within group comparison of FFI (group A)

<table>
<thead>
<tr>
<th>SESSIONS</th>
<th>MEAN ± SD</th>
<th>t-VALUE</th>
<th>p-value (Significance)</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session 1 vs Session 4</td>
<td>54.25 ± 13.25</td>
<td>38.09 ± 14.31</td>
<td>4.979</td>
<td>.000 (S)</td>
</tr>
<tr>
<td>Session 1 Vs Session 7</td>
<td>54.25 ± 13.25</td>
<td>21.41 ± 11.23</td>
<td>11.696</td>
<td>.000 (S)</td>
</tr>
<tr>
<td>Session 1 Vs Session 10</td>
<td>54.25 ± 13.25</td>
<td>7.45 ± 8.82</td>
<td>14.147</td>
<td>.000 (S)</td>
</tr>
<tr>
<td>Session 4 Vs Session 7</td>
<td>38.09 ± 14.31</td>
<td>21.41 ± 11.23</td>
<td>12.260</td>
<td>.000 (S)</td>
</tr>
<tr>
<td>Session 4 Vs Session 10</td>
<td>38.09 ± 14.31</td>
<td>7.45 ± 8.82</td>
<td>16.393</td>
<td>.000 (S)</td>
</tr>
<tr>
<td>Session 7 Vs Session 10</td>
<td>21.41 ± 11.23</td>
<td>7.45 ± 8.82</td>
<td>9.944</td>
<td>.000 (S)</td>
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Table 4: Comparison within group B for VAS

<table>
<thead>
<tr>
<th>SESSIONS</th>
<th>MEAN ± SD</th>
<th>t-VALUE</th>
<th>p-value (significance)</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session 1 Vs Session 4</td>
<td>67.26 ± 17.64</td>
<td>51.20 ± 20.33</td>
<td>6.485</td>
<td>.000 (S)</td>
</tr>
<tr>
<td>Session 1 Vs Session 7</td>
<td>67.26 ± 17.64</td>
<td>29.13 ± 14.48</td>
<td>15.875</td>
<td>.000 (S)</td>
</tr>
<tr>
<td>Session 1 Vs Session 10</td>
<td>67.26 ± 17.64</td>
<td>11.86 ± 11.32</td>
<td>15.151</td>
<td>.000 (S)</td>
</tr>
<tr>
<td>Session 4 Vs Session 7</td>
<td>51.20 ± 20.33</td>
<td>29.13 ± 14.48</td>
<td>7.490</td>
<td>.000 (S)</td>
</tr>
<tr>
<td>Session 4 Vs Session 10</td>
<td>51.20 ± 20.33</td>
<td>11.86 ± 11.32</td>
<td>9.279</td>
<td>.000 (S)</td>
</tr>
<tr>
<td>Session 7 Vs Session 10</td>
<td>29.13 ± 14.48</td>
<td>11.86 ± 11.32</td>
<td>8.942</td>
<td>.000 (S)</td>
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127.818
Table 5: Within group comparison of FFI (group B)

<table>
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<tr>
<th>SESSIONS</th>
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<th>p-value (significance)</th>
<th>F-value</th>
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<tbody>
<tr>
<td>Session 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>vs Session 4</td>
<td>56.91 ± 17.11</td>
<td>7.181</td>
<td>.000 (S)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>38.79 ± 16.21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Session 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vs Session 7</td>
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<td>9.884</td>
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<tr>
<td></td>
<td>21.65 ± 11.15</td>
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<tr>
<td>Session 1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Vs Session 10</td>
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<td>10.903</td>
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<tr>
<td></td>
<td>7.41 ± 9.77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Session 4</td>
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<td></td>
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</tr>
<tr>
<td>Vs Session 7</td>
<td>38.79 ± 16.21</td>
<td>7.710</td>
<td>.000 (S)</td>
<td>89.642</td>
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<td></td>
<td>21.65 ± 11.15</td>
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<td>Session 4</td>
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</tr>
<tr>
<td>Vs Session 10</td>
<td>38.79 ± 16.21</td>
<td>8.673</td>
<td>.000 (S)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.41 ± 9.77</td>
<td></td>
<td></td>
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<tr>
<td>Session 7</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Vs Session 10</td>
<td>21.65 ± 11.15</td>
<td>7.450</td>
<td>.000 (S)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.41 ± 9.77</td>
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</table>

Table 6: Comparison between group A and B for VAS

<table>
<thead>
<tr>
<th>SESSIONS</th>
<th>GROUP A MEAN ± SD</th>
<th>GROUP B MEAN ± SD</th>
<th>t-VALUE</th>
<th>p-value (significance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session 1</td>
<td>70.66 ± 9.60</td>
<td>67.26 ± 17.64</td>
<td>.656</td>
<td>.517 (NS)</td>
</tr>
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<td>Session 4</td>
<td>58.66 ± 16.12</td>
<td>51.20 ± 20.33</td>
<td>1.114</td>
<td>.275 (NS)</td>
</tr>
<tr>
<td>Session 7</td>
<td>34.26 ± 13.86</td>
<td>29.13 ± 14.48</td>
<td>.992</td>
<td>.330 (NS)</td>
</tr>
<tr>
<td>Session 10</td>
<td>13.13 ± 11.45</td>
<td>11.86 ± 11.32</td>
<td>.305</td>
<td>.763 (NS)</td>
</tr>
</tbody>
</table>

Table 7: Comparison between group A and B for FFI

<table>
<thead>
<tr>
<th>SESSION</th>
<th>GROUP A MEAN ± SD</th>
<th>GROUP B MEAN ± SD</th>
<th>t-VALUE</th>
<th>p-value (significance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session 1</td>
<td>54.25 ± 13.25</td>
<td>56.91 ± 17.11</td>
<td>0.476</td>
<td>0.638 (NS)</td>
</tr>
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<td>Session 4</td>
<td>38.09 ± 14.31</td>
<td>38.79 ± 16.21</td>
<td>0.125</td>
<td>0.901 (NS)</td>
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<tr>
<td>Session 7</td>
<td>21.41 ± 11.23</td>
<td>21.65 ± 11.15</td>
<td>0.058</td>
<td>0.954 (NS)</td>
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<tr>
<td>Session 10</td>
<td>7.45 ± 8.82</td>
<td>7.41 ± 9.77</td>
<td>0.009</td>
<td>0.993 (NS)</td>
</tr>
</tbody>
</table>
RESULTS

Within group analysis of group A and B shows statistically significant improvement in pain and functional disability as measured on VAS and FFI. Inter group analysis between groups A and B shows that there is statistically non significant difference between the two groups. Both the group decreases pain and functional disability as measured on VAS and FFI, but when compared in between the difference is statistically non significant.

DISCUSSION

In the current study goal of plantar fascia specific stretching is to optimize tissue tension through a controlled stretch of the plantar fascia by recreating the windlass- mechanism \[3, 18\]. The stretching of tightened plantar fascia and tendo - Achilles played an important role in breaking the vicious cycle which aggravated the condition, so to maintain and restore the proper biomechanics and maintain integrity of the muscles and related tissue stretching was done \[19\]. According to Garrett R. Troy Gastrocnemius-Soleus stretching is beneficial for the plantar Fasciitis treatment as tight calf muscles contribute to the pathology. When the plantar fascia stretching is performed prior to first step in the morning or inactivity, it helps to limit micro-trauma to plantar fascia thereby facilitating healing \[18\].

MFR is a hand on soft tissue technique that facilitates a stretch into restricted fascia. John Barnes stated that when a sustained pressure is applied to the restricted tissue barrier; after 90-120 seconds tissue undergoes histological length changes. After few release fascia becomes softer and more pliable and taking pressure off the pain sensitive structures \[20\]. Moreover, MFR has been shown to stimulate fibroblast proliferation, leading to collagen synthesis that may promote healing of plantar fascia thus helpful in reducing pain and improving functional ability \[21\]. According to Kuhar etal, MFR technique is used to ease pressure in the fibrous bands of the connective tissue, or fascia. Gentle and sustained stretching via Myofascial release is believed to free adhesions and soften and lengthen the fascia. Some practitioners contend that MFR works on a broader swath of muscles and connective tissue. The movement has been linked to kneading a piece of taffy- a gentle stretching that gradually softens, lengthens, and realigns the fascia. MFR seeks for changes in the Myofascial structures by stretching, elongation of fascia or mobilizing adhesive tissues \[10, 19\].

Iontophoresis is a non invasive and painless procedure for the local administration of anti-inflammatory medications. Being non invasive the sterility barrier of the skin is not compromised which is of particular importance when corticosteroid drugs are used. Iontophoresis of corticosteroids yields local tissue concentration that is lower than those achieved with oral administration and therefore are considered to be both safe and effective. According to Gudeman and et al (1997) prolonged physical therapy for recalcitrant cases of plantar Fasciitis and missed work days may be avoided when Iontophoresis of 0.4% dexamethasone is added to the traditional modalities of treatment \[11\].

Anderson et al in 2003 in a study said that when 40 mA/min of Iontophoresis using dexamethasone was administered on the ventral surface of forearm, vasoconstriction occurred \[22\], and Gruney Burke in 2008 in a study also proposed that Iontophoresis delivers dexamethasone sodium phosphate in connective tissue \[23\]. They agreed with Glass et al that transmission of dexamethasone may well take place by passive diffusion and local capillary blood level below the skin and thus Iontophoresis may be an efficacious and desirable method to administer steroids to localized regions of inflammation \[24\].

Acknowledgement: Dr. Jatinder Sharma, Dr. Pavin Kumar & All my teachers.

Conflict of Interest : Nil

Source of Funding: Self

Ethical Consideration

1. The identity of the subject was protected throughout the study and also in publication so made.

2. Each subject randomly, was allocated a secret code throughout and after the study.
3. All subjects would be briefed about my legal condition to observe any act of data protection.

4. After briefing only about their rights, I made them sign the consent form.

5. Subjects were free in any state of the study to walk out of it, if they felt the need.

6. Permission to conduct the study was taken from the Ethical Committee of the college.

REFERENCE


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16. HR Osborne and GT Allison. Treatment of Plantar Fasciitis by Low dye taping and Iontophoresis: Short term results of a double blinded randomized, placebo controlled clinical trial of dexamethasone and acetic acid. British Journal of Sports Medicine, Jun 2006; Vol.40/6 (545-9):0306-3674


Health Related Quality of Life and Gross Motor Function in Children with Cerebral Palsy

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¹Tutor cum Clinical Therapist, ²Assistant Professor, ³Occupational Therapist, KMPIP, Shree Krishna Hospital; H.M.Patel Centre for Medical Care & Education, Karamsad; Gujarat

ABSTRACT

Introduction: Children suffering from Cerebral Palsy (CP) have several motor limitations which limit their function and abilities for activities of daily living. In spite of medical treatment and rehabilitation, motor impairment, health and well-being are most concerning area. To find the Health Related Quality of Life and Gross Motor Function in children with CP.

Method: 51 children with CP aged 4-12 years were recruited by convenient sampling from K M Patel Institute of Physiotherapy, Mitra Rehabilitation, Deepa Academic. Only one caregiver, who must have lived with child for 6 months before participation in the study, was declared participation. Clinical assessment, gross motor functions according to GMFM-88 and face-to-face interview of CP QOL-Child Questionnaire with the primary caregiver were taken.

Result: The prevalence among boys was higher (72.5%) than girls(27.5%). The mean of total GMFM is 50.45±25.106 and of total HRQOL was 49.38±9.816. Significant positive correlation (p = 0.002) was found between GMFM-88 and HRQOL. However, physical component of HRQOL is strongly correlated rather psychosocial component.

Conclusion: CP has a tremendous negative impact on HRQOL and gross motor function of children. HRQOL is correlated with functioning, however, physical well-being domains are more strongly correlated with functioning than psychosocial well-being domains.

Keywords: Cerebral palsy, Gross motor function measure, Quality of life.

INTRODUCTION

Cerebral palsy (CP) is defined as “a group of non-progressive, but often changing, motor impairment syndromes secondary to lesions or anomalies of the brain arising in the early stages of development”¹

The most common physical disability in childhood is CP, worldwide incident being 2 to 2.5 per 1000 live births.²

Children suffering from CP have several motor limitations which limit their function and abilities for activities of daily living (ADL). In spite of medical treatment and rehabilitation, the functional implication of motor impairment in CP is crucial. The GMFM is used widely as a clinical and research outcome measure for children with CP. Although the motor impairments are most concerning area for the children with CP, the broader context of health and well-being of these children also must be described. Health Related Quality Of Life (HRQOL) is defined by WHO consists of physical well-being, mental well-being and social well-being.³ HRQOL is evaluated by generic and disease specific instruments. Among them, disease specific measures may provide more clinically relevant HRQOL evaluation directed to the symptoms, problems or side effects of a certain condition.

The link between HRQOL and gross motor function is particularly evident in HRQOL questionnaire for children. Differing theories and professional perspectives of HRQOL results in variety of conceptualizations, however, the equating of HRQOL with gross motor function...
requires consideration. If it is argued that HRQOL can be measured as ‘functioning’, the underlying assumption is that children with poorer gross motor function have poorer HRQOL. It may be the case for some children, however, it is misguided to suggest that all children with poor gross motor function have poor HRQOL.

The few studies of children with CP have examined the relationship between functioning and HRQOL. These studies demonstrate that functioning is correlated with the physical domains of QOL and there is only weak or non-significant relation between functioning and psychosocial domains of QOL, however, many of the items in the HRQOL questionnaires measure a child’s difficulties or limitations and focus on what a child can or cannot do. It remains unknown whether a relationship would exist when HRQOL is not conceptualized as what a child can do, but rather how a child feels about their life.

Therefore, this study sought to examine the gross motor function and HRQOL using newly developed and validated condition-specific HRQOL questionnaire for children with CP i.e. CP QOL – Child. This will allow us to define the specific problem area associated with the CP which, if improved, will yield the greatest benefits for children and their families. Furthermore, such knowledge also will inform policy and decision makers in the health, education and social sector and generate protocols to optimize outcomes.

**OBJECTIVES**

To find the Health Related Quality of Life and Gross Motor Function in children with CP.

**METHODOLOGY**

This study was cross sectional observational study. 51 children with CP aged 4-12 years were recruited from K M Patel Institute of Physiotherapy (KMPIP). Shree Krishna Hospital, Karamsad, Mitra Rehabilitation, Mogari, Deepa Academic, Tarapur, who were functionally dependant.

Informed assent from parent or primary caregiver of all the subjects was obtained after explaining the purpose of the study. Only one caregiver, either parent or primary caregiver of child diagnosed as having CP, was declared participation. Caregiver must have lived with the child for 6 months before participation in the study.

Primary details were obtained which includes demographic data, clinical assessment was done consists of tone, Deep Tendon Reflex(DTR), clonus, any influence of primitive reflexes, balance and equilibrium reactions, gross motor function and HRQOL.

The detail of administration of scale is as under.

**GMFM-88:**

Gross motor functions were assessed according to GMFM-88 which was recorded in GMFM score sheet. The 88 items of the test assess activities in 5 dimensions i.e. (1) lying and rolling, (2) sitting, (3) crawling and kneeling, (4) standing, (5) walking, running and jumping. Ko J & Kim M (2012) concluded that the reliability (ICC = 0.986-1.000) and responsiveness of GMFM-88 are reasonable for measuring gross motor function in children with CP. Administration time was 45 min. Each item was scored using a 4 point scale (0- does not initiate, 1- initiate, 2- partially complete, 3- complete). If an item was inadvertently missed or if the response could not be elicited from the child then the child received a score of 0 for that item. Total from each category for a subject was divided by the total possible points to produce a category percentage score. These percentages were averaged to yield an overall score.

**CP QOL – CHILD (parent proxy):**

The face-to-face interview with the parent or primary caregiver was taken out. The interview was consists of administration of CP QOL – Child Questionnaire. It comprises of 66 items and assesses on 7 domains. The primary caregiver proxy version of it has good reliability and validity. Administration time was 15-20 min. Almost all of the items have the following items stem- ‘How do you think your child feels about....?’ with a 9 point rating scale (1- very unhappy, 3- unhappy, 5- neither happy nor unhappy, 7- happy and 9- very happy). The few items, such as pain, where this stem or rating was not appropriate, have the following stem and rating scale- ‘How does your child feel about the amount of pain that they have?’ where 1- not upset at all to 9- very upset. All
domain scores range from 0-100. Domains scores were aggregated and averaged. Scoring involves two steps- (1) items were transformed to a scale with a possible range of 0-100, (2) the algebraic mean of item values was computed for each domain.8

Questionnaire was provided in the vernacular language whenever needed.

RESULT

For statistical analysis, SPSS (Statistical Package for Social Sciences) software was used. Pearson’s correlation was used to test the relationship between different variables.

Most common type of CP was spastic CP (74.5%) and according to topographical distribution, diplegic CP (41.2%).

The prevalence among boys was higher (72.5%) than girls (27.5%). The gross motor function was more affected in male than female ($p = 0.26$), but there was no significant difference in HRQOL between male and female ($p = 0.691$).

The mean percentage of lying & rolling GMFM was $86.54 \pm 24.850$, mean percentage of sitting GMFM was $73.76 \pm 33.020$, mean percentage of crawling & kneeling GMFM was $51.96 \pm 31.961$, mean percentage of standing GMFM was $30.77 \pm 33.333$, mean percentage of walking, running & jumping GMFM was $14.65 \pm 16.153$ and mean percentage of total GMFM was $50.45 \pm 25.113$. The mean value of social well-being & acceptance was $62.34 \pm 12.805$, mean value of feeling about functioning HRQOL was $49.84 \pm 14.036$, Participation and physical health HRQOL was $43.63 \pm 20.196$, Emotional well-being HRQOL was $51.54 \pm 13.824$, Access to services HRQOL was $53.39 \pm 17.723$, Pain and feeling about disability HRQOL was $31.06 \pm 12.194$, Family health HRQOL was $53.98 \pm 19.275$, and mean value of total HRQOL was $49.38 \pm 9.816$. (Table 1)

Table 1

<table>
<thead>
<tr>
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<td>Lying and rolling GMFM %</td>
<td>86.54 ± 24.85</td>
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<tr>
<td>Sitting GMFM %</td>
<td>73.76 ± 33.02</td>
</tr>
<tr>
<td>Crawling and kneeling GMFM %</td>
<td>51.96 ± 31.961</td>
</tr>
<tr>
<td>Standing GMFM %</td>
<td>30.77 ± 33.333</td>
</tr>
<tr>
<td>Walking, running and jumping GMFM %</td>
<td>14.65 ± 16.153</td>
</tr>
<tr>
<td>Total GMFM %</td>
<td>50.45 ± 25.106</td>
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<tr>
<td>Social well-being and acceptance HRQOL</td>
<td>62.34 ± 12.805</td>
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<tr>
<td>Feelings about functioning HRQOL</td>
<td>49.84 ± 14.036</td>
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<tr>
<td>Participation and physical health HRQOL</td>
<td>43.63 ± 20.196</td>
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<td>Emotional well-being HRQOL</td>
<td>51.54 ± 13.824</td>
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<tr>
<td>Access to services HRQOL</td>
<td>53.39 ± 17.723</td>
</tr>
<tr>
<td>Pain and feeling about disability HRQOL</td>
<td>31.06 ± 12.194</td>
</tr>
<tr>
<td>Family health HRQOL</td>
<td>53.98 ± 19.275</td>
</tr>
<tr>
<td>Total HRQOL</td>
<td>49.38 ± 9.816</td>
</tr>
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</table>

Table 2: Correlations between GMFM and all components of HRQOL

<table>
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<td>Feelings about functioning HRQOL</td>
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<td>Participation and physical health HRQOL</td>
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<td>Emotional well-being HRQOL</td>
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<tr>
<td>Access to services HRQOL</td>
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<td>Pain and feeling about disability HRQOL</td>
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<td>Family health HRQOL</td>
<td>0.343</td>
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<td>Total HRQOL</td>
<td>0.002</td>
</tr>
</tbody>
</table>

DISCUSSION

This study is to examine the gross motor function and HRQOL domains for children with CP using a condition-specific HRQOL instrument that focuses on well-being rather than on functioning.

In present study, children with CP have $50.45\pm25.10\%$ of total gross motor function. One of study found that 41% of children with CP were limited in their ability to crawl, walk, run or play and 31% needed to use special equipment such as walkers or wheelchairs.9 In 2006, 56% of children with CP were able to walk independently, while 33% had limited or no walking ability.10 Function in CP is determined by a number of factors. It is strongly influenced by the changes in the properties of the muscles that take place due to the upper motor neuron lesion. The loss
of inhibition from the higher centers results in over activity at the spinal level resulting in hypertonia, exaggerated reflexes and muscle response to stretch.\textsuperscript{11} The loss of connection from the higher centers and changes in the muscle properties with time result in reduction of motor units and impaired recruitment of remaining motor units resulting in muscle weakness which coexists irrespective of the spasticity.\textsuperscript{12, 13} With age, the musculoskeletal complications arise due to contracture or deformities, disproportional bone and muscle growth, excessive movement of force production in a single pattern with less or no use of different patterns of movement; all these complicate the overall function of the child. Neither the mechanisms of abnormal movement in children with CP nor how abnormalities occur during development is clear. Research is needed in this area to clearly identify mechanical, neuromuscular, and neural changes occurring during development that contribute to movement dysfunction.

HRQOL was affected in children with CP. This finding suggests that CP impacted on psychosocial health as well as physical health of children with CP. These results are consistent with previous studies which examined the relationship between HRQOL and functioning for children with CP using other generic QOL.\textsuperscript{14} Possible causes for affection in HRQOL are- first, inability to do what they like may lead the children to frustration.\textsuperscript{15} Second, sometimes due to their motor function limitations they cannot communicate with people around. Third, most children with CP do not have neighbourhood playmates. This was the reason to make them feel themselves in boredom and this pervasive sense of boredom can cause borderline personality disorder.\textsuperscript{16} All these behavioural problems have a negative impact on their learning at school, peer relationship and social competence. However, the psychosocial QOL was higher than physical QOL. There are several reasons why psychosocial QOL was higher. The finding that children with disability can have a higher psychosocial QOL has been termed ‘disability paradox’.\textsuperscript{17} That is because of they have an understanding of their disability and are part of good social networks and reciprocal relationships. Also child’s well-being can be stabilized or disrupted by a vital environmental factor i.e. family functioning.\textsuperscript{18} Parents of children with disabilities are also at risk of experiencing ongoing stress, undermining family stability and coping abilities. Factors contributing to parental stress do not appear to be related to the severity of their child’s health condition.\textsuperscript{19} However, parental stress appears closely associated with their child’s behaviour and psychosocial adjustment.\textsuperscript{20} As the families may use different coping strategies, children with similar disability levels may adapt differentially to their deficits. More effective adaptive responses in the child is encouraged by positive adaptation to disability by family, whereas poor family adaptation may diminish their child’s subjective well-being.\textsuperscript{21}

Therefore, although assessing what a child can do provides important information, this study challenges the assumption that if a child is less able to do, that child will necessarily has poorer QOL on all domains.

\textbf{CONCLUSION}

CP has a tremendous negative impact on HRQOL and gross motor function of children who experience it. HRQOL is correlated with functioning, however, physical well-being domains are more strongly correlated with functioning than psychosocial well-being domains.

Further research is needed with larger sample size, to examine other associated medical condition like epilepsy, vision/ hearing/ speech problem, coping strategies or the environment mediate the relationship between functioning and HRQOL, to examine the effect of physiotherapy on HRQOL, to examine whether HRQOL can change, and fundamental, given HRQOL is increasingly used in clinical trials to evaluate the effectiveness of interventions and to examine the HRQOL of caregiver of child with CP.

\textbf{Acknowledgement:} The authors would like to thank to Mr.Semual and Mrs. Pratibha, for all their support and encouragement.

\textbf{Conflict of Interest:} The Author has no conflict of interest.

\textbf{Source of Funding:} No funding allocation was applicable for the current study

\textbf{Ethical Clearance:} The research work was duly cleared by the Human Research Ethics Committee (HREC) of Charutar Arogya Mandal before start.
REFERENCES

(Endnotes)


A Comparative Study to Determine the Effectiveness of Neural Tissue Mobilization v/s IFT for Sciatica

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ABSTRACT

Purpose: To find out the comparison in pain and SLR-ROM in Sciatica with NTM and IFT.

Methodology: 30 subjects with Sciatica were recruited and conveniently allocated to NTM group (n=15) and IFT group (n=15). Subjects in A group received NTM and B group received IFT. The treatment period was 6 weeks for both groups. The outcome measure was SLR-ROM and NPRS.

Results: According to need of study test were applied and seen clinical improvement in pain and ROM in Sciatica patients receiving NTM in comparison to IFT.

Conclusion: Greater improvement is seen in Sciatica patients who received NTM than IFT.

Keywords: NTM, IFT, SLR.

INTRODUCTION

The sciatic nerve is largest nerve of the body. Sciatica is a set of symptoms including pain that caused by compression and irritation of one of five spinal nerve roots by compression or irritation of the left or right or both sciatic nerves. The pain is felt in the lower back, buttocx, and various parts of the leg and foot. In addition to pain, which is sometimes severe, numbness, muscular weakness, pins and needles or tingling and difficulty in moving or controlling the leg.

Sciatica due to compression of a nerve root is one of the most common forms of radiculopathy1. Clinical assessment by history taking and physical examination can support a diagnosis of Sciatica. Generally accepted treatments, as described below, may include IFT, Strengthening Exercise, TENS, NTM, Acupuncture, Analgesics, Surgeries etc.

Neural Tissue Mobilization: Mechanism of Recovery 1) Circulation and nutrition occur optimally through movement 2) Musculoskeletal tissue changes, dimension and exert mechanical forces on neural structures 3) Minimize forces on adjacent neural structures 4) Increase nerve tension and intraneural pressure 5) Facilitate venous return 6) Disperse edema 7) Reduce pressure inside the perineurium 8) Limit fibroblastic activity and minimize scar formation2-4.

IFT: IFT acts through stimulating pain gate mechanism and mask the pain symptoms by directly acting on peripheral nerves. It slows the conduction in the nerves and thereby reducing the volume of nociceptor traffic. The basic principle of IFT is to utilize the significant physiological effects of low frequency (@<250pps). IFT utilizes two of the medium frequency currents, passed through the tissues simultaneously, where they are set up so that their paths cross & they literally interfere with each other—hence another term that has been used in the past but appears to be in of favor at the moment – Interference Current Therapy5,6.

MATERIALS & METHODOLOGY

30 subjects of Sciatica were selected and divided into 2 group A. Quasi Experiment study
with Convenient sampling Subjects with Sciatica done in Ahmedabad Physiotherapy College OPD, Ahmedabad. Group A (n=15) subjects were given NTM and Group B (n= 15) given IFT.

**SAMPLEING CRITERIA**

**INCLUSION CRITERIA**
- Clinically diagnosed as Sciatica.
- Either with Intra Lumbar or Extra lumbar Pathology.
- Unilateral Involvement.
- Sub acute stage.
- Age Group: 20-50 years.
- Males and Females.
- Who were not taking other forms of treatment such as manual therapy, analgesics, acupuncture, injection therapy

**EXCLUSION CRITERIA**
- Prolapsed intervertebral disc (Type III & IV)
- B/L neurogenic lower limb pain.
- Systemic Disorders.
- Neurological claudication.
- Spinal instability.
- H/O spinal surgery, psychiatric illness.
- Acute infection, acute inflammation, pregnancy.
- Severe osteoporosis
- Tumors of the nervous system and spinal cord.
- Congenital anomaly

**TOOLS AND PARAMETERS**
- NPRS
- Measurement of a-ROM –SLR

**DATA ANALYSIS**

NTM: Duration of the procedure was extended to 20-30 sec, with increasing amplitude of movement in the joint through which the oscillations, longer duration of a single oscillation and more series of oscillations.

Frequency -5 days /week.
Duration-10 Days.


Machine- Biotech
Carrier fr- 5 kHz;
Beat fr -100 Hz.
Treatment time -15 min
Electrode Placement -Using the spinal nerve root electrode placement method via plate electrodes

Table 1: Comparison of pre and post intervention of values by Non Parametric Wilcoxon Signed Ranks Test in Group A.

<table>
<thead>
<tr>
<th>GROUP A</th>
<th>MEAN</th>
<th>S.D</th>
<th>MIN</th>
<th>MAX</th>
<th>Z VALUE</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>10.80</td>
<td>1.971</td>
<td>8</td>
<td>14</td>
<td>3.423</td>
<td>0.00</td>
</tr>
<tr>
<td>POST</td>
<td>63.87</td>
<td>4.984</td>
<td>55</td>
<td>69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Comparison of pre and post intervention of values by Non Parametric Wilcoxon Signed Ranks Test in Group B.

<table>
<thead>
<tr>
<th>GROUP B</th>
<th>MEAN</th>
<th>S.D</th>
<th>MIN</th>
<th>MAX</th>
<th>Z VALUE</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>10.93</td>
<td>2.120</td>
<td>8</td>
<td>15</td>
<td>2.449</td>
<td>0.009</td>
</tr>
<tr>
<td>POST</td>
<td>11.33</td>
<td>2.193</td>
<td>8</td>
<td>16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Comparison of pre and post intervention of Neural Tissue Mobilization for NPRS values by Non Parametric Wilcoxon Signed Ranks Test in Group A

<table>
<thead>
<tr>
<th>GROUP A</th>
<th>MEAN</th>
<th>SD</th>
<th>MIN</th>
<th>MAX</th>
<th>Z VALUE</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>8.53</td>
<td>1.506</td>
<td>5</td>
<td>10</td>
<td>3.431</td>
<td>0.00</td>
</tr>
<tr>
<td>POST</td>
<td>1.80</td>
<td>0.941</td>
<td>0</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4: Comparison of pre and post intervention of Maitland Mobilization for NPRS values by Non Parametric Wilcoxon Signed Ranks Test in Group B.

<table>
<thead>
<tr>
<th>GROUP B</th>
<th>MEAN</th>
<th>SD</th>
<th>MIN</th>
<th>MAX</th>
<th>Z VALUE</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>8.53</td>
<td>1.506</td>
<td>5</td>
<td>10</td>
<td>1.633</td>
<td>0.104</td>
</tr>
<tr>
<td>POST</td>
<td>8.27</td>
<td>1.223</td>
<td>6</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Comparison of post values of Range Of motion and NPRS of Group A and B by Mann-Whitney U test.

<table>
<thead>
<tr>
<th></th>
<th>Z value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLR-ROM</td>
<td>4.682</td>
<td>0.000</td>
</tr>
<tr>
<td>NPRS</td>
<td>4.717</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table shows comparison of post values of SLR ROM and NPRS scale of Group A and B by Mann-Whitney U test. The z value was for SLR ROM 4.682 with p value =0.000, which was<0.001. The z value was for NPRS scale 4.717 with p value =0.000, which was<0.001 which suggests rejecting null hypothesis and proved that there was statistically significant increase in the improvement SLR-ROM and NPRS in Group A (Neural tissue Mobilization) as compared to Group B (IFT).

RESULTS

Mean and SD were found out to assess the parameters.

Above table suggests rejecting null hypothesis and proved that there was statistically significant increase in the improvement of SLR-ROM and NPRS in Group A (NTM) as compared to Group B (IFT).

DISCUSSION

The reason improving in SLR ROM and reduction in NPRS score with NTM was due to improve axonal transport by this mechanism to improve nerve conduction. By NTM the nerve may reduce the pressure existing within the nerve and could therefore result in an improvement of blood flow to the nerve. Review on Non-surgical treatment for Sciatica for neurodynamic mobilization VS control group and concluded neuro dynamic mobilization is more effective than control with Secondary outcome measures included. 1) Improvement in functional status and/or health quality of life parameters 2) Improvement in objective physical examination measures. Improvement in neurophysiologic parameters after three months after treatment. 4) Clinical improvement at of follow-up.5) clinical improvement at one year after treatment and no need for surgical release of the flexor retinaculum during followup.

Although statistically significant results were obtained from this study but there is significant difference in results of Neural Tissue Mobilization and IFT. NTM having more benefit for Sciatica patients Rather than IFT When analyzing the results of ROM between conditions visually it can be seen that for ROM groups A & B. Both demonstrated improvement but better improvement in Group A Compare to Group B.

IFT is less effective means of treatment for Sciatica the reason behind that could be is purely the condition which is inflammation of nerve and to relieve the condition Neural Mobilization can directly targeting on nerve so more reduction in symptoms is due to Neural tissue mobilization.

LIMITATIONS

• Small sample size.
• Home program was not given
• Long Term Follow Up not taken
• No Randomization

SUGGESTION

• To compare the effect of NTM with
Acupuncture, strengthening exercise, Ergonomic Modification, Dry needling, steroid, medications and surgical release.

- larger sample size.
- NTM for other compressive Neuropathy, Cubital Tunnel Syndrome and CTS.
- Random Sampling Technique can be used.
- Quantitative method can be used as outcome measure.
- study the long term follow-up.
- all age group population.

**CONCLUSION**

NTM was proved to be a better treatment option for the patients with Sciatica than IFT.

**Acknowledgement:** I’d like to take this opportunity to thank my Parents and my husband for their constant support, encouragement and guidance.

**Conflicts of Interest:** Nil

**Fundings:** By the Institute.

**Ethical Clearance:** It was Given By Committee.

**REFERENCES**

Effect of Unsupported Upper Extremity Exercise Training on Symptoms & Quality of Life in Patients with COPD

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ABSTRACT

Introduction: COPD is preventable and treatable pulmonary disease with significant extrapulmonary effects. Its manifestations are dyspnea, fatigue, airflow obstruction, cachexia, skeletal muscle weakness, osteopenia & reduced health related quality of life (HRQOL). Unsupported upper limb activities are most commonly causing the dyspnea & are the major limiting factor in ADL in COPD patients. In Pulmonary rehabilitation upper limb exercises are recommended but more importance is given to lower limb exercises till date & no specific evidence is available regarding the type & extent of upper limb exercises.

Aims & Objective: To determine effects of unsupported upper extremity exercises on symptoms & quality of life in patients with COPD

Methodology: An Interventional study was done with 40 subjects who fulfilled inclusion & exclusion criteria and were then randomly divided into two groups A&B (20 in each). Group A participants were given pulmonary rehabilitation and Group B participants were given 5 different unsupported upper limb exercise along with PR, thrice a week for 6 weeks. Data at the baseline & at the end of 6 weeks were collected using outcome measures i.e. 6 Minute Walk Distance (6MWD), Clinical COPD Questionnaire (CCQ) total score and Unsupported Upper Limb Exercise (UULEx) test total score. Study was conducted at Govt Physiotherapy College, Ahmedabad.

Result: Statistical analysis of 36 subjects (4 dropped out – 2 from each group) was done using graph pad prism (version 5.03). Significant improvement was found in 6MWD (p<0.0001) & CCQ score (p<0.0001) in both group & significant improvement in UULEx test found in group B (p<0.0001), but not in group A (p= 0.8243) at the end of 6 weeks. No significant difference in improvement found in 6MWD (P=0.3429) & CCQ score (P=0.7780) score, but significant difference in improvement found in UULEx test duration (P<0.0001) between groups after 6 weeks.

Conclusion: Significant difference in improvement found in UULEx test duration suggests improvement in symptoms (dypnea & arm fatigue) & arm endurance. But the difference found in 6MWD & CCQ score is not significant, so it doesn’t reflect any additional effect of unsupported upper extremity exercises on Quality Of Life in COPD patients along with Pulmonary Rehabilitation.

Keywords: COPD, Pulmonary rehabilitation, HRQOL, 6MWD, CCQ, UUIL Ex test.

INTRODUCTION

COPD is “preventable & treatable disease with some significant extra-pulmonary effects. Its pulmonary component is characterized by airflow limitation that is not fully reversible, usually progressive and associated with an abnormal inflammatory response of lung to noxious particles or gases”.

Prevalence of COPD in India is widely variable in different population, round off median prevalence is 5% for males & 2.7% for females over age of 30 years. COPD is distinctly more common in males, male: female ratio varies from 1.32:1 to 2.6:1 in different study with median ratio of 1.6:1.

One of the earliest specific problems reported by patients with COPD is dyspnea with activities that
involves the upper extremities i.e. ADL like carrying groceries, sweeping the floor, dressing, bathing, combing hair etc. Unsupported arm exercise is more limited than leg exercise in COPD patients. So at comparable workloads (similar VO2), upper limb exercise leads to greater VCO2, ventilation, and lactate production than does lower limb exercise, with an early anaerobic threshold. The probable reason may be the reduced muscle mass and possible micro structural changes, which result in increased muscle work in order to maintain the exercise level. Therefore, the activities that involve shoulder girdle muscles lead to a marked sensation of dyspnea, as well as upper limb fatigue.

Arm elevation above shoulder level increases FRC that increases the hyperinflation resulting in a greater load that must be overcome by diaphragm (which is already at mechanical disadvantage in severe COPD) which leads to decrease in force generating capacity of diaphragm which ultimately leads to thoraco-abdominal dissynshrony, increase in dyspnea & arm fatigue.

Though PR guidelines recommends upper limb exercises as a part of PR program as its increases upper limb exercise capacity, reduces ventilatory demands, metabolic load & O2 consumption during upper limb activities, clear instructions regarding the exact type of exercise & its effects on the clinical outcome measures (like dyspnea, arm fatigue & HRQOL) are not yet provided. Moreover, unsupported upper limb exercises (which resemble the daily activities of arm more) are conferred to be of greater benefit than supported arm exercises. So the core aim of the study is to find out effects of unsupported upper extremity exercise training in addition to the lower extremity training on symptoms and health related quality of life in COPD patients.

MATERIALS & METHODOLOGY

Study design: Intervventional study

Convenience sampling method was used for the data collection. Total 40 subjects were selected who were then randomly allocated into two groups i.e. Group A and B (20 subjects in each). Data were collected from Out Patient Department of Chest Clinic, Civil Hospital, Ahmadabad & study was conducted at Govt Physiotherapy College, Civil Hospital, Ahmadabad.

Inclusion Criteria: Patients with age ≥ 50 years & diagnosed as having COPD by physician (GOLD criteria stage III or IV) who were never involved in PR program before, able to comprehend commands & willing to participate were included in the study.

Exclusion Criteria: Patients with unstable COPD (who have had any exacerbations during last 4 weeks), on oxygen therapy, having any other heart or lung pathology, acute illness or any unstable medical condition, any musculo-skeletal or neurological condition that prevent or contra-indicate exercises & having communication or transport difficulties were excluded.

Materials/Equipments Used: Assessment form and pencil, Consent form, Data collection sheet, Clinical COPD Questionnaire, UULEX Test Wall Chart, Borg’s scale, Ambulatory pulse oxy-meter, Stethoscope, Sphygmomanometer, Stop watch, Treadmill, Static cycle, Weights (dumbbells/stick), Chair, Plinth and pillow.

Procedure: All patients with COPD were screened & who fulfilled inclusion and exclusion criteria were selected & were then briefly explained about the study. A written consent was obtained from all. Selected participants were randomly divided into two groups namely,

Group A: Pulmonary Rehabilitation

Group B: Pulmonary Rehabilitation with Unsupported Upper Limb Exercise Training

Their demographic data, evaluation, dyspnea intensity, 6-MWD, CCQ total score and UULEX test duration were noted.

For 6-MWT, baseline data (HR, BP, RR, RPE) were taken. Patients then requested to walk for 6 minutes at self selected pace on 30 meter walkway which was free of obstacles. Patients were allowed to take rest in between, if they want. Standard instructions were given and on completion of 6 minutes, again HR, BP RR and RPE were taken. 6-MWD (meter), reason for rest, number of rests and total time of rest were noted. One practice test was given before the actual test at
For UULEx Test, A symptom-limited UULEx was performed using a continuous incremental exercise protocol. Test began with a 2-minute warm-up (patients flexed and extended their arms simultaneously, lifting the bar from a neutral position to the first stage on the wall chart). After the warm-up, patients requested to perform shoulder flexion within 15cm height from stage one, at a speed of 30 repetitions per minute controlled by mobile recorder with weight of 200 grams. Vertical amplitude was increased by 15cm every minute as patients progressed through the stages of test. When patients reached their maximum vertical height, weight was increased to 500gm and patients continued the exercise at the highest stage. Each minute thereafter, the weight was progressively increased by 500gms to a maximum of 2000gms. The test was continued, until patients reported dyspnea or arm fatigue. The total duration (in seconds) & reason for termination of the test was recorded.9,10,11

Figure 1: Unsupported Upper Limb Exercise Test

Group A participants were given comprehensive PR program involving treadmill walking, static cycling and stair climbing for 30 minutes. Intensity of exercise was progressed to maintain RPE of 12 to 13 on Borg’s scale.12 Warm-up and cool down periods are also included in program but are excluded from the 30 minute exercise session. Participants were allowed to take 1 or 2 short rest periods during session, if they required.

Group B participants were given the same training as Group A in addition to the unsupported upper limb exercise training that includes;

Five different exercises of upper limb in sitting position with 200gm weight in hands.

1) Shoulder flexion from $90^\circ$ to $180^\circ$,
2) Shoulder abduction from $90^\circ$ to $180^\circ$,
3) Shoulder horizontal adduction from shoulder abduction $90^\circ$ (with $90^\circ$ elbow flexed),
4) Full elbow extension from full elbow flexion (with shoulder fully flexed),
5) Shoulder abduction $180^\circ$ with full elbow extension from shoulder abduction $90^\circ$ with full elbow flexion

Training consisted 3 sets of 10 repetitions of each exercise with RPE at 12 to 13 on Borg’s scale. Rest between sets was kept at 30 seconds and between different exercises 1 min. For progression, repetitions were increased from 10 to 12 to 15 and then weight from 200gm to 500gm, 1kg, 1.5kg… to maintain the RPE at 12 to 13.

Both the groups were encouraged for walking and cycling, and group B in addition for doing unsupported upper extremity exercises that are taught, at home to supplement the formal sessions.

Education and advise regarding the disease process & exacerbation, importance of exercises, breathing retraining, energy conservation, improved hydration, good nutrition, relaxation skills and management of anxiety and depression were also given to both groups as a reinforcement of PR.5

At the end of 6 weeks program, 6-MWD, CCQ total score and UULEx test duration were collected.

RESULTS

Study comprised of 40 subjects, 20 in each group. 4 subjects (2 from each group) were dropped out during the intervention. Statistical analysis (of 36 subjects) was done using Graf Pad Prism (version 5.03) software. Amongst them 18 (17 M, 1 F, mean age 58.28yr) were in Group A & 18 (17 M, 1 F, mean age 57.83yr) in Group B. Data were analyzed for normal distribution & all the outcome measures were analyzed at baseline and at the end of 6 weeks using appropriate statistical test (level of significance- 95%). Changes in outcome measures were analyzed within as well as between groups.
Table 1: Comparison of mean CCQ score, 6MWD & UULEx test duration before & after treatment in Group A & B.

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Groups</th>
<th>Pre treatment</th>
<th>Post treatment</th>
<th>t value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean CCQ score</td>
<td>Group A</td>
<td>3.256 ±0.4592</td>
<td>2.461 ±0.4002</td>
<td>13.19</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>Group B</td>
<td>3.361 ±0.3534</td>
<td>2.544 ±0.2833</td>
<td>19.72</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean 6MWD (m)</td>
<td>Group A</td>
<td>371.9 ±45.22</td>
<td>426.6 ±45.53</td>
<td>27.45</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>Group B</td>
<td>371.8 ±50.40</td>
<td>432.8 ±46.85</td>
<td>12.25</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Mean UULEx duration (sec)</td>
<td>Group A</td>
<td>210.7 ±39.72</td>
<td>210.9 ±40.49</td>
<td>0.2255</td>
<td>0.8243</td>
</tr>
<tr>
<td></td>
<td>Group B</td>
<td>211.5 ±40.22</td>
<td>268.2 ±47.28</td>
<td>12.17</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Table 2: Comparison of difference in CCQ score, 6MWD & UULEx test duration after treatment between group A & B.

<table>
<thead>
<tr>
<th>Difference in CCQ score</th>
<th>Group A</th>
<th>Group B</th>
<th>Difference between group A &amp; B</th>
<th>t value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.7500</td>
<td>0.8167</td>
<td>0.0666</td>
<td>0.9619</td>
<td>0.3429</td>
</tr>
<tr>
<td>±SD</td>
<td>±0.2358</td>
<td>±0.1757</td>
<td>±0.0693</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference in 6MWD</td>
<td>Mean</td>
<td>54.61</td>
<td>55.44</td>
<td>0.8333</td>
<td>0.7780</td>
</tr>
<tr>
<td>±SD</td>
<td>±8.396</td>
<td>±9.179</td>
<td>±2.932</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference in UULEx duration</td>
<td>Mean</td>
<td>0.2222</td>
<td>56.67</td>
<td>56.44</td>
<td>12.35</td>
</tr>
<tr>
<td>±SD</td>
<td>±4.181</td>
<td>±18.93</td>
<td>±4.569</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DISCUSSION

A significant improvement was found in 6MWD & CCQ score in both the groups, but no significant improvement was found in UULEx test duration in Group A at the end of 6 weeks.

Improvement in 6MWD and CCQ score in present study are in accordance with a meta-analysis, done by Combach and colleagues (1999) & many other studies which shows statistically as well as clinically significant improvement in maximum exercise capacity, endurance time, walking distance and HRQoL in COPD patients.

But there is no significant difference in improvement in 6MWD and CCQ total score between groups (p=0.7780, p=0.3429 respectively) which probably because, the training given to the Group B was specific to the upper extremities & the results did not demonstrate any crossover effect of UULEx on over all physical activities of participants which is supported by Ries AL, et al (1988), Belman MJ, et al (1992) and Lake FR & coworkers (1990) who also did not find any crossover benefits of upper extremity training on ventilatory muscle endurance and/or leg cycling endurance.

While in a study of Epstein at al (1997), significant increase in PImax was found after 24 sessions of unsupported arm training in COPD patients, suggesting crossover effect of UULEx on ventilatory muscles. Similar findings were obtained by Keens TG & colleagues (1977) in cystic fibrosis patients.

A study by Martinez & colleagues demonstrated that a 6 week arm training program in COPD has decreased minute ventilation by decrease in RR, suggests that this training may have increased the aerobic capacity of arm muscles.

A UULEx test used here involved stereotypical, repetitive movements which were closely related to the training exercises. So probably, the task specific
training allowed group B participants to perform the test more easily. Moreover, performance during incremental exercise tests may be dependent on strength, so any increase in force-generating capacity of the upper limb muscles may contribute to an improved exercise performance.

Most of the dyspnea inducing activities reported by participants were complex upper limb activities incorporating variety of postures and muscle groups and frequently performed in standing. So training given in present study, in sitting position with the trunk supported by chair, may not adequately address the complex co-ordination required in functional tasks. These findings are also supported by Holland AE & coworkers (2004). UULEx training can provide relief from dyspnea & arm fatigue in COPD patients during ADL but it is unclear whether these interventions relieved symptoms to a clinically significant level.

As ADL require coordinated movement of multiple muscles around multiple joints simultaneously, strengthening of muscles in a particular action may probably not reflect improvement in all ADL.

CONCLUSION

The study found increase in UULEx test duration in patients who underwent unsupported upper limb exercises along with PR, so improvement in symptoms (dyspnea or arm fatigue) and increase arm endurance are found.

Moreover, study found improvement in 6MWD & CCQ total score in both the groups but did not show significant difference in improvement between groups, so it does not reflect any effect of unsupported upper extremity exercise training on Quality of Life in addition to the comprehensive pulmonary rehabilitation.

Limitations: Small sample size
Long term effects were not seen

Acknowledgement: I heartily thankful to Dr. Urmi Bhatt & Dr. Chitra Rachchh for their valuable guidance & support.

Conflict of Interest: Nil

Funding – Nil

Ethical Clearance- Was taken

REFERENCES


The Effect of Cervical Lateral Glide and Manual Cervical Traction Combined with Neural Mobilization on Patients with Cervical Radiculopathy

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¹MPT Student, ²Principal & Prof., ³Associate Prof., Dashmesh College of Physiotherapy, SGT Group of Institutions, Gurgaon

ABSTRACT

Study Design: Experimental study design

Background: To our knowledge there are no prospective, randomized studies in the literature investigating the effectiveness of different manual therapy techniques for the treatment of cervical radiculopathy.

Purpose of the study: To compare the effectiveness of lateral cervical glide and manual traction combined with neural mobilization in the treatment of patients with cervical radiculopathy.

Method: 30 subjects were included in the study and randomly divided into two groups with group A receiving cervical lateral glide and group B receiving manual cervical traction combined with neural mobilization. Readings were taken for Neck Disability Index (NDI) and Numeric Pain Rating Scale (NPRS) 2 weeks and 4 weeks after the treatment.

Results: Group B treatment protocol is better than group A in improving pain, functional disability and cervical range of motion in patients with cervical radiculopathy.

Conclusion: The results of the study indicated that manual cervical traction combined with neural mobilization is better than cervical lateral glide in improving the pain, functional disability and cervical range of motion in patients with cervical radiculopathy.

Keywords: lateral cervical glide, manual traction, neural mobilization, Neck Disability Index and Numeric Pain Rating Scale.

INTRODUCTION

Cervical radiculopathy is a common clinical diagnosis classified as a disorder of a nerve root which can be either ventral or dorsal and most often is the result of a compressive or inflammatory pathology such as disc herniation, spondylitic spur, cervical osteophytes and ligamentum flavum hypertrophy. Studies reported. Cervical radiculopathy is common in middle age with increased prevalence in 5th decade of life with male is to female ratio 2:3¹. The location and pattern of symptoms will vary depending on the nerve root level affected. C₇ root is commonly involved followed by C₆, C₈ and C₅ respectively. The typical symptoms of cervical radiculopathy are unilateral neck pain, radiating pain and finger paraesthesia. Motor weakness, diminished DTR and sensory disturbances are also frequently seen²,³.

There are several intervention strategies being commonly used in the management of cervical radiculopathy which range from conservative approaches, such as physical therapy and electrotherapeutic modalities like Transcutaneous...
Electrical Nerve Stimulation, Interferential therapy, Ultrasound, cervical traction, Electrical Muscle Stimulation, Short Wave Diathermy and Pulsed Electromagnetic Field to surgical intervention.

Recent studies by Lishman and Russell have revealed that cervical radiculopathy can also be accompanied by altered neurodynamics in the nerve trunk and in the mechanical interface.

The cervical intervertebral foramen has been identified as one of the interfacing tissue that might impede on neural tissue mobility in cervical radiculopathy.

Recent studies have supported that the application of cervical traction combined with neural mobilization can produce significant improvements in terms of pain and disability in cervical radiculopathy.

Elvey recommended that a cervical lateral gliding technique would allow movement of structures within the intervertebral foramen to reduce undue tension to the neural tissues.

Cervical traction and neural mobilization techniques (NMTs) have been advocated in the management of cervical radiculopathy due to their immediate analgesic effect. Cervical traction is applied to provide pain inhibition, through the widening of the cervical neural foramina and the reduction of the intradiscal pressure. In addition, NMTs are widely used to normalize the CNR’s structure and function via the possible reduction of nerve adherence, facilitation of nerve gliding and decreased neural mechanosensitivity.

**METHOD**

**Design:** Experimental study design was used for this study. Patients were randomly allocated to 2 groups with 15 subjects in each group. The independent variables were Group A-lateral cervical glide and Group B-manual cervical traction combined with neural mobilization.

**Subjects:** Subjects ranging in age from 30-50 years were recruited from Physiotherapy OPD of Dashmesh College of Physiotherapy.

**Inclusion criteria:** age group of 30-50 years, both genders, subject having positive Spurling test and manual cervical distraction test.

**Exclusion criteria:** subjects with Cervical Instability, cord compressions, cervical rib, vertebro-basilar insufficiency, undiagnosed pain and bilateral upper extremity symptoms.

Both the groups were also given Short Wave Diathermy, neck isometric exercises and postural correction as part of conventional treatment.

**INTERVENTION**

**Short Wave Diathermy** - With patient in supine lying the heating pad is placed over the back of neck and applied for 15 minutes.

**Neck isometric exercises** were taught to the patient for cervical flexion, extension, side flexion and rotation.

Education regarding correct posture:
- Perform postural exercises regularly.
- Keep your posture erect.
- Change body position frequently.
- Take frequent body stretch breaks.

**Group A-Lateral cervical glide in UTT position**

With patient in supine position, the therapist will cradle patient’s head and neck and will perform cervical lateral glide to the spinous process and facet joint of C2-C7 (Grade 3 and 4, 2-3 oscillations/sec, 3 sets of repetitions each of 60 seconds and interval of 1 minute between each repetition) towards the contralateral side while maintaining the extremity in UTT position. This will be performed thrice a week (every alternate day) for 4 weeks. If the patient exhibited symptoms in the above position, the elbow will be placed in flexion to a point where symptoms diminishes.

**Group B-Manual cervical traction combined with neural mobilization in UTT position**

Manual cervical traction will be performed with patient’s upper limb in ULNT1 position (scapular depression, shoulder abduction, forearm supination,
wrist and finger extension, shoulder external rotation and elbow extension) by a second clinician. If the patient exhibited symptoms in the above position, the elbow will be placed in flexion to a point where symptoms diminishes. The therapist will grasp the patient’s head and gently pull it backwards. The pull is maintained for about 7 seconds and then released. This will be performed thrice a week (every alternate day) for 4 weeks.

OUTCOME MEASURES

Pain was measured using Numeric Pain Rating Scale (NPRS) and Neck disability was measured using Neck Disability Index (NDI). All the readings were taken on baseline, 2nd week and 4th week after the treatment.

RESULTS

Analysis of the data collected was done by statistical tests using SPSS software 15.0 version in order to verify the investigation of the study. The results were considered statistically significant if the p-value ≤ 0.01. Mann Whitney U test was applied to analyse the inter-group differences in NPRS and NDI scores.

NUMERIC PAIN RATING SCORE

Within group analysis revealed that there was no significant improvement in NPRS score in group A and group B from baseline to 2nd week. However there was a significant improvement from 2nd week to 4th week and from baseline to 4th week (p<0.001). Refer Table 1&2

Table 1: Within Group Comparison of NPRS-Group A

<table>
<thead>
<tr>
<th>Intervention Period</th>
<th>Mean± S.D.</th>
<th>Mean difference</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day1</td>
<td>7.13±.834</td>
<td>2.86</td>
<td>-6.497</td>
<td>.051 NS</td>
</tr>
<tr>
<td>Day15</td>
<td>4.27±1.846</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day15</td>
<td>4.27±1.846</td>
<td>1.34</td>
<td>-3.25</td>
<td>.001***</td>
</tr>
<tr>
<td>Day30</td>
<td>2.93±1.100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day 1</td>
<td>7.13±.834</td>
<td>4.2</td>
<td>-3.482</td>
<td>.001***</td>
</tr>
<tr>
<td>Day 30</td>
<td>2.93±1.100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NS-not significant

***-Highly significant

Table 2: Within Group Comparison of NPRS-Group B

<table>
<thead>
<tr>
<th>Intervention Period</th>
<th>Mean± S.D.</th>
<th>Mean difference</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day1</td>
<td>7.33±0.724</td>
<td>4.2</td>
<td>-6.460</td>
<td>.078 NS</td>
</tr>
<tr>
<td>Day15</td>
<td>3.13±0.990</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day15</td>
<td>3.13±0.990</td>
<td>1.53</td>
<td>-3.502</td>
<td>.001***</td>
</tr>
<tr>
<td>Day30</td>
<td>1.60±0.507</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day 1</td>
<td>7.33±0.724</td>
<td>5.73</td>
<td>-3.530</td>
<td>.001***</td>
</tr>
<tr>
<td>Day 30</td>
<td>1.60±0.507</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NS-not significant

***-Highly significant

Between group analysis revealed that there was no significant difference in NPRS scores between group A and B on baseline (p>0.05). However there was a significant improvement in NPRS score in group B in 2nd week and in 4th week (p<0.001) as compared to that in group A. (Table 3)
Table 3- Comparison of NPRS between Group A and Group B

<table>
<thead>
<tr>
<th></th>
<th>GROUP A</th>
<th>GROUP B</th>
<th>Z-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M± SD</td>
<td>M± SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day 1st</td>
<td>7.13±.834</td>
<td>7.33±.724</td>
<td>-.648</td>
<td>.517 NS</td>
</tr>
<tr>
<td>Day 15th</td>
<td>4.27±1.486</td>
<td>3.13±.990</td>
<td>-2.256</td>
<td>.01*</td>
</tr>
<tr>
<td>Day 30th</td>
<td>2.93±1.100</td>
<td>1.60±.507</td>
<td>-3.670</td>
<td>.001**</td>
</tr>
</tbody>
</table>

NS-not significant
**- significant

NECK DISABILITY INDEX

Within group analysis revealed that there was no significant improvement in NDI score in group A and group B from baseline to 2nd week. There was significant improvement from 2nd week to 4th week and from baseline to 4th week (p<0.001). Refer table 4&5

Table 4: Within Group Comparison of NDI-Group A

<table>
<thead>
<tr>
<th></th>
<th>Intervention Period</th>
<th>Mean± S.D.</th>
<th>Mean difference</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td>Day 1</td>
<td>47.47±14.861</td>
<td>22.67</td>
<td>-.271</td>
<td>.017 NS</td>
</tr>
<tr>
<td></td>
<td>Day 15</td>
<td>24.80±8.678</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair 2</td>
<td>Day 15</td>
<td>24.80±8.678</td>
<td>10.13</td>
<td>-3.418</td>
<td>.001***</td>
</tr>
<tr>
<td></td>
<td>Day 30</td>
<td>14.67±2.690</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair 3</td>
<td>Day 1</td>
<td>47.47±14.861</td>
<td>32.8</td>
<td>-3.409</td>
<td>.001***</td>
</tr>
<tr>
<td></td>
<td>Day 30</td>
<td>14.67±2.690</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NS-not significant
***- Highly significant

Table 5: Within Group Comparison of NDI-Group B

<table>
<thead>
<tr>
<th></th>
<th>Intervention Period</th>
<th>Mean± S.D.</th>
<th>Mean difference</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td>Day 1</td>
<td>49.33±13.042</td>
<td>28.26</td>
<td>-2.353</td>
<td>.195 NS</td>
</tr>
<tr>
<td></td>
<td>Day 15</td>
<td>21.07±8.940</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair 2</td>
<td>Day 15</td>
<td>21.07±8.940</td>
<td>9.07</td>
<td>-3.418</td>
<td>.001***</td>
</tr>
<tr>
<td></td>
<td>Day 30</td>
<td>12.00±3.117</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair 3</td>
<td>Day 1</td>
<td>49.33±13.042</td>
<td>37.33</td>
<td>-3.413</td>
<td>.001***</td>
</tr>
<tr>
<td></td>
<td>Day 30</td>
<td>12.00±3.117</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Between group analysis revealed that there was no significant difference in NDI scores between group A and B on baseline (p>0.05). However there was a significant improvement in NDI score in group B in 2nd week and in 4th week (p<0.001) as compared to that in group A.
Table 6-Comparison of NDI between Group A and Group B

<table>
<thead>
<tr>
<th></th>
<th>GROUP A (M± SD N=15)</th>
<th>GROUP B (M±SD N=15)</th>
<th>Z-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>47.47±14.861</td>
<td>49.33±13.042</td>
<td>-.271</td>
<td>.787&lt;sup&gt;NS&lt;/sup&gt;</td>
</tr>
<tr>
<td>Day 15&lt;sup&gt;th&lt;/sup&gt;</td>
<td>24.80±8.678</td>
<td>21.07±8.940</td>
<td>-1.296</td>
<td>.195&lt;sup&gt;NS&lt;/sup&gt;</td>
</tr>
<tr>
<td>Day 22&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>14.67±2.690</td>
<td>12.00±3.117</td>
<td>-2.383</td>
<td>.007**</td>
</tr>
</tbody>
</table>

DISCUSSION

This study compared the effectiveness of cervical lateral glide and manual cervical traction combined with neural mobilization in improving pain, functional disability and cervical range of motion. The results showed manual cervical traction combined with neural mobilization is better than cervical lateral glide in improving the pain, functional disability and cervical range of motion in patients with cervical radiculopathy.

There was significant improvement in pain in 2<sup>nd</sup> week and in 4<sup>th</sup> week (p<0.001) of treatment in both the groups, however, Group B showed more significant results.

There was significant improvement in neck disability in 2<sup>nd</sup> week and in 4<sup>th</sup> week (p<0.001) of treatment in both the groups, however, Group B showed more significant results.

The results of our study are in accordance with the results of Murphy et al, (2006) demonstrated in a study in which cervical traction and a slider neural mobilization of the medial nerve were applied simultaneously to reduce pain and disability measured at baseline and at 2 and 4 weeks using the Numeric Pain Rating Scale, the Neck Disability Index and the Patient-Specific Functional Scale. In conclusion, the findings of this study support that the application of cervical traction combined with neural mobilization can produce significant improvements in terms of pain and disability in cervical radiculopathy.

The basis for this is that cervical mechanical traction, commonly used for cervical radiculopathy, in addition to cervical joint distraction, may loosen adhesions within the dural sleeves, reduce compression and irritation of discs, and improve circulation within the epidural space.

Schenk RJ, Kelley J, Kruchowsky T, Bhaidani T, Boswell M (2006), demonstrated in a cervical radiculopathy patient a positive outcome in terms of range of motion, strength and function with neural mobilization along with conventional treatment.

Cleland J et al;(2005) have done a study on effect of intermittent cervical traction, cervical lateral glide towards contralateral side in ULNT1 position, thoracic spine manipulation and strengthening exercises of deep neck flexors and scapulothoracic muscles in cervical radiculopathy. They have taken 11 patients. On the basis of test item cluster described by Wainner, Neck Disability Index, Numeric Pain Rating Scale and global rating of change. They concluded that patients with cervical radiculopathy treated with manual physical therapy, strengthening exercises and ICT exhibited reduced pain and improved functional status at time of discharge and at a 6-month follow up.

Elvey recommended that a cervical lateral gliding technique would allow movement of structures within the intervertebral foramen to reduce undue tension to the neural tissues.

LIMITATIONS

Cervical Range of Motion was not measured

Sample size was small

Follow up was not done.
CLINICAL RELEVANCE

This study showed a significant overall improvement of pain, functional disability in both control and experimental groups but the results of neural mobilization combined with cervical traction are more significant than lateral glide group. Hence, the result of this study provide the evidence that cervical traction combined with neural mobilisation may be the valuable and useful tool in clinical practice and is consistence with the current use by clinical physiotherapist in improving neck disability and reducing pain in patients with cervical radiculopathy.

FUTURE RESEARCH

In future studies, research can be done with a large group of samples including subject with different age groups. The merits associated with the long term effects of the lateral glide and neural mobilization combined with cervical traction in patients with cervical radiculopathy can be studied which may include a longer treatment duration of 2-4 months.

CONCLUSION

The results of this study concluded that manual cervical traction combined with neural mobilisation is better than cervical lateral glide in improving the pain, functional disability and cervical range of motion in patients with cervical radiculopathy.

Acknowledgement: We are grateful to all the participants and the hospital staff who assisted in the study.

Conflict of Interest: We certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Ethical Clearance and Funding: We certify that this study has been duly approved by the relevant ethical committee and is not funded by any organization.

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A Comparative Study on Dominant Hand Grip Strength in Physical Therapists v/s Non-Physical Therapists in Ahmedabad

Bhookima Brahmbhatt¹, Dhara Vyas¹, Gira Thakrar²
¹Lecturer, ²Senior Lecturer, Ahmedabad Physiotherapy College, Gujarat University, Ahmedabad, Gujarat, India

ABSTRACT

Background: Hand grip strength is the force applied by the hand to pull on or suspend from objects and is a specific part of hand strength. It is very useful in various professions where people must work with their hand, like physiotherapy. So this study was designed to evaluate dominant hand grip strength among physical therapists in comparison with non-physical therapists.

Objectives:

- To measure dominant hand grip strength in Physical therapists
- To measure dominant hand grip strength in non-physical therapists
- To compare dominant hand grip strength in Physical therapists Vs non-physical therapists

Materials and Methodology: Two groups, 50 physical therapists and 50 non-physical therapists, were enrolled for the study including both the genders, aged between 20-30 years, with normal BMI by convenient sampling method from Ahmedabad. Hand grip strength was evaluated and compared using SAEHANS HAND DYNAMOMETER.

Results: Statistically analysis was done using student unpaired t-test between two groups. The results in this study shows that there is significant difference in dominant hand grip strength between physical therapists and non-physical therapists.

Conclusion: Physical therapists are having more grip strength in dominant hand compare to non-physical therapists in Ahmedabad.

Keywords: Hand grip strength, Hand dynamometer.

INTRODUCTION

Reliable and valid evaluation of hand strength is important for determining the effectivity of treatment strategies and according to Mayers et al 1973 and 1982, it is accepted that grip strength provide an objective index for the functional integrity of upper extremity. Grip strength is a force applied by the hand to pull on or suspend from objects and is a specific part of hand strength. It is the muscle power and force that can be generated by the hand. There are different types of grips. A great deal of muscle endurance is necessary to have a good carrying grip. Grip strength testing is frequently used for clinical decision making and outcome evaluation in evidence based medicine.

Grip strength is functionally relevant to measure the combined action of a large number of intrinsic and extrinsic hand muscle as well as the combine action of
There are 10 muscles that make up the hand grip. Three of these muscles are located in the forearm and wrist and other seven are located in hands themselves.\(^1\)\(^2\)

In general, grip strength measurement can be done by manual muscle testing (MMT) and hand dynamometer. MMT however has a number of limitations, therefore, to create more quantitative assessment of grip strength, dynamometer has been developed.\(^1\)\(^2\) A dynamometer is a device used for measuring force, torque or power produced by hand muscles. These dynamometer measurements are more sensitive to change compared to MMT and render outcome on a continuous scale.

According to Rice et al., 1989, in addition to being an economical measure that is easy to administer, it is one of the best indicators of the overall strength of the limb.

Grip strength and relative endurance may both contribute in the work-related accident and cumulative musculoskeletal injury. As a physical therapist has to deal with the patients with repeated use of hands daily, this study was to find out whether physical therapist has enough strength for the requirement of their profession.\(^3\)

**MATERIAL & METHODOLOGY**

Study design: Comparative cross-sectional study

Study setting: Ahmedabad physiotherapy college, Bopal, Ahmedabad, Gujrat, India.

Sample size: 100 subjects, 50 – Physical therapists and 50 – Non-physical therapists

Sampling method: Convenient sampling

**Inclusion criteria:**
- Age – 20-30 years
- Gender – Both Male and female
- Body Mass Index (BMI): Normal(18.5-24.9kg/m\(^2\))
- Asymptomatic subjects without any clinical complaints related to Upper limb

**Exclusion criteria:**
- Upper limb injury
- Neuromuscular disorder
- Sports person
- Subjects pursuing fitness training

**Instrument:**
- SAEHANS SH®5001 hydraulic handheld dynamometer
- Standard weighing scale
- Height measurement chart
- Informed consent form

Procedure: 100 subjects with normal BMI were selected from Ahmedabad city, out of which 50 were physical therapist and 50 were non-physical therapists. The use of hand dynamometer was explained and demonstrated to the subjects to prevent any subjective error and the consent forms were filled by the subjects.

- Preparation of apparatus: Set the adjustable handle to the desired spacing. Make sure the handle clip is located at the lower post from the gauge before moving the handle from one position to another. If the handle is not placed in the correct position, inaccurate readings will result. Rotate the red peak-hold needle counter-clockwise to zero.

- Position of subject: Standing

- Test position: Shoulder adducted and neutrally rotated, elbow flexed 90\(^\circ\), forearm and wrist in neutral position

- Instructions to the subjects: Hold the instrument such that it fits in the hand comfortably and then ask the subject to squeeze with maximum strength without holding the breadth with dominant hand and hold for 5 seconds. Repeat each test 3 times with 30 seconds rest in between.

- After the subject has used the instrument, record the reading (average).

- Reset the peak hold needle to zero before recording new reading.

**Measurement**

SAEHANS SH®5001 hydraulic handheld dynamometer was used for testing the grip strength which has peak hold needle that retains the highest recording until reset for easy and convenient recording of strength. It comes with dual scale readout of forces in kilograms and pounds. However
all readings were recorded in kilograms in the present study. It provides adjustable handle to accommodate various size of hands allowing the investigators to quantify grip strength for different size objects. The handle is set at 2 according to the participant’s comfort as most of the participants preferred 2nd position more comfortable during the testing.  

Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity. \(^5,6\) The body weight was measured using a weighing scale by SIGNALE, Sknol manufacturers, India. The height was measured by height measurement chart. BMI was calculated for each subject using the equation.

**Statistical methods:** A unpaired t-test (two tailed) was used to determine as two sets of data were significantly different from each other, and was most commonly applied as the test statistic followed a normal distribution.

### RESULTS

The results showed in Table 1 explain s that there was significant difference in dominant hand grip strength between physical therapists and non-physical therapists. The statistical analysis was done by using unpaired two tailed t-test.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean Grip Strength* (Kg)</th>
<th>t-value</th>
<th>p-value(^y)</th>
<th>Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male Physical Therapist</td>
<td>29.99+3.68</td>
<td>2.503</td>
<td>0.0079</td>
<td>95%</td>
</tr>
<tr>
<td>Male Control</td>
<td>27.21+4.14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female Physical Therapist</td>
<td>23.30+3.17</td>
<td>3.740</td>
<td>0.0002</td>
<td>95%</td>
</tr>
<tr>
<td>Female Control</td>
<td>20.06+2.94</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^*\)-Mean\(_{\pm SD}\) \(^y\)-Significant

### DISCUSSION

The results showed that grip strength was greater in physical therapist than in non-physical therapists. The main idea behind the study was to compare the hand grip strength between two groups. Physiotherapy is a kind of profession in which the physical therapist has to deal with a greater amount of manual work as well as exercises. So, this can be the reason behind the increased grip strength of physical therapist.

The results of dynamometry showed that there was significant difference found in physical therapist’s hand grip strength. We also found that grip strength was greater in male as compared to female in both the samples. Studies in the past have concluded that women are weaker than males in upper body by 40% to 60%. \(^7\) It is also been summarized that differences in levels of activity of upper limb between the genders may also contribute to the variations in results of strength comparisons.

In recent times many studies have attempted to provide a picture of the difference between dominant and non dominant hand grip strength. It has been proved earlier that population as whole demonstrated a significant difference between their dominant and non dominant hand grip strength. Therapist often follows 10% rule as general guidelines. This rule states that person’s grip strength in dominant hand is 10% greater than that of non dominant hand.

Grip strength may also play a role in injury prevention and rehabilitation. In many cases, strengthening of the grip has been a prescription for rehabilitation from injuries such as golfer’s and tennis elbow. According to Poliquin, “these ailments are often caused by improper grip strength ratio between elbow muscles and the forearm muscles.”

The findings of Teraoka (1979) \(^9\) and Balogun et al (1991) \(^10\) who had similar findings of maximal handgrip strength measured in standing. Mathiowetz et al (1985) \(^11\) in his study had concluded that handgrip strength is maximum when the elbow is flexed in 90\(^0\) position which was supported by Fan et al (1999). \(^12\)

The nutritional status has also been correlated to hand grip strength. Guo et al (1996) and Kenjile et al
(2005) found grip strength to be a strong predictor of an individual’s nutritional status. These findings draw parallel to the findings of the anthropometric measurement studies-Body Mass directly correlated to the grip strength. So, BMI of all the subjects was measured and the subjects with the normal BMI were included in the study.

Poliquin also reveals when the grip strength improves, less neural drive is needed for the forearm and hand muscles to perform exercises.

It is mandatory in rehabilitation to understand how minor changes in body and body segments can affect performance involving hand grip, be it in sports or normal day to day activities. The method of grip strength assessment has a value of cost-effective, non-invasive screening tool to evaluate person’s well-being.

**Limitation:**
- The hand span of the subjects was not measured.
- Small sample size

**CONCLUSION**

The results in this study indicate that there is significant difference in dominant hand grip strength between physical therapists and non-physical therapists. Physical therapists are having more strength compare to non-physical therapists in Ahmedabad.

**Further recommendations:**
- Correlation between hand grip strength and musculoskeletal injuries
- Hand grip strength in dominant and non-dominant hand of physical therapists

**Acknowledgement:** We express our gratitude to our principal, colleagues and all the subjects who played important role in completion of this study.

**Conflict of Interest:** None

**Ethical Clearance:** Ethical clearance was taken from the ethical committee of the Ahmedabad Physiotherapy college, Ahmedabad.

**Source of Support:** Self

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8. Bechtol c. o; the use of a dynamometer with adjustable handle spacing. Journal Bone and joint surgery. 1954;36A:324-832
Comparison between the Distances Covered, Heart Rate and Respiratory Rate During 20 Metre & 30 Metre 6-minute Walk Test among Smokers

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ABSTRACT

Background- According to ATS, 30m is standardized length of corridor for conducting a 6MWT & it avoids the use of shorter corridor, since it requires subject to take more turns and hence more exertion. The present study was planned to compare the distances covered, physiological vitals and subjective exertion rating on different lengths of corridor.

Design- We performed a crossover observational, pre-test and post-test study

Aim and objectives - Our aim was to compare the differences between the distances covered, heart rate, blood pressure, respiratory rate and perceived exertion ratings during a 20 meter & a 30 meter, 6-minute walk test among smokers.

Subjects and method - 100 male smokers in the age group 20 to 50 years were considered for present study. Measurements of HR, BP, RR, RPE on Modified Borg’s scale, was taken before and after 6MWT on 20m and 30m length of corridor. 6MWD was also documented & compared at the end of 6MWT (as per ATS).

Results - Intergroup comparison showed statistically non-significant difference in resting RR(p=0.660), HR(p=0.640), SBP(p=0.189), DBP(p=0.530), RPE(p=0.083), and post 6MWT measures RR(p=0.351), HR(p=0.324), SBP(p=0.937), DBP(p=0.831), RPE(p=0.025) parameters. 6MWD was clinically non-significant in 20m & 30m corridor 6MWT. Within group comparison of 6MWT measures showed statistically highly significant (p=0.000) differences in both 20m and 30m length of corridor in 6MWT. The magnitudes of the improvement in these parameters were found to be significant at the level (p<0.05)

Conclusions- There was no clinically significant difference found in 6MWT physiological variables, subjective exertion & measures of 6MWD post 6MWT in 20m & 30m length of corridor among smokers. So, a 20m corridor length can be used to conduct 6MWT in smokers, when the 30m corridor is unavailable.

Keywords: Smokers, 6MWT, 20m Corridor, 6MWD, HR, RR, BP, RPE.

INTRODUCTION

6MWT is a simple, reliable & economic tool to assess the functional capacity of a person, as it doesn’t require instruments and special skill.¹It has been found that chronic smoking affects young male smokers’ cardiovascular fitness, impairing the economy and hence decreases the capacity of their circulatory system. The smokers have impaired exercise tolerance and their maximal exercise test
duration time is shorter. So, 6MWT serves as one of the best tool in assessing the functional capacity of smokers. Current ATS guidelines prescribes the use of an indoor or outdoor corridor with a flat surface of 30 meter in length, however, not all institutions have such long corridors to perform the 6MWT, which hinders or prevents its application and the consequent realization of its benefits. So, the present study was aimed at distinguishing the difference in the HR, RR, BP, RPE and 6MWD in smokers during 6MWT when performed either on 30 m long corridor or 20 m long corridor.

**Aims & objectives:** The aim of study was to compare the differences between the distances covered, heart rate, blood pressure, respiratory rate and perceived exertion ratings during a 20 meter & a 30 meter, 6-minute walk test among smokers.

The objective of our study was to perform a comparative analysis of the 6MWT in smokers in two corridors of different lengths: a 30-meter corridor, as standardized and proposed by the ATS, and a 20-meter corridor that is easier to implement and better suits the clinical spaces.

**MATERIALS & METHOD**

All subjects were given informed written consent form. A randomized cross-over pre test-post test design was used. All subjects were studied between 9am-5pm on weekdays. Subjects were asked to abstain from caffeine for 4 hours before test session.

Subjects performed 6 minute walk test on both the corridors (shorter length viz 20 m corridor as well as standard 30 m corridor. All the subjects underwent through the examination and investigation. After proper assessment of the subjects 30 minutes rest period was given. The 6-MWT was conducted according to ATS guidelines. The subject’s resting heart rate; blood pressure, saturation and rate of perceived exertion (RPE) were recorded prior to test. The subjects walked from one end to the other end of a 30meters hallway at their own pace, while attempting to cover as much ground as possible in the allotted 6 minutes. Subjects were encouraged with the standardized statements like “You are doing well” or “Keep up the good work”. Subjects were allowed to stop and rest during the test, but were resumed to walking as soon as they felt able to do. Heart rate, blood pressure, RR, & RPE were monitored.

**CURRENT SMOKERS** shall be those who had smoked ≥100 cigarettes in their lifetime, and have been smoking since 5 years and are currently smokers.

Cumulative smoking exposure in smokers is determined in terms of pack-years by multiplying the number of years smoked with the average number of packs per day.

Based on pack-years of smoking, subjects are classified as never smokers (0.0 pack-years), light smokers (0.1-20.0 pack-years), moderate smokers (20.1-40.0 pack-years), and heavy smokers (> 40 pack-years).

**STATISTICAL ANALYSIS**

Independent t test to compare the variables between groups. Also, Spearman rank correlation coefficient was used to evaluate the correlation between the parameters. For within group analysis, paired t test was used. A p value of 0.05 was considered to be significant. All values are presented as the mean (SD) and 95% confidence interval, unless stated otherwise.

**Findings:** In this present study we noted no significant difference between the physiological measures (RR, SBP, DBP, HR) and subjective exertion value (RPE) by Modified Borg Scale (MBS) prior to and post 6MWT conduction on 20m and 30 m length of corridor among smokers.**Table 1**. Statistically significant difference was found in the distances covered on two different lengths of corridor, but clinically the difference was non-significant. (Figure 1)

**Table 1- Paired sample t-test to compare the vitals of the smoker on different lengths of corridor**

<table>
<thead>
<tr>
<th>Vitals</th>
<th>MEAN±S.D</th>
<th>t-value</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resting HR (20)-Resting HR (30)</td>
<td>0.140±2.98</td>
<td>-0.47</td>
<td>0.640</td>
</tr>
<tr>
<td>Post 6MWT HR (20)- Post test HR (30)</td>
<td>0.450±4.54</td>
<td>-0.99</td>
<td>0.324</td>
</tr>
<tr>
<td>Resting SBP(20)-Resting SBP(30)</td>
<td>0.480±3.63</td>
<td>-1.32</td>
<td>0.189</td>
</tr>
<tr>
<td>Post 6MWT SBP(20)-Post 6MWT SBP(30)</td>
<td>0.40±5.01</td>
<td>0.080</td>
<td>0.937</td>
</tr>
</tbody>
</table>
**DISCUSSION**

Comparison between physiological variables and subjective RPE on different lengths of corridor i.e. 20m & 30m

No significant difference was found in the resting baseline vitals (RR, HR, BP & RPE) and post 6MWT vitals on 20 meter corridor and 30 meter corridor while performance of 6MWT by the smokers (Table 1).

![Figure 1 Comparison of 6MWD covered by the smokers on different lengths of corridor](image)

**Table 1- Paired sample t-test to compare the vitals of the smoker on different lengths of corridor (Cont...)**

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.80±1.26</td>
<td>0.069±2.80</td>
<td>0.070±1.58</td>
<td>0.240±2.56</td>
<td>0.015±0.08</td>
<td>0.21±0.92</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 0.631</td>
<td>- 0.442</td>
<td>- 0.936</td>
<td>- 1.750</td>
<td>- 0.272</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.530</td>
<td>0.831</td>
<td>0.660</td>
<td>0.351</td>
<td>0.025</td>
</tr>
</tbody>
</table>

Speed in meter/minute was calculated by dividing the distance walked to 6minutes i.e. the time taken to cover the test. Estimated oxygen consumption i.e. $VO_2$ was calculated by the formula: $VO_2 = 3.5 \text{ ml/kg/min} + \text{oxygen consumed (in ml/kg/min)}$. Hence, MET level achieved was calculated by dividing $VO_2$ by 3.5, since 1 MET = 3.5 ml/kg/min.

In the present study mean MET post 6MWT on 20 meter corridor was $3.78\pm0.41$ METs, which were significantly similar to that achieved post 6MWT on 30 meter corridor ($3.82\pm0.41$). The energy consumed during two tests did not showed any significant difference. The energy consumed by the smoker in both lengths of corridor was similar; hence it might be the significant reason for similar exertion rates on MBS on different lengths of corridor.

Chung, Lin and Wasserman⁹ proposed an alternative method to assess functional capacity and defined work rate ($\omega$) as the product of walked distance multiplied by body weight (Km.Kg). Other
authors concluded that expressing walked distance in work units improves the accuracy and extension of its usefulness, and it is better correlated with walking performance during the test. In the present study the work rate during 6MWT on 20 meter corridor was 38345.21±8263.41 km.kg, as compared to 38980.06±8338.51 km.kg. The work rate measured in the present study did not show significant differences between the tests in the different corridors, with similar energy expenditure between the different proposed lengths.

Comparisons in the 6MWD covered by the smokers in 6MWT on 20m and 30m length of corridor

In the present study statistically significant difference was found in the 6MWD covered by the smokers in six minute walk test on 20m and 30m length of corridor. The 6MWD on 20 meter corridor (583.32±86.63 meter) was lesser as compared to 6MWD covered on standardised 30m length of corridor (593.12±87.65meter) (p=0.000) as seen in Figure 1. But according to ATS guidelines, a statistically significant mean increase in 6MWD in a group of study participants is often much less than a clinically significant increase in an individual patient. So, the difference of 10 m in 20 m and 30 m corridor walk test might be statistically significant, but clinically it is insignificant. Guyatt et al. suggested that the minimum clinically significant distance for the 6-MWT was 30 m. Redelmeier et al. reported a clinically significant mean change of 54 meters (95% CI, 37-71 m) in patients’ perception of exercise tolerance in 112 patients with stable, severe COPD. O’Keeffe et al. reported a clinically significant mean change of 43 m in 45 elderly patients with heart failure.

So, we can say that the 6MWD covered by the smokers on different lengths of corridor were statistically significant but they were clinically insignificant.

In the present study, the 6MWD during best test in 30 meter corridor (797 m) was significantly higher when compared to the best test in 20 meter (760 m) corridor. However, the difference between the two tests was only 4.64%, i.e. less than 10%, suggesting that both tests in different length of corridor are reproducible. These results were similar to the study done by EvaniroS.Aquino et al. in 2010, where the difference between two tests was 3.57%.

When the six minute distances covered were compared with Enright and Sherill equation, it was found that the distance covered on 20m corridor was 85.61%, and that on 30m was 84.1% of the predicted distance. The results showed that the smokers displayed functional impairment, because in both the tests, they walked on average of 84.85% of that predicted for them, according to the equation proposed by Enright and Sherill. This can be explained by the fact that, chronic smoking affects young male smokers’ cardiovascular fitness, impairs the economy and hence decreases the capacity of their circulatory system. The smokers have impaired exercise tolerance and their maximal exercise test duration time is shorter. 6MWD i.e. the distance walked during 6MWT is considered as the main variable to measure functional capacity in the 6MWT.

The limitations of the study were that, the smokers group chosen for the study was not homogeneous, 44% bidi (B), 49% cigarette (C) & 7% (B+C) smokers were there. Study was done in only 100 smokers, & a sample of convenience was taken. Female smokers restrained their participation in the study due to social stigma. Moreover PFT &oxymetery was not done due to financial constraints.

**CONCLUSION**

There is no significant difference between the distances covered, HR, RR, BP & RPE on 20m & 30m corridor, 6MWT among smokers.

**CLINICAL SIGNIFICANCE**

Since we found that the distances covered, change in HR, RR, RPE and BP were similar when performed in either length of the corridor i.e.20m & 30 m, so in future we can use shorter corridor of 20 meter to conduct 6MWT in smokers when standardized 30m corridor is unavailable.

**Acknowledgement:** I would like to thank Prof. Shridhar Dwivedi Professor of Medicine/ Preventive Cardiology HIMSR, Jamia Hamdard, Hamdard Nagar New Delhi and Dr. Jyoti Ganai (PT) Assistant Professor, HIMSR, Jamia Hamdard, Hamdard Nagar,
New Delhi for their constant support and inputs during the course of the study.

Conflict of Interest: I did not have any personal relationships that might have inappropriately influenced my actions, such as dual commitments, competing interests, or competing loyalties.

Source of Funding: The study was self financed.

Ethical Clearance: All the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was taken from the subjects prior to the study.

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The Effects of Thoracic Thrust Manipulation and Neck Flexibility Exercises for the Management of the Patients with Mechanical Neck Pain

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¹II MPT (Orthopaedics & Traumatology,) ²MPT(Ortho), Department of Orthopaedic Physiotherapy, ³Principal, Saveetha College of Physiotherapy, Saveetha University

ABSTRACT

Aim: To aim of the study is to compare the Effects of Thoracic thrust manipulation and Neck Flexibility exercise for the Patients with Mechanical Neck Pain.

Objective: The objective of the study is to investigate the effectiveness of Thoracic Thrust manipulation for the Patients with Mechanical neck pain in reducing pain and disability.

Materials: Wooden couch with pillow.

Study Design: Experimental Study design.

Study Setting: Outpatient Department, Saveetha College of Physiotherapy, Saveetha University, Thandalam, Chennai – 60210

Sampling Technique: Quota sampling technique.

Methodology: 60 subjects with Mechanical neck pain are selected for study based on Inclusion and Exclusion Criteria and are divided into two Group A and B. Group A - experimental group (n=30) or Group B- control group (n=30).

Outcome Measure: Neck Disability Index (NDI) Fear-Avoidance Beliefs Questionnaire -Neck (FABQ)

Statistical Analysis: t- test is used to analyze the results between the group and Paired t test is used to analyze the results within the group.

Result: From Statistical Analysis made, the quantitative data revealed statistical significant difference between both groups mean difference of group A and group B. The post test mean value of NDI in Group A is 24.87 (SD 7.96) and in group B is 33.07 (SD 8.90), and the value of FABQ in Group A is 51.27(SD 11.93) and in group B is 57.97 (SD 11.80). Statistical Analysis of post test for NDI and FABQ showed a significant increase in the group A (Thoracic Thrust Manipulation).

Conclusion: On comparing both the Groups, Thoracic Thrust Manipulation group is more effective than Neck Flexibility Exercises Group in the Management of Patients with Mechanical Neck Pain in reducing Pain and by this the functional activities of patients has been improved.

Keywords: TTM- Thoracic Thrust Manipulation, NFE – Neck Flexibility Exercise, NDI - Neck Disability Index, FABQ – Fear Avoidance Belief Questionnaire.

INTRODUCTION

Background of the Study: Mechanical Neck Pain is a common complaint, with a point prevalence of nearly 13% and lifetime prevalence of nearly 50%.¹ Pain and Impairment of the Neck is common. It is estimated that 22% to 70% of population will have neck pain sometime in their lives. In addition, it has been suggested that the incidence of neck pain is increasing. At any given time, 10% to 20% of population reports neck problems, with 54% of individuals having experienced neck pain within the last 6 months.²³
Neck pain, although felt in the neck, can be caused by numerous other spinal problems. Mechanical Neck pain may arise due to muscular tightness in both the neck and upper back. Exercise plus joint mobilization and manipulation has been found to be beneficial in both acute and chronic neck disorders. Neither mobilization nor manipulation without exercise however has been found to be helpful. Mobilization is equivalent to manipulation.

Here two varieties of techniques are carried out in treating the neck pain. Recently evidence has begun to emerge for the use of manual therapy, specifically thrust manipulation procedures, directed at the thoracic spine in people with neck pain. Further decrease in the mobility of the thoracic spine has been shown to be related to the presence of neck pain symptoms. So it is possible that manipulation of the thoracic spine may alter the biomechanics of the cervical region and decrease mechanical stress.

MATERIAL & METHOD

Wooden couch with pillow.

STUDY DESIGN: Experimental Study design.

STUDY SETTING: Outpatient Department, Saveetha College of Physiotherapy, Saveetha University, Thandalam, Chennai - 602105

SAMPLING TECHNIQUE: Quota sampling technique.

SAMPLE SIZE: 60 Subjects are selected for study based on Inclusion and Exclusion Criteria and are randomly divided into two Group A and B. Each Group of 30 subjects.

A prior consent was obtained from all the subjects after explaining the procedure, methodology, nature and purpose of the study.

INCLUSION CRITERIA

- Both male and female with the age group of 18-45 years.
- Patient experiencing neck pain at least for 2 months.
- Patient with non-specific neck pain, without specific identifiable etiology (i.e., infection, inflammatory disease) but which could be reproduced by movement and prolonged Posture.
- Base line neck disability index of 15 or greater

EXCLUSION CRITERIA

- Cervical spine injury or surgery
- If they had received any physiotherapy within the 6 months prior to study
- Cervical radiculopathy or presenting neurological deficit
- Cervical spondylitis
- Exclusion criteria is verified by history and physical examination and X-ray.

OUTCOME MEASURE

- Neck Disability Index (NDI) questionnaire is used to assess subject’s disability level.
- Fear-Avoidance Beliefs Questionnaire - Neck (FABQ) to is used to address how people respond to the fear of pain.

STATISTICAL ANALYSIS

- The Collected Data were tabulated and analyzed from both group subjects were analyzed using Paired ‘t’ test to measure the changes between the pretest & posttest values of Thoracic thrust manipulation and Neck flexibility exercise within the group & ‘t’ test to measure the changes between the groups.
TABLE 1 Comparison of Pre test & Post test values of Group A (Thoracic thrust manipulation) using paired t-test

<table>
<thead>
<tr>
<th>Group A</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Mean difference</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck disability index (scores)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre test</td>
<td>40.83</td>
<td>9.26</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post test</td>
<td>24.87</td>
<td>7.96</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear avoidance belief questionnaire (scores)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre test</td>
<td>69.13</td>
<td>10.92</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post test</td>
<td>51.27</td>
<td>11.80</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- The data from the above table shows the Pre test & Post test values of Neck Disability Index and Fear Avoidance Belief Questionnaire in Group A.
- The pre test mean value of NDI was 40.83, SD 9.26, and the post test mean value were 24.87, SD 7.26. The post test values are gradually reducing with mean difference of 15.97.
- The paired t value (17.0276) show that there is statistically, significant change at P<0.05(5% less from) from pre test to post test using Thoracic thrust manipulation for Mechanical neck pain.

- The pre test mean value of FABQ, was 69.13, SD 10.92, and the post test mean value were 51.27, SD 11.80. The post test values are gradually reducing with mean difference of 17.87.
- The paired t value (28.4355) show that there is statistically, significant change at P<0.05(5% less from) from pre test to post test using Thoracic thrust manipulation for Mechanical neck pain.

TABLE 2 Comparison of Pre test & Post test values of Group B (Neck Flexibility Exercises) using paired t-test

<table>
<thead>
<tr>
<th>Group A</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Mean difference</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck disability index (Scores)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre test</td>
<td>40.87</td>
<td>8.92</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>32.73</td>
<td>8.54</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear avoidance belief questionnaire (Scores)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post test</td>
<td>68.90</td>
<td>10.92</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>57.97</td>
<td>11.80</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- The data from the above table shows the Pre & Post test values of Neck Disability Index and Fear Avoidance Belief Questionnaire in Group B.
- The pre test mean value of NDI was 40.87, SD 8.92, and the post test mean value were 32.73, SD 8.54. The post test values are gradually reducing with mean difference of 8.13.
- The paired t value(15.8368) show that there is statistically, significant change at P<0.05(5% less from) from pre test to post test using Neck Flexibility Exercise for Mechanical neck pain.
- The pre test mean value of FABQ, was 68.90, SD 10.92, and the post test mean value were 51.97, SD 11.80. The post test values are gradually reducing with mean difference of 10.93.
- The paired t value(13.1233) show that there is statistically, significant change at P<0.05(5% less from) from pre test to post test using Neck Flexibility exercises for Mechanical neck pain.
TABLE: 3 Comparison of post test values of group A and B using Independent t-test.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Mean difference</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck disability index</td>
<td>Pre test</td>
<td>24.87</td>
<td>7.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>33.07</td>
<td>8.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear avoidance belief questionnaire</td>
<td>Post test</td>
<td>51.27</td>
<td>11.93</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>57.97</td>
<td>11.80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- The data from the above table shows the Post test values of Neck Disability Index and Fear Avoidance Belief Questionnaire.

- The post test mean value of NDI of Group A and Group B was 24.87 and 33.07, SD 7.96, 8.90 respectively. The post test values are gradually increasing with mean difference of 8.20

- The paired t value (3.7620) show that there is statistically, significant change at P<0.05(5% less from) from pre test to post test using Thoracic Thrust Manipulation for Mechanical neck pain.

- The pre test mean value of FABQ, was 51.27, SD 11.93 , and the post test mean value were 57.97 ,SD 11.80 . The post test values are gradually reducing with mean difference of 6.70.

- The paired t value (2.1868) show that there is statistically, significant change at P<0.05(5% less from) from pre test to post test using Thoracic Thrust Manipulation for Mechanical neck pain.

**DISCUSSION / CONCLUSION**

Mechanical Neck Pain: Is the pain caused by the mechanics of movement, There are muscles, tendons, vertebrae, discs and joints between the vertebrae, nerves and other structures that can cause pain. Mechanical pain is based on inflammation of these structures and the aggravation of this inflammation by movement.17

Norlander investigated that reduced mobility at the cervical-thoracic junction has been shown to be a risk factor for neck pain. Following on from these early studies, evidence has recently begun to emerge for the use of manual techniques concentrated at thoracic spine dysfunctions for patients with mechanical neck pain.20

The Outcome Measures in this Study were assessed by Neck Disability Index (NDI) and Fear Avoidance Belief Questionnaire. NDI and FABQ was chosen because of the appropriateness of the question to the symptoms of Mechanical Neck Pain in addition to its good content validity and its being used as a tool of measuring Neck Pain in many Research.

The difficulties faced during the study was to convince the subjects to come regularly for treatment, and to avoid their absence phone calls were made to remind the subjects to come for the research.

Present Study concludes that there is improvement in the Outcome measure measured by the investigators in both Group A (Thoracic Thrust Manipulation) and Group B (Neck Flexibility Exercises)

Statistical Analysis of Post test for NDI, FABQ showed a significant increase in Group A (Thoracic Thrust Manipulation).

**CONCLUSION**

The present study among the Patients with Mechanical Neck Pain showed a improvement in both Group A (Thoracic Thrust Manipulation) and Group B (Neck Flexibility Exercise). On comparing both the Groups, Group A is more effective than Group B in the management of Patients with Mechanical Neck pain in reducing Pain and Disability, thereby the functional activities of the Patients has been improved.
Conflicts of Interest: The terms of the study and its arrangement have been reviewed and approved by the Saveetha University in accordance with its policy and objectivity in research.

Ethical Clearance: Saveetha University

Acknowledgement: Nil

REFERENCES


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Effect of Fear of Falling on Quality of Life in Geriatric Population

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¹(PT), D. E. Society’s Brijlal Jindal College of Physiotherapy, Pune

ABSTRACT

Study design: Cross sectional study

Aims & Objectives:-
1. To assess fear of falling by FFABQ (fear of falling avoidance behavior questionnaire).
2. To assess QOL by OPQOL.
3. To correlate fear of falling with QOL in geriatric population.

Methodology:
• Type of study: cross sectional study.
• Sample size: 100
• Study setting: Community
• Inclusion criteria: All elderly individuals above age of 65 years.
• Exclusion criteria: Individuals with neurological, orthopedic, cardiovascular, & psychological problems.
• Method: Assessment of 100 community dwelling individuals aged above 65 for FOF by FFABQ & QOL by OPQOL. Appropriate statistical tests are used to analyze data. Correlation of FOF with QOL is done.

Results: Collected data was statistically analyzed by spearman correlation test which showed correlation coefficient, r = 0.8416 and P value < 0.0001 which is extremely significant.

Conclusion: The results from this study provide that there is significant correlation between two scales i.e. FFABQ and OPQOL. Hence, fear of falling has effect on QOL in geriatric population.

Keywords: Fear of falling, QOL, Elderly.

INTRODUCTION

FALLS is defined as “an event which results in a person coming to rest unintentionally on the ground or lower level, not as a result of a major intrinsic event (such as stroke) or overwhelming hazard.[¹]

Falls and falls related injuries are one of the major complications in geriatrics. It has been reported that 28% to 35% of individuals 65 years of age and older will fall within a year’s time, exposing them to serious injury. Injuries as a result of a fall can be significant, but a fear of falling may be a more serious problem, as it may lead to decrease in activity and mobility in elderly people. Previous research indicates 50% of the elderly population have a fear of falling after experiencing just one fall, and many of these individuals describe avoiding some activity due to their fear.[²]

However, a fall is not a prerequisite to the fear of falling or subsequent activity restriction.
It is found that, 20% of individuals who had not recently experienced a fall were still afraid of falling. Therefore, “fallers” and “nonfallers” both may have a fear of falling that may lead to inactivity and social isolation, which can become a reason to stimulate deconditioning, functional decline, and decreased quality of life.

Despite the availability of many balance impairment tools, balance confidence measures, and self-efficacy measures, there is a need for a practical, clinical tool that can help quantify the effect of fear of falling on activity and participation, as defined by the International Classification of Functioning, Disability and Health (ICF). The most commonly used self-perceived balance confidence and efficacy questionnaires— the Activities-specific Balance Confidence (ABC) Scale and the Falls Efficacy Scale (FES)— appear to be adequate at measuring “confidence” and “self-efficacy,” respectively, with activities of daily living (ADL); however, both questionnaires fail to capture the downstream consequence (i.e., activity limitation and participation restriction) that a lack of confidence or decreased self-efficacy has effect on performing functional tasks. Furthermore, the ABC Scale and the FES do not assess whether this confidence translates into avoidance behavior. Instead, these questionnaires are focused on the ICF-defined personal factors rather than activity and participation. Although performance based measures of balance, gait, and fall risk (i.e., Berg Balance Scale [BBS], Dynamic Gait Index [DGI], Timed “Up & Go” Test [TUG], Functional Reach Test [FRT], and dynamic posturography) are good at measuring different aspects of balance and fall risk, they fail to measure the role and influence that the fear of falling has on activity and participation. There are few survey instruments that measure the effect of fear of falling on activity.\[2\]

QOL is a marker of underlying conditions, disability, depression and the frailty syndrome. Hence QOL can get affected by many reasons and fear of falling and subsequent activity restriction may contribute to it.

Fear of Falling Avoidance-Behavior Questionnaire (FFABQ) -

The FFABQ quantifies avoidance behavior (activity limitation and participation restriction) related to the fear of falling. The model explains that individuals learn through operant conditioning to fear situations or stimuli that cause harm or stress and, as a result, to avoid that situation or these stimuli. The premise for the FFABQ was that individuals with a fear of falling (secondary to a previous fall or awareness of the negative consequences of falling) would avoid activities that put them at a risk for a fall. Therefore, the FFABQ would capture the avoidance of activities that would result from a fear of falling.\[2\]

Older people quality of life questionnaire (OPQOL) -

The OPQOL was designed to be multi-dimensional, and was developed directly from older people’s views on the main components of QOL. The full OPQOL consisted of 35 statements, with the participant being asked to indicate the extent to which he/she agrees with a score of 1–5. Lower scores indicate a better QOL. The total score ranges from 35 to 175. The 35 statements of the full OPQOL questionnaire cover life overall, health, social relationships and participation, independence, control over life and freedom, home and neighborhood, psychological and emotional well-being, financial circumstances, culture and religion. \[3\]

This study is conducted to find effect of fear of falling on quality of life in geriatric population.

Materials and Methodology:

- Type of study: cross sectional study.
- Sample size: 100
- Study setting: Community
- Inclusion criteria: All elderly individuals above age of 65 years.
- Exclusion criteria: Individuals with any known systemic health problem.
- Materials: Questionnaire.
- Method:

Consent from the subject was obtained.

Questions about previous history and frequency of falls, existing medical conditions were asked.
Assessment of 100 community dwelling individuals aged above 65 for FOF by FFABQ & QOL by OPQOL. Subjects were scored according to their responses.

The obtained data was used for data analysis. Correlation of FOF with QOL is done.

**RESULTS**

Data analysis: Collected data was statistically analyzed by spearman correlation test.

**Graph 1: Correlation of fear of falling with quality of life.**

In the graph, y axis shows score of an individual on FFABQ and x axis shows score of individual on OPQOL. The graph shows positive correlation. Hence, there is significant correlation between two scales i.e. FFABQ and OPQOL.

**Graph 2: Effect of number of falls on fear of falling.**

In the graph, y axis shows score of an individual on FFABQ and x axis shows score of individual on OPQOL. The graph shows positive correlation.

**Graph 3: Effect of number of falls on quality of life.**

In the graph, y axis shows score of an individual on OPQOL and x axis shows previous no of falls. The graph shows positive correlation.

**DISCUSSION**

Falls are common in geriatric population and one that presents a substantial health problem among the elderly due to the overwhelming rise in human life expectancy. A hidden and often under-recognized consequence of falls is fear, loss of confidence and restriction of activities in order not to put them themselves in the position of risking further falls. This study was conducted to find effect of fear of falling on quality of life in geriatric population.

The result of this study shows that, there is significant correlation of FFABQ scores and OPQOL scores. As the graph-1 shows positive correlation, the fear of falling has effect on quality of life in geriatric population. This can be explained as, due to fear of falling, elderly people avoid some ADL’s or instrumental ADL’s mainly involving staircase climbing, walking in crowded places, lifting and carrying objects, doing housework (e.g., cleaning, washing clothes), recreational and leisure activities (e.g., play, sports, arts and culture, crafts, hobbies, socializing, traveling) etc. Thus person tries to avoid activities which may put them under risk of falling. The person may seriously restrict outings, hobbies and activities such as attending religious services. This activity and participation restriction affects their quality of life.

The study also shows that, there is positive correlation of number of previous falls with fear of falling and quality of life. Graph 2 and Graph 3 shows positive correlation as fallers reported a greater amount of avoidance behavior, as measured by the
FFABQ, compared with nonfallers.

The people who have experienced a fall may restrict activities or situations that had put them at risk for falling. In addition, the more often a person falls, the more fear-avoidance behavior was exhibited. Fallers may have increased anxiety from the fall or anxiety related to their unsteadiness. This anxiety may contribute to a vicious cycle involving fear of falling, activity and participation restriction, and decreased quality of life. This can lead to detrimental effects such as social isolation, loneliness and immobility leading to further reduced strength and muscle tone and stiffer joints. Because of a limitation of lifestyle and being confined to the home, the person can become very depressed and withdrawn.

CONCLUSION

The results from this study provide that there is significant correlation between two scales i.e. FFABQ and OPQOL. Hence, fear of falling has effect on QOL in geriatric population.

Also, number of previous falls has significant correlation with fear of falling and quality of life. Hence, previous falls increases fear of falling and affects quality of life.

Acknowledgement : Nil

Conflict of Interest : Nil

Source of Funding : Nil

Ethical Clearance : Obtained

REFERENCES

Self Efficacy and Wheel Chair Skills among Active Wheelchair Dependent T_2-L_4 SCI Clients in Delhi and NCR: A Co-Relational Study

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ABSTRACT

Study Design: Correlation study design

Objectives: To determine the relationship between self efficacy and wheelchair skills.

Method: 80 SCI clients participated in the study. Purposive sampling was done to recruit the subjects. Demographic data were taken and Wheelchair skills and self efficacy were evaluated by wheelchair skills test questionnaire (WST-Q) and self efficacy in wheeled mobility (SEWM).

Results: The relationship was determined by the domains of WST(capacity), WST(performance) and SEWM. Karl Pearson’s test was applied and showed excellent correlation between WST-Q (performance) and SEWM (r=.928, p=0.000) and WST-Q(capacity) and SEWM (r=.941, p=0.000).

Conclusion: The present study reveals that self efficacy is specific to task thus assessment and management should involve components of self efficacy specific to wheelchair skills in order to get additional benefit and generalization of wheelchair skills learnt by the patient in turn improving the wheelchair skills capacity and performance.

Keywords: spinal cord injury, mobility, self efficacy, wheelchair skills.

INTRODUCTION

Spinal cord injury (SCI) is an interruption of the neural pathways in the spinal canal and is characterized by loss of sensation and motor dysfunction below the level of the injured lesion. SCI is caused by traumatic (e.g. automobile accident, violence, impact) or non-traumatic injuries (e.g., surgery, disease).

A person with SCI may experience several distressing complications which can occur both during the acute phase and long after injury like pressure sores, heterotopic ossifications, urinary complications respiratory complications, deep vein thrombosis, bladder infections, depression, cardiovascular disease. In addition to these complications, a person’s ability to become mobile is reduced due to limitations below the level of injury.

Within the SCI context, mobility is defined as the ability to independently move from one location to another. Due to motor deficits in the lower limbs the mobility is hampered in the spinal cord injury persons. It has also been seen that mobility is among the top goals for spinal cord injury patients. Many people with SCI face transportation and mobility barriers within various settings and free-living environments, making mobility a major concern for community participation and integration. Mobility via one’s wheelchair is also a personal form of transportation, which enables people with SCI to become fully reintegrated into their social systems. Approximately 82% of persons with spinal cord injury are dependent on wheelchair for mobility. For these persons wheelchair use is conditional to achieve
Mobility may not only facilitate physical activity through physical function but by psychosocial means as well. That is, by being mobile with one’s wheelchair, people living with SCI may be more confident in using their wheelchair to engage in physical activities and more confident in overcoming barriers.

The wheelchair users frequently encounter environmental obstacles that limit their opportunities. These architectural barriers are distressing for people who use wheelchair for full time mobility and can cause safety challenges for individuals with SCI. An alternative and complimentary approach to enhance access is to teach wheelchair users the skills needed to overcome these barriers safely and efficiently. These skills can further provide independence, freedom of movement and thus improving the quality of life. The wheelchair skills are among the most important therapeutic tools in rehabilitation. So, an appropriate training programme is prescribed to the wheelchair users which is said to be as “wheelchair skills training program" (WSTP). WSTP is a structured protocol that incorporates several principles of motor learning. Various training protocols given by different researchers. Bullard et al found that wheelie training improved subjects performance on a obstacle course. Coolen et al found that wheelchair training improves the wheelchair skill performance.

Nosek et al reported that maximizing wheeled mobility and achieving overall independence are influenced by attitudinal factors such as self efficacy, rather than by disability related factors alone.

Self-efficacy is a key construct within Social Cognitive Theory. Self-efficacy is a form of social cognition and refers to situation specific self confidence, where it is a person’s belief in his or her own abilities to perform the specific behaviors needed to accomplish a certain task.

Hedrick et al, found perceived self-efficacy as mediator of an individual’s wheelchair mobility behavior and reported that participation in tennis by wheelchair mobile adolescents increased their perceived efficacy in tennis. Greenwood et al, investigated psychological well-being of wheelchair tennis participants and wheelchair non-active participants, found a significant correlation between perceived self efficacy in wheeled mobility and perceived self-efficacy in wheelchair tennis. Self-efficacy has been found to be a mediator of an individual’s wheelchair mobility behavior.

Previous studies included athletic group of SCI and suggested that sports may improve self efficacy and wheelchair skills performance. But there is minimal literature on the correlation between self efficacy and performance of wheelchair skills among the general SCI population not involved in sports specifically. Thus the purpose of the study was to find relationship between wheelchair skills and self efficacy in SCI clients.

**METHOD**

This was a co-relational study design. The sample (n=80) of Traumatic paraplegic (T2-L4) SCI clients with ASIA classification A,B,C or D with age group 18-65 from Delhi and NCR who could read, understand and comprehend English were recruited by purposive sampling method. The SCI clients who had any other neurological, physiological, orthopedic diagnosis and any form of medical complication were excluded from the study. Clients in spinal shock and withdrawal of consent were also excluded.

The Wheelchair skill evaluation was done by using WST-Q (Wheelchair Skill Test Questionnaire) and self efficacy was determined by using SEWM(Self efficacy in wheeled mobility) within a 1 week gap for reducing the memory gap between two scales. The scores of the evaluated test were calculated and documented.

**RESULT**

The descriptive statistic of the subjects was determined according to participant characteristic which included Age, Gender, Level of Injury and Time since injury. The mean and standard deviation of 80 subjects (61 Males and 19 Females) in Age group of 18-65 with the mean ± standard deviation (SD) value of age was 33.68±10.71 and mean ± standard deviation of time since injury was 47.41±83.44 given in (Table 1).

The Correlation between wheelchair skills and self efficacy was determined by the domains of WST(capacity), WST (performance) and SEWM. The Karl Pearson’s test was applied and excellent
correlation between WST-Q(performance) and SEWM ($r=.928$, $p=.000$) and excellent correlation between WST-Q(capacity) and SEWM ($r=.941$, $p=.000$) was found (Table 2 and fig 1).

**Table 1:** Descriptive statistic of participant characteristics like Age, Gender, Level of Injury and Time Since Injury

<table>
<thead>
<tr>
<th>Number of subjects</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Minimum</td>
</tr>
<tr>
<td></td>
<td>18</td>
</tr>
<tr>
<td>Time since Injury(months)</td>
<td>Minimum</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
</tr>
<tr>
<td></td>
<td>61</td>
</tr>
</tbody>
</table>

**Table 2:** Relationship between other factors (age, gender) with self efficacy and wheelchair skills.

<table>
<thead>
<tr>
<th></th>
<th>WST (capacity)</th>
<th>WST (performance)</th>
<th>SEWM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$'r'$</td>
<td>$'p'$</td>
<td>$'r'$</td>
</tr>
<tr>
<td>SEWM</td>
<td>.941**</td>
<td>.000</td>
<td>.928**</td>
</tr>
<tr>
<td>Age</td>
<td>-.272*</td>
<td>.014</td>
<td>-.267*</td>
</tr>
<tr>
<td>Time since injury</td>
<td>.052</td>
<td>.650</td>
<td>.068</td>
</tr>
</tbody>
</table>

**significant at $p$≤0.001,*significant at $p$≤0.005

Abbreviations: $p$= p-value, $r$= Pearson’s correlation coefficient

The data also revealed that there was significant negative correlation between Age and WST(capacity), WST(performance) and with SEWM. (2-tailed) (Table 2 and fig 2 and 3).

Pearson correlation revealed that there is no relationship between Time since injury and wheelchair skills and self efficacy (Table 2 and figure 4).

It was also found that the scores of females were higher than males with respect to wheelchair skills and self efficacy however not significant (table 3 and figure 5).
According to t-test the data revealed the mean and standard deviation between the groups according to the level of injury from (T2-T7) and (T8-L4). The group with high level of injury (T2-T7) showed lesser score as compared to the group with lower level of injury (T8-L4). The data revealed that there was a significant difference between the scores of (T2-T7) and (T8-L4). (Table 3 and figure 6).

Table 3 Mean and standard deviation scores of Gender, level of injury with respect to WST(capacity), WST(performance) and SEWM

<table>
<thead>
<tr>
<th>Variables</th>
<th>WST Capacity</th>
<th>WST Performance</th>
<th>SEWM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>80.00±13.60</td>
<td>76.96±13.66</td>
<td>31.26±5.10</td>
</tr>
<tr>
<td>Female</td>
<td>82.16±10.79</td>
<td>80.26±10.72</td>
<td>32.68±4.04</td>
</tr>
<tr>
<td>(Level of injury)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T2-T7</td>
<td>79.2±14.4</td>
<td>76.8±14.8</td>
<td>31±5.38</td>
</tr>
<tr>
<td>T8-L4</td>
<td>81.8±11.1</td>
<td>78.6±10.8</td>
<td>32.2±4.2</td>
</tr>
</tbody>
</table>

DISCUSSION

The results of the study suggest that there was a positive correlation between the wheelchair skills and self-efficacy.

Various studies done on athletic SCI clients showed similar results. (16) (17) However, these studies were comparative studies between athletics SCI and non-athletic SCI group. This did not reveal whether the pattern of performance was similar with non athletics. Present study was done on non athletic SCI clients and it revealed that wheelchair skills were associated with self-efficacy. Increased self-efficacy on wheeled mobility further enhances wheelchair capacity and performance.

The secondary findings of the present study indicate that age was significantly negatively correlated with wheelchair skills and self-efficacy. It was found that with the increase in age, the score of wheelchair skills and self-efficacy was significantly lower. Similar results were found by Osnat Fliess-Douer et al in 2013, the results of correlation of wheelchair skill performance with age revealed that older participants showed lower performance than younger participants on time score and ability score in wheelchair circuit test. (19) It suggests that with the increase in age, the wheelchair users probably use their wheelchair minimally and thus there is decrease in the wheelchair skills performance and capacity and self-efficacy regarding wheelchair use. These participants would have greatest need of targeted interventions to enhance their self-efficacy with using a wheelchair.
In the present study it was also found that Time since injury had no correlation with the wheelchair skills and self efficacy. Similar results were found in a study done by Osnat Douer et al, where they found that there were no significant changes in the ability scores and the performance time scores of wheelchair circuit test during the first year after discharge from inpatient rehabilitation. This suggests that the wheelchair skill learning is not time dependent and thus client can be trained for the same at any time post injury if his physical capacity is adequate to learn the skills.

The previous researches had shown that lesion level is directly related to performance of wheelchair skills in persons with SCI. The paraplegic clients with low lesion level had higher SEWM scores compared to paraplegics with high lesion level. In the present study the data revealed that the level of injury is correlated with the wheelchair skill score and the self-efficacy. The SCI wheelchair users with higher level of injury (T2-T7) showed statistically significant lesser score as compared to the wheelchair users with lower level of injury (T8-L4). Similar, results were found in a study conducted by Seelen et al which concluded that lower thoracic spinal injured subjects showed longer programming timings than higher thoracic spinal cord injury subjects. This result suggests that with the higher level of injury there is a lack of control in the abdominals which may affect the balance of the wheelchair users. Hence, wheelchair skills capacity and performance can be influenced by lesion level.

LIMITATIONS OF THE STUDY

Data from other geographical locations have not been included in the study so results may not be generalized

FUTURE RECOMMENDATIONS

In Future studies the self efficacy can be incorporated into intervention program which will have an effect on the wheelchair skills outcomes. Also present study was limited to Delhi and NCR, future studies can be done including other regions in India.

CONCLUSION

The present study reveals that self efficacy is specific to task thus assessment and management should involve components of self efficacy specific to wheelchair skills in order to get additional benefit and generalization of wheelchair skills learnt by the patient in turn improving the wheelchair skills capacity and performance.

Acknowledgement: We are highly indebted to Mrs. Osnat Douer and Mr. Kirby Lee for their continuous support throughout. Lastly, we offer our regards and blessings to all those who were part of the study.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: We certify that all applicable institutional regulations concerning the ethical use of human volunteers were followed during the course of research

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Case Reports of Writer’s Cramps: Optimizing Function through Sensori Motor Relearning Program

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ABSTRACT
The current case study emphasizes the role of rehabilitation in 2 patients with Writer’s cramps. Writer’s cramps are a type of Task Specific Dystonia. Repeated use of the extremity in a particular position may lead to this type of a dystonia which is functional or task specific. i.e. the hand becomes dystonic only when it performs the specific function of writing as is the case here. Both the patients were subjected to occupational therapy for 8 weeks consisting of tailored sessions of sensori motor relearning program and traditional methods. As Occupational Therapy aims at return to function, these patients were longitudinally followed up for a period of 1 year during which they resumed their normal lifestyle and there was no significant complain.

This study strengthens the hope of rehabilitation for such cases and authenticates the literature which talks of such rehabilitation.

Keywords: Occupational Therapy, Sensorimotor relearning, Biofeedback, UDORS.

INTRODUCTION
Writer’s Cramps was initially listed under neurotic conditions but is now well identified as a type of focal dystonias. It is classified as task specific dystonias. It results from repeated use of the hand muscles for a specific task here writing leading to deterioration of the cortical mapping or homuncular pattern organization of the fingers of the hand manifesting as dystonic movements and pain. This persists only for writing and is not manifested during any other activity using that hand1.

The etiology is unknown and there may not be pronounced benefit with use of drugs. We studied 2 such cases longitudinally over a period of 1 year and observed that post therapy there was no recurrence of the condition in the follow up period even after the therapy was discontinued.

CASE STUDY

Case 1: This 21 year old commerce student came with complaints of torsion of hand and fingers after about 10-15 minutes of writing and slipping of writing utensil from hand from right hand. He also complained of pain, cramping and change in his handwriting. He was experiencing these complains since 3-6 months and had taken treatment on outpatient basis from Neurology Department. He was treated with Pacitane but had no relief then he was injected Botulinum Toxin at the Flexor Digitorum Superficialis and Profundus and Palmaris longus.

He did not have any amelioration of symptoms and was then referred for rehabilitation. All his biochemical investigations were within normal limits. He had no sensory affectations or tremors

Case 2: A 23 year old medical student in his final year was referred with complains of twisting of hand,
pain and loosening and slipping of pen from hand after 2-3 minutes of writing. The complain had started since a year before and later aggravated. This patient was also treated with drugs with little benefit. He had not received any other type of therapy. In this case also there were no sensory affectations or tremors.

**OCCUPATIONAL THERAPY PROTOCOL**

Both the patients were evaluated for their muscle strength, tone, sensation and range of motion and were found to be normal on these parameters. Their handwriting sample was taken before the start of the protocol [Fig 1a & 1b]. The rehabilitation protocol based on the theory of sensori motor retuning and relearning program was started. The protocol was upgraded every 2 weeks and was once in a day carried out in the department on outpatient basis and simulated home program was suggested once in a day. It was spread over a period of 8 weeks as described below:

**Week 1 & 2:** The aim was mainly focused on rest and relaxation. The relaxation was done by cooling of the affected part by immersion in 15degree water for 10 mins twice.

Immobilization of non dystonic fingers using modified functional cock up splint for most of day interspersed with finger activities. The finger activities included sequential extension/flexion of 2-3 digits including the affected digits for 10 minutes.

In this period tasks triggering or leading to dystonic movements as well as heavy resistive activities were avoided.

Therapeutic exercises to improve cardiopulmonary fitness and to improve postural alignment were included.

The patient could carry out his ADL activities that required gross movements.

**Week 3 & 4:** The relaxation was continued as in the previous week.

The usage of the splint was decreased to half the time in the day.

The patient performed activities using different textured materials for each finger.

The sequential exercises were continued as before. Light exercises using pegs and model blocks were given.

The use of the affected hand was encouraged in light ADL.

The cardiopulmonary exercises were continued.

**Week 5 & 6:**

The relaxation was continued.

The splint use was minimal.

The sequential exercises were continued. Light resistive activities were incorporated like clay modeling, plasticine squeezing.

The cardiopulmonary exercises were continued.

**Week 7 & 8:**

The relaxation was continued. Discard use of splint.

Initiate performance of task causing dystonic movements (writing) and train in proper writing techniques including postural techniques.

Suggest environmental adaptations if required.

Initiate resistive tasks.

Post therapy both the individuals found relief in pain and cramping. After 2 months of continuous therapy the patients were tried for their writing skill. They did not show the dystonic pattern for the writing period of 2mins. The writing time was slowly increased at the rate of 5 mins per week. The patient did all the other exercises along with fomentation as per the protocol.

As the patients did not show any return of dystonic signs the gradual increase in the duration of writing was continued. The exercises were discontinued as the writing time increased. The patients were treated on home program basis thereafter with OPD follow up once a month. After ten months the handwriting sample was taken again and it was found that they sustained the improvement [Fig 2a & 2b].
DISCUSSION

The pathophysiology behind task specific dystonia is the repetitive use of thumb and other fingers in specific position. Neuro physiological studies in patients with dystonia disclose excessive cocontraction of agonist muscles, overflow of muscular activity in to extraneous muscles and finally impairment of discriminative sensory processing and an abnormal perception of movement. This leads to of smearing of the homuncular organization of the representation of the digits in primary somatosensory cortex in such individuals. Therefore when the writing grip is used, as the brain no longer recognizes thumb different from other fingers it tries to grip the pencil as one and not in apposition thereby leading to torsional extension and loosening of grip and finally slipping of pencil. During this process any attempt to write leaves the writer with an illegible handwriting which has deficits like improper making of alphabets and spacing deficiencies and many times a painful experience.

A study done in monkeys suggests that monkeys who were made to mimic the dystonic symptoms showed relief when subjected to rest periods. A protocol constituting rest and extensive successful practice is helpful in cortical reorganization (Byl et al 2003). The research to date talks mostly about treatment of focal dystonia in musicians by use of sensory motor retuning programs and simultaneous assessment on SSEP and finger dexterity devices. In our study we applied our protocol on Writer’s Cramps and relied on the subjective feedback of the individual, handwriting sample and most important the longitudinal carryover effect of the therapy. Instead of using constraint induced therapy we used intermediate rest periods with gentle mobilization and gradual practice of the affected task (writing). The use of cooling was found useful in relaxation, pain reduction and increasing in sensory feedback and thereby reinforced the effect of therapy. In contrast to immobilizing non affected fingers we splinted all the fingers in their functional position. This not only increased the proprioceptive feedback but also kept the position maintained without the muscles voluntarily contracting. In this way the activity was not performed but the pattern of movement was maintained. Also the affected fingers were given enhanced sensory feedback by use of different textures during therapy.

Thus the use of the sensory motor relearning program can prove useful in adapting the use-dependent cortical alterations of the brain.

![Handwriting Sample Pre therapy Case1](image1)

![Handwriting Sample Pre therapy Case2](image2)

![Handwriting Sample Post therapy Case1](image3)

![Handwriting Sample Post therapy Case2](image4)
CONCLUSION

The process of sensory motor relearning can widen the scope of rehabilitation in Writer’s cramps and can enhance the understanding of cortical reorganization of the brain. It can prove to be an efficient, cost effective and definite method of improving the clinical motor function in individuals with Writer’s Cramps.

Statement for conflict of interest: I, Moushami S. Kadkol, am taking full responsibility for the data, the interpretation, and the conduct of the research and that I have full access to all of the data; and have the right to publish any and all data separate. I declare no conflict of interest.

Financial disclosure statement: This is to state that the above mentioned Case reports of Writer’s Cramps: Optimizing function through Sensori Motor Relearning Program is not funded or sponsored by any financial resources.

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Ethical Clearance: Patient consent has been taken as this is a case report.

REFERENCES

Effects of Mulligan’s Mobilisation with Movement on Pain and Range of Motion in Diabetic Frozen Shoulder a Randomized Clinical Trail

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ABSTRACT

Purpose of the study: To investigate the effect of Mulligan’s mobilisation with movement (MWM) in combination with supervised exercises on pain, range of motion and functional ability in frozen shoulder patients with type-2 diabetes mellitus. Background: MWM is an important part of intervention in management of frozen shoulder. A higher prevalence of frozen shoulder has been reported in diabetes mellitus patients. Documentation of the outcome after MWM application in these patients has not been well documented in past. Methodology: Sixty six participants were randomly assigned to one of the two treatment groups. Control group received supervised exercises alone, experimental group received MWM along with supervised exercises. All the outcomes measurement was done at the baseline and at intervals of 3, 6 and 12 weeks. Results: In both the groups improvement was seen in all outcomes measurement. Improvement in abduction AROM in MWM group was 23.4 (95% CI=17.6 to 29.1) greater than control group. Improvement in internal rotation AROM in MWM group was 20.4 (95% CI=17.5 to 23.4) greater than control group. The pain during movement and shoulder disability reduced significantly in MWM group than control group at 12 weeks. Conclusion: MWM thus has an added effect in improving range of motion, functional ability and reducing pain when administered along with a regimen of supervised exercises for frozen shoulder patients with type 2 diabetes mellitus.

Keywords: Frozen shoulder, MWM, Diabetes mellitus.

INTRODUCTION

An increased prevalence of frozen shoulder (12%-20%) has been reported in type 2 diabetes patients in south India (¹). Frozen shoulder is a common clinical entity dealt by physiotherapists, which is characterized by pain and global restriction of both active and passive range of motion. It is a highly disabling condition of the shoulder affecting the overall function of the upper limb. The underlying pathology includes modification in the properties of collagen framework through a process called non-enzymatic glycosylation. In this process excess glucose in diabetics undergoes covalent bonding with the collagen protein without enzyme control over it (²). This leads to formation of cross links between the molecules where in collagen fibers become glued together preventing them to slide over another during movement. As a result there is decreased flexibility and contracture of the capsule-ligamentous structures and soft tissues surrounding the shoulder joint. Apparently, leading to impaired shoulder movements that affect function (³). A number of physiotherapeutic approaches have been recommended for management of frozen shoulder. These include but are not limited to heat and ice applications, electrotherapeutic modalities, exercise and joint mobilisation (⁴). Joint mobilisation induces stretching of the capsule-ligamentous structures and soft tissues surrounding the shoulder joint resulting to regain their normal extensibility. Mobilisation with movement (MWM) is a class of joint mobilisation techniques, which involves the manual application of a sustained glide by therapist.
to a joint while a concurrent movement of the joint is actively performed by the patient \(^{(5)}\). Previous studies reported significant beneficial results with MWM in various shoulder conditions \(^{(6-8)}\), but none of these have focused on frozen shoulder patients with type 2 diabetes. The aim of this study is to investigate the effect of MWM on pain, range of motion and functional ability in frozen shoulder patients with type-2 diabetes mellitus.

**METHOD**

This is a prospective randomized trial with 2 group parallel design. The recruited subjects were considered eligible for the trial only if they fulfilled the following inclusion criteria: (1) having a painful stiff shoulder for at least 3 months, (2) having limited range of motion of the shoulder joint (ROM losses \(> 25\%\) compared with the non-involved shoulder in at least 2 of the following shoulder motions: glenohumeral flexion, abduction, or medial and lateral rotation), (3) history of type 2 diabetes. The exclusion criteria consists of (1) History of systemic disorders other than type 2 diabetes, (2) history of surgery on the particular side, (3) tendon calcifications, (4) fracture of the shoulder complex, (5) other conditions involving shoulder (e.g., Rheumatoid Arthritis, Osteoarthritis, Rotator cuff tears, Malignancies in shoulder region), (6) neurological deficits affecting shoulder function, (7) pain and disorders of the cervical spine. The eligible subjects were given written and verbal explanation of the purpose and procedures of the study. To achieve 80\% power at a two sided 5\% significance level, 30 subjects per group would be required to detect a change of 18.6 degrees of shoulder range of motion, which was reported to be clinically relevant difference by previous studies \(^{(9-11)}\). Considering a dropout rate of 10\%, at least 66 subjects in total would be needed for the present study.

**PROCEDURES**

Consenting subjects were randomly assigned to either exercise alone group or MWM group. Randomization was done by a random number generator with permuted blocks of 4. The allocation sequence was concealed from the person enrolling the participants, in sequentially numbered, opaque, sealed and stapled envelopes. Corresponding envelopes were opened, only after the enrolled participants completed all the baseline assessment and were ready for allocation. Outcome assessor was kept blinded to the allocation process.

**INTERVENTIONS**

Participants in the exercise alone group received Codman’s exercises, stretching exercises, active assisted range of motion exercises and scapular setting exercises. All were directed to do the same as Home Exercise Program (HEP) at least twice daily.

In addition to supervised exercise and HEP participants in experimental group received MWM to glenohumeral joint. The MWM technique was performed on the involved shoulder as described by Mulligan \(^{(5)}\). With the subject in a relaxed sitting position, one hand was placed over the scapula while the other hand was placed over the anterior aspect of the head of the humerus and postero-lateral force was applied (Fig 1). The subject was then asked to perform the affected movements to the end of the pain-free range and a overpressure was applied. The gliding force was sustained until the return to the starting position. Three sets of 10 repetitions were applied with a rest interval of 30’s between each set, for each of the affected movements. Participants in both the groups received 2 treatment sessions per week for a period of 12 weeks.

**OUTCOMES**

A masked assessor, who is a trained and experienced physiotherapist, carried out all the outcomes measurement. Primary outcome measures were shoulder Range of Motion (ROM) measured using a standard goniometer and shoulder pain intensity measured with Visual Analogue Scale (VAS). Secondary outcome was shoulder disability...
measured with Disability of the Arm, Shoulder and Hand (DASH) score.

**DATA ANALYSIS**

All the analyses were done on an intention to treat principle and all the randomized subjects were included in the analysis. For patients who withdrew all the available data were used. To determine the similarity between the groups at baseline, subjects’ characteristics were compared using independent sample t-test or Chi-square test as appropriate. Clinical characteristics were analyzed using independent sample t-test. The effects of intervention were estimated with analysis of covariance using a regression approach. Baseline values were included as covariates to increase the precision of estimates.

**RESULTS**

A total of 100 patients were screened for eligibility, of these 68 patients accepted the invitation and were randomized. Both groups were well matched at the baseline (Table 1 & 2). Two participants allocated to the experimental group withdrew from the study at six weeks of outcomes measurement after the commencement of the study. In control group two participants withdrew, one at six weeks and the another one at twelve weeks of outcomes measurement.

**Table 1: Comparison of subjects’ characteristics at baseline by group**

<table>
<thead>
<tr>
<th>Subject characteristics</th>
<th>Exercise alone Group (n=34)</th>
<th>MWM Group (n=34)</th>
<th>pvalue&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Yrs)</td>
<td>51.0 ± 7.7</td>
<td>50.5 + 5.9</td>
<td>.78</td>
</tr>
<tr>
<td>Gender (F/M)</td>
<td>19/15</td>
<td>20/14</td>
<td>.80</td>
</tr>
<tr>
<td>No of subjects with dominantside affected</td>
<td>21</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Duration of diabetes (Yrs)</td>
<td>3.1 + 2.0</td>
<td>3.4 + 2.3</td>
<td>.54</td>
</tr>
<tr>
<td>Duration of symptoms (Months)</td>
<td>6.7 + 2.5</td>
<td>7.2 + 2.9</td>
<td>.48</td>
</tr>
</tbody>
</table>

<sup>a</sup> The level of significance was set at p<0.05

**Table 2: Comparison of clinical characteristics at baseline by group**

<table>
<thead>
<tr>
<th>Clinical Characteristics</th>
<th>Control Group (n=34)</th>
<th>Experimental group (n=34)</th>
<th>pvalue&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS pain scale (mm)</td>
<td>62.5 + 9.5</td>
<td>66.3 + 12.8</td>
<td>.17</td>
</tr>
<tr>
<td>Abduction AROM (°)</td>
<td>105.1 + 14.6</td>
<td>103.6 + 10.8</td>
<td>.63</td>
</tr>
<tr>
<td>Abduction PROM (°)</td>
<td>112.2 + 13.2</td>
<td>110.4 + 10.4</td>
<td>.54</td>
</tr>
<tr>
<td>Flexion AROM (°)</td>
<td>117.0 + 13.4</td>
<td>116.6 + 10.6</td>
<td>.88</td>
</tr>
<tr>
<td>Flexion PROM (°)</td>
<td>123.3 + 10.9</td>
<td>124.2 + 9.3</td>
<td>.72</td>
</tr>
<tr>
<td>External Rotation AROM (°)</td>
<td>20.4 + 6.7</td>
<td>20.1 + 6.7</td>
<td>.85</td>
</tr>
<tr>
<td>External Rotation PROM (°)</td>
<td>24.7 + 7.4</td>
<td>24.2 + 7.3</td>
<td>.80</td>
</tr>
<tr>
<td>Internal Rotation AROM (°)</td>
<td>31.0 + 7.0</td>
<td>30.7 + 6.6</td>
<td>.86</td>
</tr>
<tr>
<td>Internal Rotation PROM (°)</td>
<td>35.1 + 7.9</td>
<td>34.8 + 7.0</td>
<td>.87</td>
</tr>
<tr>
<td>DASH score</td>
<td>57.9 + 14.9</td>
<td>57.1 + 16.0</td>
<td>.83</td>
</tr>
</tbody>
</table>

<sup>a</sup> The level of significance was set at p<0.05

**EFFECT OF INTERVENTION**

Each of the outcomes showed significant improvement over time. With respect to range of motion there is significant improvement in first 3 weeks but clinically relevant improvement in internal rotation and abduction were seen at duration of 6 to 12 week period with MWM treatment (Fig. 3). Improvement in abduction AROM in MWM group was 23.4 (95% CI=17.6 to 29.1) greater than control group.
Improvement in internal rotation AROM in MWM group was 20.4 (95% CI= 17.5 to 23.4) greater than control group. Reduction in the level of pain experienced by the patient while moving the shoulder to newly acquired range was significant at periods between six to twelve weeks (Fig. 2).

DISCUSSION

The results obtained in this study show that application of MWM technique along with exercise therapy in frozen shoulder patients with type 2 diabetes is effective in decreasing the level of pain during movement and improving the shoulder range of motion at 12 weeks follow up period. This reduction in pain and increased range of motion encouraged the patients to use their affected arm more and more in their activities of daily living thereby increasing their functional capability. Previous studies describing the effectiveness of joint mobilisation in frozen shoulder subjects with diabetes delivered mobilisations as described by maitland and kaltenborn (12, 13). In a study done by Maricar and Chok where in maitland mobilisations were applied to shoulder joint and reported less successful improvement in the outcome measures. On the contrary this study results obtained by application of MWM had shown significant improvement of all outcome measures. In diabetic population, exuberant scar tissue forms in response to trauma due to non-enzymatic glycosylation of collagen in which the remodeling of scar tissue collagen is less. (14). This scar tissue formation in the capsule-ligamentous structures around the shoulder joint leads to reduced flexibility and restriction of normally possible movements. Application of MWM to the patient involves passive glide delivered by the therapist in a specific plane during which the patient is asked to actively perform the restricted movement which should preferably be painless. Passive glide supposedly corrects the positional fault which was previously causing mechanical block within the joint and makes the joint return to its physiological position (15). Simultaneously, it also facilitates the collagen alignment along the lines of stress. This realignment of collagen increases the fiber glide when particular movements stress the specific part of the capsule (16). Since the physiological movement are done actively by the patient, the extent to which the tissue need to be stressed so as not to cause any trauma is determined by the pain limits of every individual patient by himself. Threlkeld suggests that immediate effects of the forces used in mobilisation cause temporary length changes due to creep (17). It is for this reason the initial 3 week improvement seen was of little significance clinically. Later due to increased extensibility of the capsule-ligamentous structures due to realignment of collagen along the lines of mechanical force cause clinically relevant improvement of range. Biomechanical correction of the abnormal joint tracking along with considerable extensibility of the surrounding soft tissue reduces the nociceptive impulse transmission thereby reducing pain during active movement to newly acquired range. Neuropathological effects of MWM involves excitation of mechanoreceptors inside the joint capsule initiates the stimulation of higher centers, which in turn inhibits incoming nociceptive information. This spinal gate control mechanism eradicates pain. Stimulation of other centres such as dorsal periaqueductal grey matter (DPAG) region.
produces a profound and selective analgesia\(^{(18)}\).

Although this study showed significant results with MWM technique, the appropriate treatment decision in these patients may be dependent on course and duration of symptoms. Our selection criteria were based on inclusion of frozen shoulder patients with type 2 diabetes in particular. Therefore, these results cannot be generalized to patients with primary frozen shoulder or secondary frozen shoulder due to cardiac problems, stroke, rheumatoid arthritis or trauma. Our study looked upon the results obtained during the treatment itself. However, the sustenance of these effects and recurrence rate upon termination of treatment was not recorded. Studies with longer duration are required to work on these issues.

**CONCLUSION**

This study found that application of MWM technique did add to the effectiveness of a regimen of supervised exercises and HEP in frozen shoulder patients with type 2 diabetes mellitus. Based on these results, it is suggested to incorporate MWM techniques along with routine exercise regimens while treating these patients in clinical practice.

<table>
<thead>
<tr>
<th>OUTCOME</th>
<th>Pain during movement VAS(mm)</th>
<th>Abduction AROM (°)</th>
<th>Abduction PROM (°)</th>
<th>Flexion AROM (°)</th>
<th>Flexion PROM (°)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3 WEEKS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exp Mean (SD)</td>
<td>60.7 (12.6)</td>
<td>116.4 (11.3)</td>
<td>125 (10.9)</td>
<td>127.2 (9.8)</td>
<td>131.8 (7.9)</td>
</tr>
<tr>
<td>Con Mean (SD)</td>
<td>62.9 (9.7)</td>
<td>111.5 (13.8)</td>
<td>118.9 (13.8)</td>
<td>122.9 (12.5)</td>
<td>130.3 (8.4)</td>
</tr>
<tr>
<td>Mean difference (95% CI)</td>
<td>-2.2 (-2.7 to -1.7)</td>
<td>4.8 (3.2 to 6.4)</td>
<td>6 (4.1 to 7.9)</td>
<td>4.3 (2.4 to 6.2)</td>
<td>1.5 (-0.1 to 3.2)</td>
</tr>
<tr>
<td><strong>6 WEEKS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exp Mean (SD)</td>
<td>44.1 (13.5)</td>
<td>140.7 (11.4)</td>
<td>146.8 (9.2)</td>
<td>145.2 (9)</td>
<td>148.4 (7.6)</td>
</tr>
<tr>
<td>Con Mean (SD)</td>
<td>55.3 (9.9)</td>
<td>126.6 (14)</td>
<td>135 (13.7)</td>
<td>136.4 (6.4)</td>
<td>141.8 (6.9)</td>
</tr>
<tr>
<td>Mean difference (95% CI)</td>
<td>-11.1 (-12.8 to -9.5)</td>
<td>14 (10 to 18)</td>
<td>11.8 (8.3 to 15.2)</td>
<td>8.7 (5.9 to 11.5)</td>
<td>6.6 (3.8 to 9.4)</td>
</tr>
<tr>
<td><strong>12 WEEKS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exp Mean (SD)</td>
<td>25.4 (14.9)</td>
<td>161 (14.5)</td>
<td>165.5 (12.6)</td>
<td>155 (10.3)</td>
<td>156.8 (7.9)</td>
</tr>
<tr>
<td>Con Mean (SD)</td>
<td>44.5 (10.5)</td>
<td>137.6 (13.4)</td>
<td>143.9 (12.5)</td>
<td>142.6 (5.5)</td>
<td>146.4 (6.1)</td>
</tr>
<tr>
<td>Mean difference (95% CI)</td>
<td>-19.0 (-22.8 to -15.3)</td>
<td>23.4 (17.6 to 29.1)</td>
<td>21.6 (16.9 to 26.3)</td>
<td>12.3 (8.6 to 16.1)</td>
<td>10.4 (7.2 to 13.6)</td>
</tr>
</tbody>
</table>
Table 3.2: Results for each primary and secondary outcome measure at 3, 6 & 12 weeks

<table>
<thead>
<tr>
<th>OUTCOME</th>
<th>External Rotation AROM (°)</th>
<th>External Rotation PROM (°)</th>
<th>Internal Rotation AROM (°)</th>
<th>Internal Rotation PROM (°)</th>
<th>DASH score</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 WEEKS Exp</td>
<td>25.3 (6.9)</td>
<td>30.3 (6.6)</td>
<td>39.8 (5.5)</td>
<td>43.5 (5)</td>
<td>52.6 (16.3)</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>23.5 (7)</td>
<td>27.8 (7.1)</td>
<td>33.8 (7.2)</td>
<td>37.6 (7.7)</td>
<td>55.3 (14.8)</td>
</tr>
<tr>
<td></td>
<td>Mean difference (95% CI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.8 (1.0 to 2.6)</td>
<td>2.4 (1.7 to 3.1)</td>
<td>6 (4.7 to 7.3)</td>
<td>5.9 (4.5 to 7.3)</td>
<td>-2.6 (-3.2 to -2.0)</td>
</tr>
<tr>
<td>6 WEEKS Exp</td>
<td>31.1 (6.3)</td>
<td>36.9 (6.2)</td>
<td>49.7 (5.9)</td>
<td>53 (5.6)</td>
<td>44.5 (16.5)</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>26.5 (6.6)</td>
<td>31 (6.5)</td>
<td>37.7 (6.4)</td>
<td>40.8 (7.6)</td>
<td>51.6 (15)</td>
</tr>
<tr>
<td></td>
<td>Mean difference (95% CI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.6 (3.5 to 5.7)</td>
<td>5.9 (4.6 to 7.2)</td>
<td>12 (10 to 14)</td>
<td>12.2 (10 to 14.4)</td>
<td>-7 (-8.1 to -5.9)</td>
</tr>
<tr>
<td>12 WEEKS Exp</td>
<td>39.9 (6.5)</td>
<td>44.9 (6.4)</td>
<td>63 (7.3)</td>
<td>64.8 (7.7)</td>
<td>32.7 (17.3)</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30.7 (6.9)</td>
<td>34.3 (6.6)</td>
<td>42.5 (6.3)</td>
<td>45.8 (7)</td>
<td>46.4 (15.4)</td>
</tr>
<tr>
<td></td>
<td>Mean difference (95% CI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.2 (7.3 to 11.0)</td>
<td>10.6 (8.7 to 12.4)</td>
<td>20.4 (17.5 to 23.4)</td>
<td>19 (16.1 to 21.8)</td>
<td>-13.6 (-15.8 to -11.5)</td>
</tr>
</tbody>
</table>

Acknowledgement: We heartfully thank all the volunteers and participants without whom this would not have been possible.

Conflict of Interest: Nil

Source of Funding: Self

The study was approved by NIMS Institutional Ethical Committee. Informed consent was given by all the participants.

REFERENCES


Effects of Bladder Training and Pelvic Floor Muscle Exercise in Urinary Stress Incontinence During Postpartum Period

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¹HOD, ²Assistant Professor, ³Physiotherapist, Career Institute of Medical Science Department of Physiotherapy, Bhopal

ABSTRACT

Objective: To study the effects of bladder training with pelvic floor muscle exercise for urinary stress incontinence in post partum period.

Method: The study was carried out on 30 subjects with age group of 20 to 35 years and were grouped by randomized trial method into control group (n=A) and experimental group (n=B), Control group (n=A) were treated with bladder training programme, while experimental group (n=B) were treated with bladder training programme and pelvic floor exercises for 8 weeks. The assessment was done by MMT, VAS and IIQ.

Result: The experimental group B had a significant decrease in urinary stress incontinence episodes and increase pelvic floor muscle strength to large extent in comparison to control group.

Conclusion: Pelvic floor muscle training with bladder training is more effective to reduce stress urinary incontinence in comparison to bladder training alone.

Keywords: Urinary stress incontinence, pelvic floor muscle training, Bladder training.

INTRODUCTION

Urinary incontinence is an important social and hygienic health problem which affects the quality of life in women. According to I.C.S, stress incontinence is defined as “Involuntary emission of urine during physical activity such as coughing, sneezing, laughing or exercise due to weakened pelvic floor muscles that supports bladder and urethra².”

Approximately 90% of women experiences postpartum complications like urinary incontinence (40%) pelvic floor muscle weakness (70%) due to multiple physiological, physical & psychological change in the body related to pregnancy such as centre of mass change, more pressure on organs, increased body weight¹. During pregnancy because of overweight PFM get weakened and after delivery pelvic muscles get stretched, sometimes neurological damages may also seen, resulting in permanent or temporary weakness of PFM that causes involuntary leakage of urine¹.

A wide range of treatments has been used in the management of urinary incontinence including conservative interventions such as pelvic floor muscle training (Dumoulin2010), vaginal cones, anti-incontinence devices, pharmaceutical interventions and surgery etc⁶.

The American Gynecologist Arthur Kegel emphasized the value of PFM training for restoring PFM strength and to control urinary incontinence. It includes slows and fast pull-ups or hold and relax techniques¹.

Bladder retraining or drill is used in management of stress incontinence by lengthening the amount of time between bathroom trips, increase the amount of urine that bladder can hold.
It involves:-
1. Scheduled bathroom trips
2. Delayed urination
3. Self care tips

The role of pelvic floor muscle with bladder training together for incontinence is not very well studied. More researches are on either pelvic floor muscle training or bladder training alone. So the study is performed to know about the combined effect of both the therapy for management of urinary incontinence in postpartum period.

METHODOLOGY

Sampling-Technique: Randomized Control Trial technique was selected for study.

Sample-Size: 30 Post partum women were selected for study.

Inclusion Criteria
1. Subject willing to participate
2. 20 to 35 yrs females were chosen.
3. Subjects that were experiencing urinary incontinence.
4. Subjects who were experiencing pelvic floor muscle weakness.

Exclusion Criteria
4. Postpartum infective or hemorrhagic subjects.
5. Non co-operative subjects.
6. Subjects who suffered from any kind of cardio vascular disease.
7. Postpartum hypertensive subjects.

Study Setting: It was conducted in an outpatient setting in physiotherapy department of Career institute of medical science BHEL, Bhopal (M.P.)

Duration of Protocol: The total duration of protocol was 8-weeks.

Tools Used
(1) Patients assessment chart
(2) Recording material
   i. Recording sheet
   ii. Consent form
   iii. Data collection sheet
   iv. Gloves
(3) V.A.S
(4) M.M.T Oxford grading chart
(5) I.I.Q form

Variables Used
1. Dependent variables:
   (i) Pelvic floor muscle weakness
   (ii) Amount of leakage
2. Independent variables:
   (i) Pelvic floor muscle exercises
   (ii) Bladder training

OUT-COME MEASURES

Before physiotherapy procedures were carried out, each subject was assessed and examined.

(1) Manual grading of strength of pelvic muscle contraction by Oxford M.M.T method
(2) Visual analogue scale
Incontinence impact questionnaire

V.A.S. (Visual analogue scale)
Severity of symptoms of incontinence was gauged on a V.A.S.

The patient is asked to mark at appropriate point on a 10 c.m. line scale, one end of which is marked, for example “no leakage” “no incontinence” or “no problem” and at the other end always wet, totally incontinent or massive problem B et al. (1989) used VAS before and after a course of treatment to measure ability to participate in different social activity without leaking. Before procedures were carried out, each patient was assessed and a brief history taken noting age, mode of onset, duration and treatment.

Manual grading of strength of pelvic floor muscle contraction

Rating scale devise similar to Oxford scale to grade the strength of pelvic muscle contraction where 0 indicate no contraction and 5 indicate strong contraction.

INCONTINENCE IMPACT QUESTIONNAIRE

Total seven questions to describe how the subject activities, relationships and feelings are being affected were assessed before and after treatment.
PROCEDURE: Total 34 subjects from Bhopal were contacted and screened for inclusion and exclusion criteria of study, but out of 34, 1 subject left the study due to infection and 3 left due to their inability to co-operate so total 30 subjects were instructed to participate efficiently in study.

After the subject met the inclusion criteria, they were explained about the study protocol and after obtaining informed consent from them, they were randomly assigned to either of the two groups i.e. control group (n=15) & experimental group(n=15).

Control Group: - (n = 15) 15 subjects who received only bladder training.

Experimental Group: - (n = 15) 15 subjects who received bladder training as well as pelvic floor exercises.

VAS was assessed and IIQ was taken and Pelvic floor muscle strength was assessed by oxford six point scale of assessing the muscle strength by introducing a gloved index finger (or index and middle finger) into patients vagina and patient was asked to contract the pelvic floor muscle and the value was recorded, ranging from 0-5)

0= nil, contraction  3= moderate
1= flicker     4= good
2= weak          5= strong

The subjects were selected according to inclusion Criteria and were assessed on day one by using assessment chart then patients were treated.

(1) Kegels (Pelvic floor exercises)

(2) Bladder training

PELVIC FLOR EXERCISE PROCEDURE

Instruction to slowly tighten or squeeze pelvic floor muscles under the bladder, hold and count 5 then relax, and repeat called slow pull-ups than do the same exercise for 10-50 second repeat at a time for at least five times, called fast pull-ups.

BLADDER TRAINING PROCEDURE

(1) Bladder training scheduled

For this bladder urge control procedure used to regain control and wait until the next scheduled time to void in each week time between bathroom visits is increased and monitor no of urine leaks each day.

(2) Bladder urge control procedure

In this procedure patient stand or sit quietly, slow relaxed breaths, contract the pelvic floor muscles to close urethra to prevent leakage, use mental imaginary and self talk to suppress the urge and slowly urge subsides.

(3) Self care

After teaching above procedure some self care tips given such as-

(i) Use clock wrist watch alarm clock to remind you of next bathroom visit.

(ii) Drink water and other fluids as usual do not restrict fluids, avoid food or beverages with caffeine.

(iii) Keep your bladder diary handy with you so you record bathroom visit.

DURATION OF PROTOCOL-The total duration of protocol was 8-weeks.

STATISTICAL ANALYSIS: In this study we use t-test for statistical analysis of data. Unpaired t-test is used to compare pre and post test values between the control and experimental group. Paired t-test is used to compare pre and post test values within the groups. Significant level was defined at P<0.05

RESULT

1. The result of the study after analysis shows that bladder training along with pelvic floor exercises are more effective in controlling amount of leakage in urinary incontinence than bladder training alone.

2. Result also shows that PFMT is effective in increasing pelvic floor muscle strength.

The table no. 1 showing comparison of VAS Score pre-test values between control group and experimental group by using unpaired t-test.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>S D</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>7.73</td>
<td>0.80</td>
<td>0.0599</td>
<td>0.9527</td>
</tr>
<tr>
<td>Group B</td>
<td>7.71</td>
<td>0.91</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The table no. 2 showing comparison of MMT Score pre-test values between control group and experimental group by using unpaired t-test.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>S D</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>1.47</td>
<td>0.64</td>
<td>0.4385</td>
<td>0.6645</td>
</tr>
<tr>
<td>Group B</td>
<td>1.57</td>
<td>0.65</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table no.3 showing comparison IIQ Score pre-test values between control group and experimental group by using unpaired t-test.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>S D</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>2.4900</td>
<td>0.1428</td>
<td>0.0798</td>
<td>0.9370</td>
</tr>
<tr>
<td>Group B</td>
<td>2.4850</td>
<td>0.1925</td>
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</tr>
</tbody>
</table>

The table no. 4 showing comparison of post-test values of VAS between control group and experimental group by using unpaired t-test.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>S D</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>4.53</td>
<td>0.92</td>
<td>8.4334</td>
<td>0.0001</td>
</tr>
<tr>
<td>Group B</td>
<td>2.07</td>
<td>0.62</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table no 5 showing comparison of post-test values of MMT between control group and experimental group by using unpaired t-test.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>S D</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>1.60</td>
<td>0.63</td>
<td>7.2890</td>
<td>0.0001</td>
</tr>
<tr>
<td>Group B</td>
<td>3.29</td>
<td>0.61</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table no 6 showing comparison of post-test values of IIQ between control group and experimental group by using unpaired t-test.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>S D</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>1.4867</td>
<td>0.1642</td>
<td>9.6352</td>
<td>0.0001</td>
</tr>
<tr>
<td>Group B</td>
<td>0.9464</td>
<td>0.1351</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table showing comparison of pre-test and post-test values of IIQ within the control group by using paired t-test.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>S D</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>2.4900</td>
<td>0.1428</td>
<td>25.2055</td>
<td>0.0001</td>
</tr>
<tr>
<td>Group B</td>
<td>1.4714</td>
<td>0.1590</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DISCUSSION

This study was based on the research hypothesis of pelvic floor exercise with bladder training will be effective in reducing stress urinary incontinence.

In this study we divided subjects in two group one group is control group and another is experimental group. Results show that experimental group who received pelvic floor training and bladder training is more effective rather than subjects that received only bladder training.

1998 (Am j Obs & gynaec 179,999,WYMAN JF; Fantl JH,Mclish Dk.et al) that bladder training plus pelvic muscle exercises reduced urinary incontinence in women immediately after treatment.

These finding support hypothesis that is published in (2008-09) by Cochrane, according to this hypothesis pelvic floor exercises are effective for treating urinary incontinence, Fending also support the hypothesis that is published in (2005) by marked et. Al according to this hypothesis intensive pelvic floor muscle training is effective in preventing urinary incontinence.

The basic physiology behind bladder training and pelvic floor muscles exercises is that they progressively re-establish the voluntary control over the micturition. They attempts to improve person’s natural voiding schedule. By pelvic floor muscles exercises, pelvic floor muscles are stimulated through pudendal nerve reflex loop which activates pudendal nerve reflex depresses or eliminates uninhibited bladder contraction and improve patients ability to contract pelvic muscles.
The above study supports the initial hypothesis, that pelvic floor exercise with bladder training is very effective in management of urinary incontinence.

CONCLUSION

According to the result & discussion it is concluded that clinical implication of this experimental study is that physiotherapy exercise and bladder training has great potential to control urinary incontinence.

Acknowledgement: We are thankful to all our subjects who participated with full cooperation.

Conflict of Interest/ Source of Funding- Nil

Ethical Clearance: We certify that this study involving human subjects is in accordance with the regulations stated by ethical committee.

REFERENCES

Aim: To compare the effect of Mulligan Mobilization with Movement (MWM) and Hydrocortisone injection in the treatment of chronic lateral epicondylitis: A 24 weeks follow up study.

Objectives: To assess pre and post treatment Pain Status at rest, during any two or three most painful activities and post-activity on visual analogue scale (VAS), pre and post treatment Functional activities using Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH), Pain and Functional activities on each follow up for the period of 24 weeks and compare the status of improvement in patients treated with Mulligan Movement With Mobilization (MWM) and patients given Hydrocortisone injection.

Methodology: Study design is an Experimental Prospective study and was conducted in Physiotherapy Outpatient Department, Public Sector Hospital in collaboration with Orthopedic Department of the Hospital with sample size of 30. Patients were divided into group A and group B. Group A treated with hydrocortisone injection and Group B treated with MWM. Pre and post treatment parameters were checked.

Result: Changes in mean score of VAS and DASH were calculated between baseline and each month follow-up. One-way ANOVA test and p-value of less than 0.05 – significant were used.

Conclusion: Mulligan Mobilization with Movement (MWM) proved to be more effective than hydrocortisone injection in the treatment of chronic lateral epicondylitis.

Keywords: MWM, hydrocortisone injection, lateral epicondylitis.
position.27

Also there is inadequate forearm extensor power and endurance to withstand normal, forceful repetitive movement placed against the forearm flexion (Nirchl 1973).27 Tennis elbow is associated with signs and symptoms like pain, end range restriction of elbow range of motion, effusion.27

Weakness in the wrist can cause difficulty in carrying out simple movements like lifting a plate, opening a door, wringing out wet clothes, etc.

Many techniques for the treatment of lateral epicondylitis have been cited in the literature9, these include:

- Electrotherapy – Ultrasound, Phonophoresis, Laser.
- Manual therapy techniques-soft tissue mobilization, friction massage, joint mobilization
- Taping, bracing
- NASIDS, local corticosteroid injection
- Surgery

N.Smoldt, D.Yan Der Windt, W.Assendelft, (1999) in their study found that effect of Physiotherapy is better than the hydrocortisone injection for a short term.10

So in order to see the long term effect of mobilization with movement (MWM) in lateral epicondylitis and its comparison with invasive techniques like hydrocortisone injection a study is needed.

Aim of the study is to compare Mulligan Mobilization with Movement (MWM) and Hydrocortisone injection in the treatment of chronic lateral epicondylitis: 24 weeks follow up study. Objectives are to assess pre and post treatment Pain Status at rest & during any two or three most painful activities and post-activity on visual analogue scale (VAS), Functional activities using Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH). Pain and Functional activities on each follow up for the period of 24 weeks.

MATERIALS & METHOD

This is an experimental prospective study and was conducted in Physiotherapy Outpatient Department, Public Sector Hospital in collaboration with Orthopedic Department of the Hospital.30 Patients referred by the Department of Orthopedics with a clinical diagnosis as chronic lateral epicondylitis having past history of minimum two such episodes with current history of acute exacerbation included in the study. Any patients with pain radiating from cervical region, old history of fractures around the elbow joint, any other pathology around elbow joint were excluded.

Ethical committee permission was obtained prior to the initiation of the study. As the patient was referred from the orthopedic department, verbal and written information was given to the patient about the study and a written consent was taken from each patient. Pre-treatment, patient’s pain assessment on rest, on activity and post activity using VAS (Visual Analogue Scale) and functional activity assessment using DASH Questionnaire was done. After the evaluation patients were divided into two groups:

**Group A** – treated with hydrocortisone injection.

**Group B** – treated with Mulligan mobilization with movement.

Patient in Group A was referred back to orthopedic department for the Hydrocortisone injection. Immediately after injection reevaluation was done.

Patient in Group B was treated with mulligan mobilization. Ice pack was given to involved part for 10 minutes.

Post treatment parameters were checked in both groups. Follow up was done at 1 month (4 weeks), at three months (12 weeks) and at six months (24 weeks).

Same parameters i.e. pain on rest, on activity and post activity using VAS scale, functional activities by using DASH Questionnaire were taken.

**Data analysis and Results:** Data was collected and data analysis was done Changes in mean score of VAS and DASH were calculated between baseline and each month follow-up. One-way ANOVA test and p-value of less than 0.05 – significant were used
Hydrocortisone injection respectively which were comparable and the difference was not statistically significant. Immediately after post treatment, mean VAS on activity score had a significant change among Mulligan mobilization group i.e. 3.53 and minimal change was observed among Hydrocortisone injection i.e. 0.07. If you compare the change was significantly more among Mulligan mobilization than the Hydrocortisone injection. And same trend was observed among both the groups at the end of 6 months of treatment.

**Graph 1:**

**Interpretation:** At pre-treatment, mean VAS at rest score was 7.67 and 7.73 among Mulligan mobilization and Hydrocortisone injection respectively which was comparable and the difference was not statistically significant. Immediately after post treatment, the significant reduction in mean VAS was observed in Mulligan mobilization i.e. 4.87 but among Hydrocortisone injection change was minimal i.e. 0.07. If we compare the fall was significantly more in Mulligan mobilization than the Hydrocortisone injection. The same trend was observed up to 6 months after treatment in both the groups.

**Graph 2:**

**Interpretation:** Mean VAS on activity score was 8.33 and 8.47 in Mulligan mobilization and Hydrocortisone injection respectively which were comparable and the difference was not statistically significant. Immediately after post treatment, mean VAS on activity score had a significant change among Mulligan mobilization group i.e. 3.53 and minimal change was observed among Hydrocortisone injection i.e. 0.07. If you compare the change was significantly more among Mulligan mobilization than the Hydrocortisone injection. And same trend was observed among both the groups at the end of 6 months of treatment.

**Graph 3**

**Interpretation:** Mean VAS post activity score was 7.87 among Mulligan mobilization and hydrocortisone injection which was same and the difference was not statistically significant. Immediate post treatment mean VAS post activity score had a significant change among Mulligan mobilization i.e. 4.67 and minimal change was observed among Hydrocortisone injection i.e. 0.13. If you compare the change was significantly more among Mulligan mobilization than the Hydrocortisone injection group. The same trend was observed among both the groups at the end of 6 months after the treatment.

**TABLE 1: Comparison of changes in mean DASH score between two groups**

<table>
<thead>
<tr>
<th>Duration</th>
<th>Mean DASH Score(± SD)</th>
<th>Hydrocortisone injection (Group A)</th>
<th>P Value between Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mulligan Mobilization with Movement (Group B)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre treatment</td>
<td>62.64 ± 9.49</td>
<td>66.73 ± 9.13</td>
<td>0.2391</td>
</tr>
<tr>
<td>Post treatment</td>
<td>30.87 ± 9.72</td>
<td>66.41 ± 8.63</td>
<td></td>
</tr>
<tr>
<td>After 1 month</td>
<td>11.47 ± 6.49</td>
<td>39.68 ± 11.20</td>
<td></td>
</tr>
<tr>
<td>After 3 month</td>
<td>3.26 ± 3.39</td>
<td>43.21 ± 10.61</td>
<td></td>
</tr>
<tr>
<td>After 6 month</td>
<td>1.53 ± 0.73</td>
<td>44.76 ± 12.48</td>
<td></td>
</tr>
<tr>
<td>Mean change (pre-post treatment)</td>
<td>@ * 31.77 ± 10.65 (0.0000)</td>
<td>- 0.33 ± 12.57 (0.6269)</td>
<td>* 0.0000</td>
</tr>
</tbody>
</table>

@ *
TABLE 1: Comparison of changes in mean DASH score between two groups (Cont...)

| Mean change (pre-1 month) (p value) | @ * 51.96 ± 10.33 (0.0000) | * - 26.54 ± 12.69 (0.0000) | * 0.0000 |
| Mean change (pre-3 month) (p value) | @ *  - 59.53 ± 10.93 (0.0000) | * - 24.85 ± 13.53 (0.0000) | * 0.0000 |
| Mean change (pre-6 month) (p value) | @ * -  61.27 ± 10.34 (0.0000) | * - 23.29 ± 13.87 (0.0000) | * 0.0000 |

by ANOVA @Between Groups * P 0.05 Significant

This table reveals that mean dash score was 62.64 in Mulligan mobilization and 66.73 among Hydrocortisone injection group which was comparable and the difference was not statistically significant.

Post treatment, the change in mean dash score was observed in both the groups. The change was significant among Mulligan mobilization i.e. 31.77 and minimal change was observed among Hydrocortisone injection group i.e. 0.33. If you compare the change was significantly more among Mulligan mobilization than the hydrocortisone injection group. The same trend was observed among both the groups at the end of 6 months of the treatment.

**DISCUSSION**

Lateral epicondylitis is the most commonly occurring overuse syndrome.

It has been observed that the most commonly involved age group is from 27-55 years. Consulo T Lorenzo says that Lateral epicondylitis often occurs between the 3rd and 5th decades of life. 12

This study has been conducted to compare mobilization with movement and hydrocortisone injection in the treatment of the chronic lateral epicondylitis in long term in order to relieve pain and diminish disability.

Hydrocortisone injection is commonly used treatment for the chronic lateral epicondylitis. 30, 31

Hydrocortisone suppresses the attending inflammatory response irrespective of type of injury and insult. The action is nonspecific and covers all components and stages of inflammation. This includes reduction of increased capillary permeability, local exudation, cellular infiltration, phagocytic activity and late responses like capillary proliferation, collagen deposition, fibroblastic activity and ultimately scar formation.32

Assendift WJ, Hay FM, Adshead R, Boule LM concluded that hydrocortisone injection appears to be relatively safe and seems to be effective in short term (2 – 6 weeks). 30, 31

There are many side effects of hydrocortisone. Clifford R Wheeless III MD says hydrocortisone injection causes side effects i.e. bone changes like osteoporosis, steroid induced myopathy, increased cholesterol, headache, peptic ulcer. 10

Mulligan mobilization with movement has been practiced historically and it is accepted as a treatment for pain. It results in rapid pain relief and more rapid restoration of function.

According to Mulligan minor positional faults occur following injury or strain resulting in movement restriction and / or pain. These are not readily palpable or visible on x-rays, but when a correctional mobilization is sustained, pain-free function is restored and several repetitions bring about lasting improvement. Mulligan uses this theory to explain the mechanism of action of mobilization with movement.

According to him, tennis elbow which is thought to be a soft tissue lesion is actually a mal-tracking or positional fault at elbow contributing to its chronicity. 28

Apart from this, there are few hypotheses which may help to understand the mechanism of pain relief by Mulligan Manual therapy.

- Gliding during mobilization acts as a non-noxious sensory input at the elbow. It thereby, acts
as a physical stimulus, which is capable of activating the endogenous nociceptive control system or the descending pain inhibitory system. This brings about analgesia. This acts at the level of the Brainstem Periaqueductal gray area (PAGA).36

According to Exelby, joint movement can be reduced as a result of reflex muscle splinting and treatment directed at the joint will have an effect on muscle activity and vice versa. End range passive movement causes reflex inhibition of muscle acting over the joint. So to achieve a desired effect on muscle, the mobilization must be performed into resistance without excessive pain, as this would lead to an adverse effect on the muscle.18

Mobilization with Movement also places particular emphasis on restoration of glide component of joint movement to facilitate full pain free range of motion (ROM). This Mobilization with Movement provides a passive pain free end range correct joint glide with an active movement.

The combination of joint with an active movement may be responsible for the rapid return of pain-free movement.18

In our study outcome measures used were pain on VAS (visual Analogue Scale) and functional activities using Disabilities of the Arm, Shoulder and Hand Questionnaire (DASH) score. And it has been observed that in hydrocortisone group immediately after the injection pain was increased and gradually it decreased within an average 1 week. There was a significant effect seen but it was not the same in long term i.e. at 24 weeks. It means that there was significant reduction in pain on VAS at rest, on activity and post activity; and significant decrease in DASH scores in short term but not long term.

In Mobilization with Movement group, pain on VAS at rest, on activity and post activity significantly reduced; and significant decrease in DASH scores in short term as well as long term was seen.

Studies says that there is significant effect of hydrocortisone injection in short term but for intermittent and long term it is not effective in lateral epicondylitis.30,31

Hydrocortisone injection in long term in the patients with chronic Lateral epicondylitis.30

CONCLUSION

There was significant reduction in the pain score and decrease DASH score after the treatment in group B and the effect remained same till 24 weeks. Hydrocortisone injection is effective for short term. Mulligan mobilization with movement has better effect than hydrocortisone injection in long term in patients with chronic lateral epicondylitis.

Acknowledgement: Nil
Source of Funding: Self
Conflict of Interest: Nil

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Quality of Life of Childhood Spinal Cord Lesion Patients at Home after Completing Rehabilitation Program from CRP

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ABSTRACT

The purpose of the study was to assess the quality of life (QOL) of childhood spinal cord lesion (SCL) patient at home after completing rehabilitation program from Centre for the Rehabilitation of the Paralysed (CRP). The study objectives were to assess the present situation of quality of life of childhood spinal cord lesion patients in their community and to explore in-depth effective ways of coping their life in the community considering age. Usually after SCL, an individual’s social, financial, and domestic position in turn affect issues concerning quality of life and self-image. This study was adopted to explore these thematic factors, grounded differently in childhood SCL patients social and community life which played a role in their poor quality of life. A qualitative study was conducted to explore the experience of childhood SCL patient about their QOL. Convenience sampling method was chosen to select the samples and semi-structured face to face interview was carried out to collect the data. Content analysis was used to analyze the data thus several thematic factors were identified which leads poor QOL in childhood SCL patient. The main findings indicated that lack of accessibility to get physiotherapy at home, mobility problems, to functional activities, to education, employment, etc which influence quality of life negatively. That is why it is important to interact between the physical and social environment to provide proper accessibility to the childhood SCL patient to maintain standard quality of life.

Keywords: Spinal Cord Lesion, Quality of Life, Childhood Onset.

INTRODUCTION

Spinal cord lesion was a life-changing event; its changes in an individual’s social, financial and domestic position in turn affect issues concerning quality of life and self-image1. Patients with childhood spinal cord lesion have to deal with stressful situation in their work, leisure and community involvement which had more negative impact on life2. But in Bangladesh there is no specialized government hospital for the treatment and rehabilitation of these spinal cord lesion patients. There is only one non-government organization (NGO), namely Centre for the Rehabilitation of the Paralysed (CRP) which has been treating spinal cord lesion patients for the last 35 years.

Most of the spinal cord lesion patients in CRP were aged between 10-40 years. Among them 19% aged between 10-20 years3. However no research has yet been done to explore the effect of this rehabilitation program on the quality of life of childhood spinal cord lesion patients after they return to their homes. Therefore, this study focuses on the sources of distress over the course of lives of childhood spinal cord lesion patients to explore new
programs according to patients need to lead a better lifestyle after sustaining spinal cord lesion.

**METHODODOLOGY**

This study concerned with an intervention to find out the answer of the question “how is the quality of life of childhood SCL patient at home after completing the rehabilitation from CRP”. In order to achieve the goal, qualitative methodology is used as it included patient’s views, knowledge, experience, regarding QOL. Semi structured face-to-face interviews were used to obtain information. Open ended questions were used for the study as it gave the participants freedom of thoughts, opinion and also helped to answer properly.

**Setting:** Patient’s own home environment was selected as study settings.

**Methods of participant selection**: Convenient sampling was conducted to select the participants who lived into the community. The study was conducted with eight participants, especially who completed rehabilitation from the CRP’s spinal cord injury unit.

**Data collection**: The data were collected in patient’s own community through face-to-face interviews on their own language. Semi-structured open-ended questions were used for data collection. A tape recorder was also used to record the conversation as well as discussion between participants and interviewer.

**Data analysis**: Data analysis started immediately after the data collection and transcripts of the entire interview were completed. The data was organized according to the interview questions. All transcripts were read several times to discover the themes and to find out what the participants actually wanted to say. After answering all questions important points were listed. Similarities from the list of the answers were identified. Thus similar answers were put into a category. This procedure was repeated for all the answers. Following topic analysis, the second step of data analysis was done. Each interview was segmented by this topic into categories. During data analysis, the transcript was read several times and the important categories were identified. After that similar categories were listed as major categories and smaller categories were listed as minor categories. These major categories were referred to as themes.

**Theme and emerging results**

Now a day disabled children of Bangladesh experienced particularly negative effect on their quality of life. Disabled girls suffer more than boys while it is the basic right for all to get the accessibility regarding environment, education & employment\(^4^5\). That’s why following thematic concepts were emerging from the analysis of data.

**Theme – 1: Participants received the interventions through the multidisciplinary team approach of CRP**: It was indicated that the common interventions were used which were included as physiotherapy, occupational therapy, general medicine, special medicine and special care were given to those who had pressure sores. Besides, all the participants received financial assistance to get mobility aids from the CRP’s social welfare Department. They also received different training programs according to their needs. As the aim of the rehabilitation program was to rehabilitate the patients in their own community.

**Theme – 2: Physiotherapy treatment was effective to maintain a good quality of life**: This theme emerged that physiotherapy intervention was effective to maintain good quality of life for all the participants. The participants were getting treatment in a safe environment regularly. Physiotherapy helped to improve mobility, transferring, lifting, and sitting, maintains range of movement & improves muscle power etc. As they were improving physically, they had positive impact about it.

**Theme – 3: Assistance was needed to adapt to daily life**: By this theme, it was found that all the participants needed help from the family members to complete their task of daily life & therapeutic activities. Moreover, the home environments were not supportive or helpful to maintain their daily life. As a result, these patients were thinking themselves as a burden of their family.

**Theme – 4: Participants received support from the family but not from the society**: It was found that family helped them as far as they could although they had experienced negative attitudes from their family.
They were mainly ignored frequently by their society in decision making or in other social activities.

**Theme – 5: Economical support from family is not sufficient in comparison to need:** From the answers of the participants, a panicky picture came out when they were asked about the financial support. Most of the participants answered that financial support was not sufficient for them as the family income was not enough to carry every expense like food, health care, clothing & needs of the disabled children in the family.

**Theme – 6: Disabled children have to face problem in comparison to other members of the family:** Most of the participants had to face problems in comparison to other members of the family in their daily activities, therapeutic activities money etc. Sometimes their family members became irritated & they feel upset. Those participants who had functional & financial independence could cross over the disability.

**Theme – 7: Quality of life of childhood SCL patient after returning to the community was not satisfactory:** Quality of life was a key area of this study which focuses on some of the basic components such as physical, economical, recreational accessibility & other social factors. This interview showed that QOL of childhood SCL patient was not satisfactory for various reasons such as dependency, in-cooperative family & society, economical factor, home and surrounding environment & poor recreational level.

**Theme – 8: Recommendation of participants about the ways to improve their QOL:** To improve the quality of life, participants mainly focused on improving their therapeutic activities & physical activities, family, income, government help, job opportunity, improvement of follow-up service in CRP, allowing the carer during treatment period of CRP, provide physiotherapy service at community level. They also gave value to their personal role in the family & society and to improve surrounding environment as well.

**EMERGING RESULTS**

1. Physiotherapy service could be included at the community level by the government and non-government organization to improve the QOL.

2. The present situation of quality of life of childhood spinal cord lesion patients after return to their home completing rehabilitation from CRP was poor.

3. An in-depth, effective and ineffective ways of coping their life in the community considering age was explored in which program on the quality of life of childhood spinal cord lesion patient was assessed.

4. The impact of rehabilitation program on the QOL of SCL patients was good.

5. The factors that might have a major influence to make better changes for the quality of life of childhood spinal cord lesion patient were being searched.

6. Recommendations are explored for the beneficiaries of the childhood spinal cord lesion patient and make the physiotherapist to provide best service for them.

**DISCUSSION**

In Bangladesh, a considerable number of children with mild, moderate & partial disability become severely disabled due to lack of early detection & treatment, lack of knowledge of the patients as well as carer & the absence of required services. The economic, cultural & social situation of the society was also factors that contribute to disability. This study showed that good quality of life depends on various factors such as accessibility, opportunity & adaptation. However, most of the participants did not implement their rehabilitation program efficiently.

The childhood SCL patients were satisfied about the effectiveness of physiotherapy intervention. In order to improve the rehabilitation service, we need to permit the carer for both paraplegic & tetraplegic patients during the period of treatment. Government & non-government organization should provide the physiotherapy service at primary level to meet the needs of the disabled children. Domiciliary service should be delivered through the community physiotherapist as it could ensure good quality of life.

Financial problem or poverty was an important issue to all participants. Beresford (1996) proved that there was a positive relation between poverty and disability. If the government & non-government...
organization helped them economically, the situation might be changed. The disabled children required an accessible environment which was necessary for independent movement of wheelchair users in order for them to live in mainstream society with dignity.

The childhood SCL patients also reported lack of supportive classroom environment to meet the needs of the disabled learners. Only 2% to 5% of children and youths received any type of education despite many international declarations made10. This would draw the attention of educational policymakers and organizations who have been working for the disabled people. They also required environment in paid employment. Turmusani (2001) stated that paid employment was a matter of economic survival for a disabled person & their family 11. The majority of respondents expressed dissatisfaction with family & society’s attitude to them. Some SCL child mentioned that if there were any organization where the children could pass their life without making a burden to their family, then it would be helpful for them.

CONCLUSION

It was found that lack of maintaining physiotherapy at home, poverty, inaccessible home & surrounding environment, lack of transport facilities, negative attitude of the family member & the social people was the main cause of poor quality of life, which was preventable in most cases. The government & non – government organizations could make an important contribution in the development of good quality of life by provision of physiotherapy service at community level, raising awareness, economical support etc. If all concerned work, this would lead to bright future for childhood SCL patients in Bangladesh.

Acknowledgment: We are very grateful to the physiotherapy department for kind permission for conducting the study. We are also grateful to the participants for their voluntary participation.

Source of Funding: Self-funded

Conflict of Interest : None

Ethical Clearance: The study was approved by the dissertation committee of Bangladesh Health Professions Institute (BHPI).

REFERENCES

**Effect of Occupational Therapy on Fatigue and Quality of Life in Patients with Guillain Barre Syndrome**

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¹Occupational Therapist, Kokilaben Dhirubhai Ambani Hospital, Mumbai, ²Asso. Prof, Occupational Therapy Training School & Centre, Seth G.S.M. College and K.E.M. Hospital, Parel, Mumbai

**ABSTRACT**

**Objectives:** To study the effect of Occupational therapy intervention on fatigue levels & quality of life and understand the impact of fatigue on quality of life.

**Methodology:** 23 randomly selected patients in the age group 20-50 years, diagnosed with GBS, were subjected to 8 weeks Occupational Therapy programme in this Prospective Interventional study. Outcome measures were Fatigue severity scale and WHO Quality of Life- BREF.

**Results:** Statistical analysis was done using Repeated measure ANOVA.

There was decrease in Fatigue Severity Scale mean score from baseline (46.57 ± 4.785) to 8th week (25.26 ± 1.137) and increase in WHO QOL Physical Domain mean score from baseline (44.83 ± 5.416) to 8th week (73.22 ± 10.475) of therapy, Psychosocial domain mean score from baseline (44.52 ± 2.502) to 8th week (72.57 ± 10.500), Social Relationship Domain mean score from baseline (44.52 ± 5.984) to 8th week (73.61 ± 9.787), Environmental Domain mean score from baseline (44.26 ± 1.251) to 8th week (64.78 ± 8.174).

Results were statistically significant at P< 0.01 (95% confidence level)

**Conclusion:** The changes in the outcome variables indicate the effectiveness of the Occupational Therapy intervention programme in terms of reduced Fatigue and improved Quality of life in above represented data.

**Keywords**: Guillain Barre Syndrome, fatigue, quality of life, Occupational therapy.

**INTRODUCTION**

Everybody experiences periods of fatigue, but these usually can be mended by taking rest or enjoying a good night’s sleep. Severe fatigue as a chronic symptom and its impact on daily living are starting to receive more attention as patient-reported outcome measures in clinical trials and that fatigue is a disabling symptom in a variety of neurological disorders and conditions. [1]

Nowadays, it is recognized that fatigue is also an important and frequently occurring symptom in disorders of the peripheral nervous system (PNS) with a high impact on physical abilities and perceived health status in these patients. [1]

This study focuses on fatigue in neuromuscular disorders, with emphasis on fatigue in Guillain Barré Syndrome (GBS), an immune-mediated polyradiculoneuropathy.

**Guillain Barre Syndrome (GBS):** About 1–2 per 100,000 of the population get affected by the condition called Guillain Barre Syndrome.

(GBS) is a disorder in which the body’s immune system attacks part of the peripheral nervous system. The first symptoms of this disorder include varying degrees of weakness or tingling sensations in the legs. In many instances the symmetrical weakness
and abnormal sensations spread to the arms and upper body. Although the majority of patients with GBS experience rather good neurological recovery, severe fatigue is an important residual and disabling complaint, seriously affecting quality of life.

**Fatigue** covers a broad spectrum of symptoms and complaints, and has no uniform definition. In basic neurosciences, it is defined as a time-related force decline. Considering the different aspects of fatigue it is best regarded as a multidimensional concept in which the level of experienced fatigue and the ability to perform activities are influenced by the type of disease, the health status of the patient and several aspects of patient functioning. A distinction is made between experienced fatigue and physiological fatigue, which can both be influenced by psychosociological factors. [1]

**AIMS & OBJECTIVES**

1. To study the effect of Occupational therapy intervention on fatigue levels.
2. To study the effect of Occupational therapy intervention on quality of life of patients.
3. To understand the impact of fatigue on patients quality of life and domains of ADL.

**Hypothesis:**

- Null hypothesis \( H_0 \) - Occupational Therapy does not have significant effect on fatigue and quality of life in patients with Guillain Barre Syndrome.
- Alternate hypothesis \( H_1 \) - Occupational Therapy is effective in management of fatigue and improvement of quality of life in patients with Guillain Barre Syndrome.

**RATIONALE**

GBS is considered one of the few neurological diseases with a very favourable prognosis in spite of severe injury during the acute stage. Medical literature did not pay much attention to patients’ complaints regarding impaired social functioning and quality of life after recovery from the acute phase of GBS. Lately several studies stressed the central role of fatigue in the subjective limitation of daily activities, in spite of good recovery of muscle strength.

Therefore, it seems that even after apparent recovery, GBS has a greater impact on patients’ subjective handicap than expected from the motor impairment in a large proportion of patients. A major part of the difference between the expected dysfunction and the subjective handicap of those patients is explained by complaints of excessive fatigue that are encountered frequently in patients who recovered from GBS.

The benefit of non-pharmacological treatment options, such as low-intensity physical training, rehabilitation and cognitive behavioural therapy, for fatigue in neuromuscular disorders needs further evaluation. The increasing awareness of fatigue as an important part of the burden of disease in neuromuscular disorders is not only important for the development of new treatment strategies, but also for improvement of current patient care. [1]

**MATERIALS & METHOD**

**Study Design:**

Type of study: Prospective Interventional study.
Sample size: Randomly allotted 23 Patients
Duration of study: 8 Weeks
Setting: Occupational Therapy Department, Dhurmal Bajaj Orthopaedic Centre, KEM Hospital, Mumbai.

**Inclusion Criteria:**

1. Age Group [ 20 – 50 years]
2. Both Males and Females.
3. Hugh’s Functional scale for GBS score [1-3]
5. Education minimum 5th std.

**Exclusion Criteria:**

1. CIDP[ Chronic Inflammatory Demyelinating Polyradiculopathy ]
2. Neurological Involvement of central origin or other peripheral involvement.
3. Respiratory system Involvement.
4. Cardiac Involvement.

**ASSESSMENT TOOLS**

1. Evaluation form consisting detailed history & Neurological Assessment
2. Hughe’s Functional Grading Scale for GBS
3. Fatigue Severity Scale
4. WHO Quality of Life Scale

**STUDY PROCEDURE**

**Patient Selection:**
- Mode of invitation: At the inception of the study, Physicians were approached from Medicine and Neurology departments of the hospital for referral of patients.
- Screening of Patients: 70 patients inclusive of both males and females were screened as per inclusion criteria; out of which 30 were selected. 7 dropped out due to inconvenience in commuting from their residence to hospital. Data of 23 patients (20 males and 3 females) was statistically analysed.

| 30 Patients were selected for the study | 23 Participated in the study | 07 dropped out |

- An informed consent was taken from every patient who participated in the study. Demographics such as name, age, gender, etc. Present and past medical history, social history of the subjects was recorded.
- The study was started after receiving an approval from institutional ethics committee.
- All subjects were assessed on Hughe’s Scale (1-3). A thorough neurological evaluation was done in order to rule out problems related to other diagnosis.
- After screening, patients were subjected to Occupational Therapy protocol of 8 weeks and were compared for improvement in Fatigue and Quality of Life at baseline, 4th, 6th and at the end of 8 weeks.

All the subjects were assessed on FSS and WHO QOL Scale for fatigue and QOL pre and post intervention. All exercises were performed daily for 8 weeks; out of which 3 days in supervision of therapist and remaining days as per advised at home. Prescribed exercise session was of 45 minutes to 1 hour duration.

7. Outcome Measures:
- Fatigue severity Scale
- WHO Quality of Life

**Therapy Protocol:** The intervention programme was of 8 weeks which included:

- Strengthening exercises with Thera-bands, stretching, and aerobic conditioning.

  Prone back extensions, prone scapular retraction, abdominal curls, passive, prone extension, and active shoulder medial (internal) and lateral (external) rotation.

  Thera-Band for upper extremity strengthening.

  Heel-cord stretching, supine knee-to-chest stretching, and supine hamstring muscle stretching, progressive walking or cycling for up to 30 minutes.

**Week-wise protocol:**

**Week 1 & 2**

Deep breathing exercises (Figure 4), 2 hourly change in position, (splintage to correct contracture/deformity), passive Range of Motion exercises (5 repetitions) thrice daily with adequate rest periods in between, Energy Conservation Techniques, Work Simplification Techniques.

**Week 3 & 4**

Same as week 1 & 2 along with,

In supine- Heel cord stretching, hamstrings stretching, knee to chest stretching, upper limb Range of Motion exercises – active assistive to active (10 repetitions within fatigue limits).

Trunk strengthening - In supine- abdominal curl ups (within available range & hold for 5 counts within fatigue limits).

In prone- scapular retraction, Back extension with forearm weight bearing, prone extension (within available range & hold for 5 counts within fatigue limits)

Transfers and reaching in sitting.
Theraband graded exercises for upper limb in sitting inclusive of shoulder flexion, extension, abduction and rotations, elbow flexion-extension.

(5 repetitions within fatigue limits)
Foam squeezing and gripping exercises for hands.

**Week 5& 6**
Same as week 3& 4 along with,
Supported standing – independent standing-weight shifts in standing, walking short distance and then gradually with increased distance.
Inclined sanding in sitting, shoulder wheel in standing (10 repetitions within fatigue limits)
Bicycle ergometer (within fatigue limits)

**Week 7& 8**
Same as week 5& 6 along with,
Upper & lower limb ROM exercises (15 repetitions within fatigue limit)
Thera band graded exercises (10 repetitions within fatigue limits)
Inclined sanding in sitting, shoulder wheel in standing (15 repetitions within fatigue limits)
Walking, bicycle ergometer (10 minutes within fatigue limits)

**RESULTS**

**Statistical Analysis:** The data was subjected to Shapiro-Wilks test which suggested that it was normally distributed and hence statistical analysis was done using following tests of significance.

**Statistical method used:** Statistical computing was done using SPSS windows version 18. Statistical analysis using Repeated measures ANOVA (F test)

Test was used to find out statistical significance of the difference in recovery of fatigue and quality of life; from baseline to post intervention. Observations were noted pre and post intervention and ‘F’ value was calculated.
Table 1: Mean and standard deviation of Age.

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>34.43</td>
<td>10.103</td>
</tr>
<tr>
<td>Minimum</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td>50</td>
<td></td>
</tr>
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</table>

Table 2: Mean FSS scores

<table>
<thead>
<tr>
<th>FSS</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
<th>F</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>46.57</td>
<td>4.785</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th week</td>
<td>40.96</td>
<td>4.161</td>
<td>23</td>
<td>363.81</td>
<td>&lt;0.01; Very Highly Significant</td>
</tr>
<tr>
<td>6th week</td>
<td>34.70</td>
<td>2.439</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8th week</td>
<td>25.26</td>
<td>1.137</td>
<td>23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Mean percentage scores in WHO QOL domain at baseline, 4th week, 6th week and 8th week.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Baseline</th>
<th>4th week</th>
<th>6th week</th>
<th>8th week</th>
<th>F</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td>MEAN</td>
<td>44.83</td>
<td>52.04</td>
<td>60.09</td>
<td>73.22</td>
<td>93.6</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>5.42</td>
<td>9.47</td>
<td>7.81</td>
<td>10.48</td>
<td></td>
</tr>
<tr>
<td>Psychosocial</td>
<td>MEAN</td>
<td>44.52</td>
<td>53.48</td>
<td>62.04</td>
<td>72.57</td>
<td>71.6</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>2.50</td>
<td>6.40</td>
<td>9.02</td>
<td>10.5</td>
<td></td>
</tr>
<tr>
<td>Social Relationships</td>
<td>MEAN</td>
<td>44.52</td>
<td>69.43</td>
<td>70.48</td>
<td>73.61</td>
<td>180.6</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>5.98</td>
<td>8.86</td>
<td>9.11</td>
<td>9.79</td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td>MEAN</td>
<td>44.26</td>
<td>53.65</td>
<td>58.43</td>
<td>64.78</td>
<td>64.6</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>1.25</td>
<td>6.09</td>
<td>8.23</td>
<td>8.17</td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Percentage scores at baseline and 8th week

<table>
<thead>
<tr>
<th>Domain</th>
<th>Baseline</th>
<th>8th week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue Severity Scale</td>
<td>73.90</td>
<td>40.09</td>
</tr>
<tr>
<td>WHO-QOL Physical domain</td>
<td>44.82</td>
<td>73.21</td>
</tr>
<tr>
<td>WHO-QOL Psychosocial domain</td>
<td>44.52</td>
<td>72.56</td>
</tr>
<tr>
<td>WHO-QOL Social Relationships domain</td>
<td>44.52</td>
<td>73.60</td>
</tr>
<tr>
<td>WHO-QOL Environmental domain</td>
<td>44.26</td>
<td>64.78</td>
</tr>
</tbody>
</table>

**DISCUSSION**

The data was collected and the results of the study could be explained on the basis of statistical analysis of data. Repeated measures ANOVA (F test) was used to find out the statistical significance of difference in pre & post intervention parameters.

As shown in the above represented data, Mean age of 23 subjects (20 Males, 3 Females) was 34.43±10.193 years. (Table 1) As female patients in the group were too less as compared to males the scores were not compared statistically.

Using Repeated Measures ANOVA; as shown in Table 2, Fatigue Severity Scale mean scores showed decline from baseline (46.57±4.785) to 4th week (40.96±4.16). Similarly decrease was seen in 6th week (34.70±2.43) & 8th week (25.26±1.137). Calculated F value and P value suggest that this difference is statistically significant at P<0.01. This shows that there was a progressive decrease in FSS scores showing improvement in fatigue levels following 8 week intervention.

As shown in table 3; there was increase in the mean WHO QOL scores in the domains of Physical, Psychosocial, Social relations and environmental domains from baseline to 8 weeks post therapy which was statistically significant at P<0.01.

These findings were very much similar to the study done by,

Garssen MP, Bussmann JB, Schmitz PI, Zandbergen A, Welter TG, Merkies IS, Stam HJ, van
Doorn PA. & Richard A. C. Hughes et al conducted a study on Supportive Care for Patients With Guillain-Barré Syndrome in 2005.

As a decline in fatigue was seen, there was also improvement in all the domains [i.e. physical, psychological, social relationships and environmental] of Quality of life.

Comparatively lesser improvement in environmental domain was seen as patients were ambulatory but few still had slight difficulty in stair climbing, travelling and had not resumed their work.

Study conducted by Janet L Ruhland and Richard K Shields conducted this study; The Effects of a Home Exercise Program on Impairment and Health-Related Quality of Life in Persons With Chronic Peripheral Neuropathies in 1997 supports our findings that improvement in Quality of life domains were seen after therapeutic intervention.

As fatigue decreased and Quality of life improved and there was also improvement in Hughes Functional Grading Score and Independence in Activities of daily living. Most of the patients resumed back to their work after the intervention and with the help of home programme and follow ups.

As per the pre & post intervention assessment of mean scores of FSS and WHO-QOL BREF scale; Alternate hypothesis was accepted as all the subjects showed improvement in Fatigue and Quality of Life.

So, Null hypothesis was rejected.

LIMITATIONS OF THE STUDY

Several limitations would interfere with the generalisation of the findings of this study:

1. A relatively small sample size limited the generalisation of the study.
2. This study included only patients of grade 1-3 as per Hughes Functional Grading Scale (HFGS) of Guillain Barre Syndrome (GBS).
3. Therapy was provided only for 8 weeks; further longitudinal studies would be required to determine if patients maintain their gains.

CONCLUSION

The statistically significant changes found in the outcome variables indicate the effectiveness of the Occupational Therapy intervention programme.

This preliminary study suggests that there was decline in fatigue and improvement in Quality of life in patients with GBS after Occupational Therapy intervention programme.

However, further research is recommended to correlate the long term positive effects of the intervention on fatigue.

Therefore, it is concluded that, improvement is seen in Fatigue and Quality of Life in patients with Guillain Barre Syndrome having Hughes Functional Grading Score.[1-3]

Acknowledgment

• I would like to express my gratitude to all the patients for their utmost co-operation & sincerity in following the prescribed programme.

• I would like to thank my parents, teachers, and friends for their constant support.

Ethical Clearance: Taken from Institutional review Board, Seth G S Medical college, KEM Hospital, Mumbai.(EC/58/2012)

Conflict of Interest: Nil

Source of Funding: Self

Abbreviations : GBS: Guillain Barre' Syndrome
FSS: Fatigue Severity Scale
QOL: Quality of Life
QOL PHY: Quality of Life Physical Domain
QOL PsY: Quality of Life Psychological Domain
QOL SR: Quality of Life Social relations Domain
QOL E: Quality of Life Environmental Domain
ADL: Activities of Daily Living

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ABSTRACT

Aims & Objectives: To study the effect of Occupational Therapy on Balance and Activities of Daily Living Performance & compare it in patients with Right and Left cerebral infarcts respectively.

Methodology: 11 patients with Right Middle cerebral artery Cerebrovascular accident (MCA CVA) in Group A and 09 patients with Left MCA CVA in Group B, in age group 40-60 years were subjected to 12 week OT intervention inclusive of ADL & static and dynamic balance training. In this Prospective Interventional study, outcome measures were Berg Balance scale and Functional Independence Measure-Functional Assessment Measure (FIM-FAM) Scale.

Results: There was increase in Berg Balance Scale Score from baseline (27.45 ± 5.373) to 12th week (44.09 ± 5.166) in Group A & from (27.22 ± 7.014) to (44.00 ± 6.946) in Group B. There was increase in FIM-FAM Total score from baseline (181.18 ± 22.351) to 12th week (211.36 ± 21.205) in Group A & from (177.78 ± 29.731) to (209.78± 28.556) in Group B. Difference was statistically significant at P< 0.01 within group; but was statistically insignificant in intergroup comparison.

Conclusion: Recovery in balance and ADL performance seems to be independent of side of brain lesion but pattern of recovery varies slightly as represented in above data analysis.

Keywords: MCA CVA, Balance Training, Functional Independence.

INTRODUCTION

Stroke is the third most common cause of death. Of the survivors; about 50% will have a significant long-term disability. The average annual incidence rate of stroke in India currently is 203 per 100,000 populations. (9)

Although rehabilitation does not “cure” or reverse brain damage, it can substantially help people achieve the best possible long-term outcome.

Stroke or CVA results in a sudden, specific neurological deficit. To be classified as stroke, neurological deficits must persist for at least 24 hours. (9) It is the sudden death of brain cells in a localized area due to inadequate blood flow. Stroke can be thrombotic, embolic or of haemorrhagic type. (9,10)

It is evident that Right brain and Left brain functions are distinct. 95% of individuals have left cerebral hemisphere dominance and 5% of individuals have right cerebral hemisphere dominance. There is an apparent difference between performance and learning in persons with right and left brain damage. The right brain is concerned with gestalt processing, body scheme and visual spatial analysis.

The left brain is responsible for analytical processing of individual elements, temporal processing, and control of language and complex voluntary movements. (9)
Balance impairments in stroke

Studies of balance impairments consistently have shown that people with stroke have greater postural sway than age-matched healthy volunteers. Abnormal pattern is seen in static & dynamic balance and even in people with stroke with high levels of function, who are ambulatory in community. (12)

Patients with Stroke typically demonstrate asymmetry, with most of the weight shifted towards the stronger side & delay in the onset of motor activity, abnormal timing and sequencing of motor activity, abnormal co-contraction resulting in disorganization of postural synergies. Corrective responses to destabilizing forces are inadequate resulting in loss of balance and falls; hampering patients’ ability to perform ADL independently. Thus, rehabilitation plays a major role in prognosis.

The difference in balance ability between the left and right hemiplegic patients can be attributed to difference in components affected.

AIMS AND OBJECTIVES OF STUDY

1) To study the effect of Occupational Therapy in improving balance & performance of ADL post intervention in patients with Right and left MCA infarcts.

2) To compare its effect in improving balance and its impact on ADL performance in these patients.

Hypothesis:

Null hypothesis (H0): There is no significant difference in the outcome measures of the two groups following Occupational Therapy Intervention.

Alternate hypothesis (H1): Occupational Therapy is more effective in patients with Right cerebral infarct.

Alternate Hypothesis (H2): Occupational Therapy is more effective in patients with Left cerebral infarct.

RATIONALE

Patients with hemiparesis frequently present balance abnormalities. Balance problems have been implicated in the poor recovery of ADL and mobility and an increased risk of falls.
Patient Selection:

- Mode of invitation: At the incept of the study, Physicians were approached from Medicine and Neurology out-patient and inpatient departments for referral.

- Screening: 70 patients; were screened; of which 30 were selected & 10 dropped out due to inconvenience in commuting.

- An informed consent was taken. Demographics, medical & social history was recorded.

- The study was started after an approval from institutional ethics committee.

- All subjects were assessed on MMSE to rule out cognitive deficits & ensure utility of therapeutic intervention. Then were allocated into 2 groups viz. Group A consisting patients with Right MCA infarct and Group B with Left MCA infarct. All patients were Right handed. Both groups were subjected to 12 weeks of OT intervention targeting improvement in balance and ADL performance.

  Group A: 11 subjects (Right MCA CVA)

  Group B: 09 subjects (Left MCA CVA)

All the subjects were assessed on BBS and FIM-FAM before and after 4,8 &12 weeks of treatment protocol. All exercises were performed daily; 2 days under therapist’s supervision and remaining days at home as advised. Prescribed exercise session was of 45 to 60 minutes duration. Both the groups were subjected to same therapy protocol.

OUTCOME MEASURES

1) Berg Balance Scale

2) Functional Independence Measure and Functional Assessment Measure scale

Therapy Protocol:

Therapy protocol was based on Rood’s developmental patterns, Neurodevelopmental treatment approach, Proprioceptive neuromuscular facilitation (PNF) techniques.[9, 10] Week 1-4:

- Static balance in sitting- mat exercises; Single/ Bilateral UE raises (symmetrical/Asymmetrical) [9], weight bearing on affected upper and lower extremities, weight shifts, medicine ball rolling & kicking (Figure 3), etc.

- Dynamic balance in sitting- Sitting on a therapy ball with eyes open then closed (Figure 4), Single UE raises, etc.

- Static balance in standing- Standing with / without support (Figure 1), squatting- up squatting (Figure 2).

- Dynamic balance in standing

  - Walking with/without support on level ground
  - Forward and backward stepping
  - Bicycle Ergometer
  - Facial Exercises

Week 4-8:

- Static balance in sitting- same as before, table top activities etc.

- Dynamic balance in sitting: Same as before and Dual tasks like transferring objects therapy ball etc.

- Static balance in standing: Standing with narrow base, overhead activities, spot marching, standing with eyes closed, reaching etc.

- Dynamic balance in standing: Standing on various textures and overhead activities Walking & stepping with/without support

Week 8-12:

- Static & Dynamic balance in sitting: same as before

- Static & Dynamic balance in standing: Squatting & up squatting using stool lower than the one used before, Marching on textured surface, standing on a balance board, Dual task etc.

- Participation in Real life situations- simulated ADL
RESULTS AND TABLES

Statistical Analysis: The data was subjected to Shapiro- Wilks test which suggested that it was normally distributed.

Statistical method used: Statistical analysis: SPSS windows version 18.

Inter Group statistical analysis: Independent samples ‘t’ test.

Observations were noted and ‘t’ value was calculated using following formula.

\[ t = \frac{X_1 - X_2}{SE} \]

\( X_1 = \) Mean Score of Group A  
\( X_2 = \) Mean score of Group B  
\( SE = \) Standard Error of Mean

Intra Group statistical analysis was done using Repeated Measures ANOVA (F Test) and F value was calculated to assess statistical significance of variables in individual groups.

Table 1: Comparison of Berg Balance Scores in Group A & Group B using unpaired ‘t’ test (Independent sample test)

<table>
<thead>
<tr>
<th>Inter Group Comparison</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>95% Confidence Interval for Mean</th>
<th>df</th>
<th>T</th>
<th>P Value</th>
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<tr>
<td></td>
<td></td>
<td></td>
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<td>Lower Bound</td>
<td></td>
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<td>Berg Balance Score</td>
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<td>Score- Baseline</td>
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Table 2: Comparison of FIM FAM (Motor) Scores in Group A & Group B

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Table 3: Comparison of FIM FAM (Cognitive) Scores in Group A & Group B

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<th>Std. Deviation</th>
<th>95% Confidence Interval for Mean</th>
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<th>P Value</th>
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**DISCUSSION**

The results of the study could be discussed on the basis of statistical analysis of data.

The mean age of 20 subjects was $52.80 \pm 5.890$ years and included 15 males and 5 females.

As per the data analysed using Repeated measures ANOVA, there was increase in mean BBS score from baseline to $12^{th}$ week in Group A\(^6\) and in Group B.\(^6\) In both the groups it was found to be statistically significant at $P<0.01$.\(^6\)
Therefore, it can be concluded that patients in both the groups had improvement in balance following Occupational therapy intervention.

With intervention, patients developed adaptive strategies to deal with their balance problems.

These results were similar to those found in a study (2006) done by Snehal Bhupendra Shah, Smita Jayavant on Balance training in ambulatory hemiplegics. [2]

As shown in Table 1, there was minimal difference in BBS mean score of Right MCA and Left MCA groups at baseline to 12th week of therapy and this difference found was statistically not significant. These results were similar to those found in a study conducted by Laufer Y et al in 2003.

There was increase in mean FIMFAM Motor score from baseline to 12th week in Group A & Group B. Overall the scores showed progressive improvement following intervention in both groups and this difference between them was found to be statistically significant at P<0.01.

As shown in Table 2, the difference in FIMFAM Motor mean score of both groups from baseline to 12 weeks; was statistically insignificant. This suggests that the recovery following stroke is almost similar in patients with Right brain damage and Left brain damage. Although, pattern of recovery might show slight difference depending upon the lesion side. [1]

The mean FIM -FAM Cognitive Scores in Group A & Group B, showed increase from baseline to 12th week. This progressive increase in scores was statistically significant at P<0.01.

As shown in Table 3, the difference in FIMFAM Cognitive mean score of both groups was statistically insignificant.

But, pre and post FIM FAM Scores in Cognitive domain were slightly more in Group B as compared to Group A. This can be attributed to the fact that individuals with Right hemispheric damage demonstrated difficulty in spatial-perceptual tasks & short term memory, poor judgement, inattention, disorientation, lack of safety awareness. In contrast, patients with left hemispheric damage demonstrated difficulties in communication and information processing.

It was also found that the mean FIM FAM pre & post scores in Motor domain were more in patients with Right MCA CVA as compared to Left MCA CVA. This discrepancy could be attributed to the fact that all patients were right dominant and so the patients with affectations of non-dominant extremities had slightly higher scores. The difference found was statistically insignificant.

This indicates that patients’ level of Independence (ability to perform ADL independently) improves following 12 week of Occupational Therapy Intervention. These results are similar to a study conducted by Birol Balaban et al in 2008 on Early rehabilitation outcome in patients with middle cerebral artery stroke. [7]

Overall it suggests that recovery in balance following OT protocol of 12 weeks was statistically significant irrespective of side of brain lesion. These results were similar to those obtained by Mirjam de Haart et al in a study on ‘Recovery of standing balance in postacute stroke patients: a rehabilitation cohort study’ (2001).

Comparison of scores of BBS and FIMFAM in males and females did not show much of a difference.

As observed in both the groups; post intervention phases showed progressive recovery in all parameters. Motor control parameters showed a mean average lesser in the Left CVA v/s Right CVA. However, this difference was negligible when compared at end of 12 weeks of rehabilitation. It may be correlated here that the progressively up sloping cognitive abilities facilitated the learning process & helped patients in the process of task adaptation.

Hence, it can be said that motor control is an important aspect in recovery of function but it can be overcome through strategic learning over a period of time.

Limitations:

- Small sample size
- Less duration of therapy.
- No comparison was made between males and females.
CONCLUSION

Balance is a complex motor skill that depends on interactions between multiple sensorimotor processes and environmental and functional contexts. Balance training improves ADL performance.

However, recovery in balance and ADL performance was independent of side of brain lesion as represented in above data analysis.

Thus, it can be concluded that recovery in balance has an impact on ADL performance following cerebral infarct irrespective of side of brain lesion.

Acknowledgement:

- I would like to express my gratitude to all the patients for their utmost co-operation & sincerity in following the prescribed programme.
- I would like to thank my parents, teachers, friends for their constant support.

Ethical Clearance: Taken from Institutional review Board, Seth G S Medical college, KEM Hospital, Mumbai.(EC/57/2012)

Confict of Interest: Nil

Source of Funding: Self

Abbreviations:

CVA: Cerebro-vascular accident
MCA : Middle Cerebral Artery
MMSE: Mini Mental status Examination
BBS: Berg Balance Scale
FIM-FAM: Functional Independence Measure-Functional Assessment Measure
ADL: Activities of Daily living
EADL: Extended Activities of Daily living
COM: Centre of mass
BOS: Base of support

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9) John W. Krakauer, Arm Function after Stroke: From Physiology to Recovery, Seminars in neurology, volume 25, number 4, 2005
Functional Approach in Spino-cerebellar Ataxia-Occupational Therapy Perspective

Parag Sawant¹, Preetee Gokhale²

¹Occupational Therapist, Kokilaben Dhirubhai Ambani Hospital, Mumbai, ²Occupational Therapist, Goenka & Associates Educational Trust, Vasant Vihar Counselling Centre, Thane

ABSTRACT

Objectives: The cerebellum is known to play a strong functional role in both motor control and motor learning. Diseases of cerebellum like Spinocerebellar Ataxia (SCA) leads to functional limitations leading to activity restriction. Ataxia following degenerative cerebellar disease becomes a major cause of disability. Literature talks about effectiveness of Occupational Therapy in rehabilitation of these patients but not much work is been documented on it. Objective of the study was to rate ataxia and assess the Functional Independence and Balance in the context of Occupational Therapy.

Methodology: 3 male patients with diagnosis of Spinocerebellar ataxia, in the age group of 20-30 years were screened on MMSE to rule out cognitive impairment and ensure the utility of intervention. Ataxia was rated using Scale for Assessment and Rating of Ataxia (SARA). The subjects underwent 3 months of Occupational Therapy (OT) intervention including physical exercises, therapeutic activities, Intensive coordination training, prescription of adaptive aids, Balance retraining and functional retraining using Top Down Approach and were assessed on Functional Independence Measure Functional Assessment Measure FIM FAM Activities of Daily Living (ADL) scale and Berg Balance Scale (BBS) pre and post intervention and statistically analysed using paired ‘t’ test.

Results: Pre intervention mean score on FIM FAM scale was 199 ± 5.57 which increased to 202.66 ± 6.03 post intervention and was statistically significant at t = 11, P< 0.01. The mean score on BBS increased from 38 ± 2 to 39.66 ± 2.08 ; post intervention and was statistically significant at t= 5, P< 0.05. Scores on SARA were also maintained which shows there was no worsening of symptoms.

Conclusion: As the results were statistically significant it can be concluded that OT intervention was effective in improving functional independence in Patients with SCA in the selected study population. Further research is recommended with larger sample size.

Keywords: : Spinocerebellar Ataxia, Quality of life, Occupational Therapy.

INTRODUCTION

Spinocerebellar ataxia (SCA) is a form of genetically inherited disorder that is characterized by abnormalities in the person’s brain functioning. The disorder represents a varied group of related disorders and is commonly inherited as a dominant trait, meaning that people who carry one of the various different gene mutations are not affected by it. It also means that people who carry the disorder present a 50% chance of having a child who is affected by the disorder, despite the genetic background of their mate. People with SCA experience brain and spinal cord degeneration.¹⁸⁻¹⁹

People affected by SCA develop a degenerative condition that affects their cerebellum, which is located behind their brainstem. The main function of a person’s brainstem is to coordinate their body’s ability to move. People with SCA experience a progressive atrophy, or muscle wasting. Their spine atrophies, potentially leading to spasticity.

SCA may be a physically devastating disorder
involving the progressive loss of the affected person’s ability to coordinate their movements, as well as the emotional complications that accompany such losses, and significant lifestyle changes. Adverse effects of the disorder can involve the person’s hands, legs, and speech.

**Causes of Spinocerebellar Ataxia**

Generally, the incidence is believed to be around one to five people in every one-hundred thousand. SCA does not differentiate between genders; as with nearly every autosomal dominant disorder, both females and males are equally likely to inherit a defective gene.\[9\]

**Symptoms of Spinocerebellar Ataxia**

The most common type of SCA is SCA 1-8. People with SCA types 1-3 and 7 may experience an earlier age of onset combined with increased severity of the disorder; something referred to as, ‘anticipation,’ as the defect is passed along from one generation to another. What this means is that children may be more severely affected at earlier ages than their parents. \[17, 19, 20\] The size of the repeat of nucleotides in the affected genes is believed to correlate with the age and severity of onset in children. As the repeat size expands, the severity worsens, and the age of onset becomes earlier when compared with parents who are affected by the disorder. The repeat size does not; however, predict the exact age of onset, nor does it predict the specific symptoms that will develop in a particular individual.\[8,9\]

People with SCA initially develop coordination issues or, ‘ataxia.’ The development of poor movement coordination in people with SCA is manifested by abnormalities in eye or hand movements, difficulties with walking, as well as speech difficulties.

Ataxia many times happens when parts of the person’s nervous system that control movement are damaged. People with ataxia experience failure of muscle control in their legs and arms. The result is a lack of coordination and balance, or disturbance in their gait. The term, ‘ataxia,’ is one that is mainly used to describe this set of symptoms, although it is sometimes also used to describe a family of disorders. Ataxia is not; however, a particular diagnosis.

1. **Aims & Objectives:**
   - To assess functional recovery following Occupational Therapy intervention using FIM FAM.
   - To assess the recovery in balance using BBS in the context of Occupational Therapy.

**HYPOTHESIS**

- Null hypothesis \[H_0\] - Occupational Therapy does not have significant effect on functional recovery of patients with Spinocerebellar Ataxia.
- Alternate hypothesis \[H_1\] - Occupational Therapy has significant effect on functional recovery of patients with Spinocerebellar Ataxia.

**RATIONALE**

The cerebellum is essentially involved in control of various kinds of motor behaviour such as speech, eye movements, limb movements, and balance. Here, its main function is the shaping and fine-tuning of movements. Correspondingly, cerebellar damage does not lead to reduced or paretic movements but to increased variability and poor accuracy of movements (ataxia). \[16, 17, 19\]

Spinocerebellar ataxia is a type of degenerative hereditary ataxia and its Prevalence is estimated to be 1-2 in 100,000 with significant geographical and ethnic variations with lower prevalence in India, North America & Australia.

Until recently, only relatively few and small clinical studies have evaluated training interventions for patients with spinocerebellar ataxia. Using increasingly demanding balance and gait tasks, improvements can be achieved in terms of increased postural stability and reduced dependency on walking aids.

Thus, it becomes important to study the effect of Occupational Therapy on functional recovery of these patients.

**(B) Materials and method:**

1. **Study Design:**
   - Type of study: Prospective Interventional study.
   - Sample size: Randomly allotted 3 Patients
   - Duration of study: 12 Weeks

2. **Inclusion Criteria:**
1. Age Group [20 – 30 years]
2. Both Males and Females.
3. Clinical diagnosis of Spinocerebellar ataxia

**EXCLUSION CRITERIA**
2. Respiratory system Involvement.
3. Cardiac Involvement.
4. Non compliant to therapy.

**ASSESSMENT TOOLS**
1. Evaluation form consisting detailed history & Neurological Assessment
2. Mini mental state examination
3. Scale for Assessment and rating of Ataxia
4. Berg Balance Scale
5. Functional independence measure Functional Assessment measure

**STUDY PROCEDURE**

**Patient Selection:**

- Mode of invitation: At the incept of the study, Physicians were approached from Medicine and Neurology departments of the hospital for referral of patients.
- Screening of Patients: 5 patients inclusive of both males and females were screened as per inclusion criteria; out of which 3 were selected. 2 dropped out due to inconvenience in commuting from their residence to hospital. Data of 3 patients was statistically analysed.

- An informed consent was taken from every patient who participated in the study. Demographics such as name, age, gender, etc. Present and past medical history, social history of the subjects was recorded.

- The study was started after receiving the consent.
- All subjects were screened on MMSE to rule out cognitive impairment. A thorough neurological evaluation was done in order to rule out problems related to other diagnosis.
- After screening, patients were subjected to Occupational Therapy protocol of 12 weeks and were assessed on BBS and FIM FAM scale pre and post intervention.

All exercises were performed daily for 12 weeks; out of which 3 days in supervision of therapist and remaining days as per advised at home. Prescribed exercise session was of 45 minutes to 1 hour duration.

**OUTCOME MEASURES**
1. Berg Balance Scale
2. Functional independence measure – Functional assessment measure

**Therapy Protocol:**

The intervention programme was of 12 weeks which included -

Exercise program of strengthening with weighted cuffs, aerobic conditioning exercises.

The exercise program consisted of core muscle strengthening using Swiss ball activities (Figure 4), intensive coordination training (Figure 1, 2), Frenkel’s exercises [16, 17, 18], Balance Training (Figure 3) etc.

Functional Training including simulated ADL tasks, Enabling Functional activities like shoulder wheel exercises, inclined sanding, medicine ball kicking, progressive walking or cycling, Real life task situations [19, 20] etc.

Relaxation Techniques such Deep breathing, Energy Conservation Techniques, Work Simplification Techniques.

Functional Adaptations in ADL and work situations [19, 20]
RESULTS

Statistical Analysis:

The data was statistically analysed was using Paired ‘t’ test.

Test was used to find out statistical significance of the difference in functional recovery of patients; from baseline to post intervention. Observations were noted pre and post intervention and ‘t’ value was calculated.

Table 1: Mean and standard deviation of Age.

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Table 2: Pre and Post Intervention scores on FIM FAM

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Table 3: Pre and Post Intervention scores on BBS

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Table 4: Mean Pre and Post intervention Scores and SD

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DISCUSSION

In this study, patients with diagnosis of SCA were subjected to 12 weeks of OT intervention based on Functional Approach. The outcome measures used to assess functional recovery were BBS and FIM FAM.

The data was statistically analysed using Paired ‘t’ test.

As shown in Table 1, the mean age of sample was 24.66 years with SD of 3.40.
As shown in Table 2, there was an increase in FIM FAM scores from 199 ± 5.57 to 202.66 ± 6.03. This increase was found to be statistically significant at P < 0.01.

This can be attributed to the fact that in spite of continued symptoms associated with ataxia, all the subjects were made to participate in tasks which were meaningful to them by using the Occupational therapy interventions of adapted positioning, adapted movement patterns and use of environment for trunk and limb stability.

Also, the scores on SARA were maintained which shows there was no worsening of symptoms considering the degenerative nature of the disorder.

These finding are similar to a study done by Glen Gillen titled ‘Improving Activities of Daily Living Performance in an Adult with Ataxia’ which concludes that in spite of continued symptoms associated with ataxia, patient was able to independently engage in tasks that he chose and that were meaningful to him by using the occupational therapy interventions of adapted positioning, orthotic prescription, adapted movement patterns, and use of the environment for trunk and limb stability. In this case report, treatment was successful because the patient made substantial gains in scores on standardized ADL evaluations.

As shown in Table 3, there was an increase from 38 ± 2 to 39.66 ± 2.08. This increase was found to be statistically significant at P < 0.05. This can be attributed to the fact that there was an improvement in muscle strength with intervention. Also, the patients were prescribed adaptive strategies to deal with incoordination issues, balance problems which helped them to be functionally independent.

These results were similar to a study done by Ichiro Miyai et al in 2012 titled “Cerebellar Ataxia Rehabilitation Trial in Degenerative Cerebellar Diseases” [7]. They investigated short- and long-term effects of intensive rehabilitation on ataxia, gait, and activities of daily living (ADLs) in patients with degenerative cerebellar disease. In a total of 42 patients with pure cerebellar degeneration were randomly assigned to the immediate group or the delayed-entry control group. The immediate group received 2 hours of inpatient physical and occupational therapy, focusing on coordination, balance, and ADLs, on weekdays and 1 hour on weekends for 4 weeks. The control group received the same intervention after a 4-week delay. Short-term outcome was compared between the immediate and control groups. Long-term evaluation was done in both groups at 4, 12, and 24 weeks after the intervention. Outcome measures included the assessment and rating of ataxia, Functional Independence Measure, gait speed, cadence, functional ambulation category, and number of falls. The immediate group showed significantly greater functional gains in ataxia, gait speed, and ADLs than the control group. Improvement of truncal ataxia was more prominent than limb ataxia. The gains in ataxia and gait were sustained at 12 weeks and 24 weeks, respectively. At least 1 measure was better than at baseline at 24 weeks in 22 patients. They concluded that short-term benefit of intensive rehabilitation was evident in patients with degenerative cerebellar diseases. Although functional status tended to decline to the baseline level within 24 weeks, gains were maintained in more than half of the participants.

**Limitations of the study:**

Several limitations would interfere with the generalisation of the findings of this study:

1. A relatively small sample size limited the generalisation of the study.

2. Therapy was provided only for 12 weeks; further longitudinal studies would be required to determine if patients maintain their gains.

**CONCLUSION**

In spite of continued symptoms associated with ataxia, all the subjects were able to engage in tasks which were meaningful to them by using the Occupational therapy interventions of adapted positioning, adapted movement patterns and use of environment for trunk and limb stability.

As the results were statistically significant it can be concluded that Occupational Therapy intervention was effective in improving functional independence in Patients with Spinocerebellar Ataxia in the selected study population. Further research is recommended with larger sample size.
Acknowledgment: I would also like to express my gratitude to all the patients for their utmost cooperation & sincerity in following the prescribed programme.

Ethical Clearance: Informed consent was taken from all subjects.

Source of Funding: Self

Conflict of Interest: Nil

Abbreviations:
- SCA: Spinocerebellar Ataxia
- QOL: Quality of Life
- ADL: Activities of Daily Living
- OT: Occupational Therapy
- SARA: Scale for Assessment and Rating of Ataxia
- MMSE: Mini mental status examination

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Effectiveness of Occupational Therapy Intervention on Social Interaction Skills in Children with Mild Autism Spectrum Disorder

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ABSTRACT

Objectives: Objective of the study was to improve the social interaction skills in children with mild Autism Spectrum Disorder (ASD) and to reduce the abnormal behaviours in high functioning autistic children.

Methodology: Children, in age group of 6-8 years, both males and females; with diagnosis of Autism Spectrum Disorder were screened using Autism Spectrum Disorder assessment scale (ASD AS) to rule out moderate & severe impairment. Those with Mild ASD were subjected to 8 weeks of Occupational Therapy intervention focussing on social skills training (Group Therapy) along with Sensory integration therapy. In this observational cohort study; social skills assessment was done using ASD Social skills profile (ASD SSP); pre and post intervention.

Results: Post intervention, there was an improvement in Social skill areas as reflected in the scores of ASD SSP. The pre-intervention mean score was (91.67 ± 0.97) which increased to (96.88 ± 0.97). This result was statistically significant at P < 0.01

Conclusion: Thus, it can be concluded that there was improvement in social interaction skills with reduced abnormal behaviours post therapy in children with mild Autism Spectrum Disorder. The children were more comfortable in consecutive group therapy sessions.

Keywords: Mild ASD, Social Skills Training, Group Therapy, Occupational Therapy, Sensory Integration.

INTRODUCTION

Autism is a complex neurodevelopmental disorder that manifests in children by the age of three. The degree may vary from mild to very severe and is hence it is known as Autism Spectrum Disorder. Autism spectrum disorder (ASD) is marked by impaired social communication and social interaction accompanied by atypical patterns of behaviour and interest. (20,21)

ASD is differentiated from other developmental disorders by significant impairments in social interaction and communication, along with restrictive, repetitive, and stereotypical behaviours and activities. (24,25,26) Social communication and social interaction features include deficits in social-emotional reciprocity (e.g., deficits in joint attention, atypical social approach and response, conversational challenges, reduced sharing of interest, emotions, and affect); deficits in nonverbal communication (e.g., atypical eye contact, reduced gesture use, limited use of facial expressions in social interactions, challenges understanding nonverbal communication); and deficits in forming and maintaining relationships (e.g. diminished peer interest, challenges joining in play, difficulties adjusting behaviour to social context). (22,23)

A 2012 review of global prevalence estimates of autism spectrum disorders found a median of 62 cases per 10,000 people. The prevalence rate of autism in India is 1 in 250 (figure may vary as many cases are not diagnosed) and currently 10 million people are suffering in India. ASD averages a 4.3:1 male-
female ratio.

Causes and Symptoms of ASD:

Autism is a lifelong problem with a number of possible causes, including but not limited to (8,9,10,13)
- genetic problems or syndromes
- severe infections that affect the brain
- exposure to toxins or illness during pregnancy (rubella, chemicals, etc.)
- Advancing parental age

ASD features (18, 19)
- Restricted repetitive patterns of behaviour, interests, or activities may include stereotyped motor mannerisms, use of objects, or speech
- Insistence on sameness, inflexible adherence to routines, or ritualized patterns of behaviour
- Rigid patterns of thought and behaviour, performance of everyday activities in ritualistic manner
- intense preoccupation with specific interests (e.g., strong attachment to objects, perseverative topics of interests)
- Sensory sensitivities or interests (e.g. hyper reactivity or hypo reactivity to pain and sensory input, sensitivity to noise, visual fascination with objects or movement).

ASD symptoms cause impairment across many areas of functioning and are present early in life. However, impairments may not be fully evident until environmental demands exceed children’s capacity. They also may be masked by learned compensatory strategies later in life. Many children with ASD may also have intellectual impairment or language impairment.

Social Skills in ASD:

The child may have problems using social skills to connect with other people. (7) They may seem to be in their own world. It may be hard for them to
- share a common focus with another person about the same object or event-known as joint attention;
- play with others and share toys
- understand feelings
- make and keep friends

Communication Skills

The child may have trouble with understanding, talking with others, reading or writing. Sometimes, they might lose words or other skills that they are used before. The child may have problems
- understanding and using gestures, like pointing, waving
- understanding and using words
- having conversations
- learning to read or write or may read early but without understanding the meaning—called hyperlexia
- repeat words just heard or words heard days or weeks earlier-called echolalia
- use tantrums to tell you what he does or does not want
- have trouble changing from one activity to the next
- flap hands, rock, spin or stare
- get upset by certain sounds

Aims and Objectives of Study

- To improve the social interaction skills in children with mild Autism Spectrum Disorder (ASD)
- To reduce the abnormal behaviours in high functioning autistic children.

Hypothesis

Null hypothesis (H₀): There is no improvement in Social interaction skills in children with mild Autism Spectrum Disorder; following therapy.

Alternate hypothesis (H₁): There is improvement in Social interaction skills in children with mild Autism Spectrum Disorder; following therapy.

Rationale

It is well recognised that central to autism spectrum disorder is the social deficit. Many researchers have noted that “Autistic aloofness” is seen in all autistic children, regardless of their
cognitive profiles. Socialization deficits are a major source of impairment regardless of cognitive or language ability for individuals with ASD. The fact that autistic individuals have particular difficulties with tasks that involve social or affective stimuli; even if they can perform the exact same task efficiently with non social stimuli.

Thus, it becomes very important to train children with mild ASD for Social interaction skills making them efficient to develop good social relations.

**MATERIALS AND METHODOLOGY**

**Study Design:**
- Type of study: Observational Cohort study
- Sample size: 09
- Duration of study: 8 Weeks
- Setting: Vasant Vihar Counselling Centre, Thane

**Inclusion Criteria:**
- Children in the age group of 6-8 years
- Children with diagnosis of mild ASD
- Both males and females
- IQ above 70 (Borderline intellectual functioning)

**Exclusion Criteria:**
- Non correctable visual & hearing impairment
- No obvious physical impairment
- Cardiac/ Respiratory involvement
- Those who are non-compliant to therapy & follow up

**Assessment tools:**
1) Neuro-paediatric evaluation
2) Autism Spectrum Disorder assessment scale
3) ASD Social skills profile
4) DSM-5 Diagnostic criteria for Autism Spectrum Disorder

**Study Procedure:**
- Patient Selection:
  - Mode of invitation: At the incept of the study, Children were selected as per inclusion criteria.
  - Screening: The children were screened on ASD Assessment scale to rule out moderate and severe ASD; 9 children inclusive of 7 males and 2 females were selected as they scored in the range of 50-100 on ASD assessment scale (Suggestive of Mild ASD) and their data was statistically analysed.
  - An informed consent was taken from parents of every participant. Demographics, present and past medical history, social history of the subjects was recorded.
  - All subjects were assessed on ASD Social Skills profile; pre and post intervention.

The participants were subjected daily to therapy; under the supervision of therapist and also were advised home therapy program. Prescribed exercise session was of 45 minutes duration.

**Outcome Measures:**
- ASD Social Skills profile

**Therapy Protocol:**
- The subjects were given daily Occupational Therapy intervention for 45 minutes. Therapy was based on principles of Neuro-developmental approach, sensory integration theory (6), cognitive behavioural treatment approach.(5)
- The therapy also focussed on behavioural techniques likes conditioning, reward based reinforcement strategies and social skills training.
- Protocol was inclusive of Group sessions thrice in a week.
- Group used was a developmental group.
- The groups were parallel group, project group, ego centric group, mature cooperative group.
- Each session comprised of sensory integration therapy inclusive of sensory activities according to child’s demands.
- Group activities were inclusive of (1,2,4)
  - Greeting others in a group
  - Taking turns
  - Peer training
  - Play/interaction-focused interventions. These approaches uses interactions between children and parents or researchers to affect outcomes such as
imitation or joint attention skills or the ability of the child to engage in symbolic play.

- Interventions focused on behaviours commonly associated with ASD. These approaches attempted to ameliorate symptoms such as anger or anxiety, often present in children with ASD, using techniques such as Cognitive Behavioural Therapy (CBT) and parent training focused on challenging behaviours.\(^{(3)}\)

### RESULTS AND TABLES

**Statistical Analysis:**

The data was statistically analysed using the following tests of significance.

**Statistical method used:**

Statistical analysis was done using SPSS windows version 18.

Paired ‘t’ Test was used to find out statistical significance of difference in ASD social Skills profile mean scores; pre & post intervention. The formula used was

\[
\text{Mean difference of } X = \frac{\Sigma X}{n} \\
\text{SD} = \sqrt{\frac{\Sigma(x-x)^2}{n-1}} \\
\text{SE difference} = \frac{\text{SD}}{\sqrt{n}} \\
t = \frac{X}{\text{SE}} \\
X = \text{Mean of the difference} \\
\text{SD} = \text{Standard deviation} \\
\text{SE} = \text{Standard error} \\
n = \text{Sample size}
\]

The mean age of the study population was 7.22 years with standard deviation of 0.83, the population was inclusive of 2 female & 7 male participants.

**Table 1: Mean & Standard deviation of Age**

<table>
<thead>
<tr>
<th>Age (in years)</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>7.22</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>0.83</td>
</tr>
<tr>
<td>Minimum</td>
<td>6</td>
</tr>
<tr>
<td>Maximum</td>
<td>8</td>
</tr>
</tbody>
</table>

**Table 2: Gender wise distribution of sample**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-8 Years</td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Mean Pre intervention Score on ASD SSP</th>
<th>Mean Post intervention Score on ASD SSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject 1</td>
<td>83</td>
<td>88</td>
</tr>
<tr>
<td>Subject 2</td>
<td>98</td>
<td>104</td>
</tr>
<tr>
<td>Subject 3</td>
<td>103</td>
<td>109</td>
</tr>
<tr>
<td>Subject 4</td>
<td>84</td>
<td>88</td>
</tr>
<tr>
<td>Subject 5</td>
<td>99</td>
<td>104</td>
</tr>
<tr>
<td>Subject 6</td>
<td>89</td>
<td>94</td>
</tr>
<tr>
<td>Subject 7</td>
<td>101</td>
<td>108</td>
</tr>
<tr>
<td>Subject 8</td>
<td>86</td>
<td>90</td>
</tr>
<tr>
<td>Subject 9</td>
<td>82</td>
<td>87</td>
</tr>
<tr>
<td>Total (Mean)</td>
<td>91.67</td>
<td>96.88</td>
</tr>
</tbody>
</table>

**Table 4. Mean percentage Scores on ASD SSP (Pre and Post Intervention)**

<table>
<thead>
<tr>
<th></th>
<th>Mean percentage Scores on ASD SSP (Pre Intervention)</th>
<th>Mean percentage Scores on ASD SSP (Post Intervention)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject 1</td>
<td>42.3</td>
<td>44.89</td>
</tr>
<tr>
<td>Subject 2</td>
<td>50</td>
<td>53.06</td>
</tr>
<tr>
<td>Subject 3</td>
<td>52.6</td>
<td>55.61</td>
</tr>
<tr>
<td>Subject 4</td>
<td>42.85</td>
<td>44.89</td>
</tr>
<tr>
<td>Subject 5</td>
<td>50.51</td>
<td>53.06</td>
</tr>
<tr>
<td>Subject 6</td>
<td>45.4</td>
<td>47.95</td>
</tr>
<tr>
<td>Subject 7</td>
<td>51.53</td>
<td>55.1</td>
</tr>
<tr>
<td>Subject 8</td>
<td>43.87</td>
<td>45.91</td>
</tr>
<tr>
<td>Subject 9</td>
<td>41.83</td>
<td>44.38</td>
</tr>
</tbody>
</table>

### DISCUSSION

The results of the study could be discussed on the basis of statistical analysis of data. The sample was inclusive of 7 males and 2 females. Due to lesser number of females as compared to males in the sample, their scores were not compared statistically.

As per the data analysed using paired ‘t’ test, there was increase in mean ASD Social skills profile score from baseline \((91.67 \pm 0.97)\) to 8 week \((96.88 \pm 0.97)\). This difference was found to be statistically significant at \(P<0.01\). These results were similar to a
study, titled “Outcome-Based Evaluation of a Social Skills Program Using Art Therapy and Group Therapy for Children on the Autism Spectrum disorder.”

In the test Group, Subject 7 showed the maximum increase in the mean scores of ASD Social Skills profile. There was increase in the score from 101 to 108, (7 units) post intervention. The subject showed a positive change in social interaction skills in terms of ability to greet others in the group, asking question to request information about a person &/or topic, expressing sympathy for others, offering assistance to others etc.

On the contrary, Subject 4 & Subject 8 showed the least improvement in the mean scores of ASD Social Skills profile. The increase was of 4 units. This can be attributed to the fact that these subjects were more comfortable in one to one interaction sessions as compared to large Group interaction sessions where they felt left out.

Subject 2 showed overall increase in the ASD Social Skills Profile Scores with intervention but there was increase in the hyperactivity and aggression during group session which got reflected as negative peer interaction. This can be attributed to the fact that this subject could not cope with the excessive demands of the group activity resulting in increased impulsivity. These findings are similar to a study conducted by Jeffrey J. Wood and Kenneth D. Gadow in 2010 on ‘Exploring the Nature and Function of Anxiety in Youth with Autism Spectrum Disorders’ which suggested that anxiety may play at least three roles: (a) a downstream consequence of ASD symptoms (e.g., via stress generation through social rejection); (b) a moderator of ASD symptom severity, such that certain core autism symptoms like social skill deficits and repetitive behaviours may be exacerbated by anxiety; and (c) as a proxy of core ASD symptoms.

CONCLUSION

Despite the pervasive socialization deficits in children with ASD and the negative impact that such deficits have on other aspects of development, we know relatively little about efficacious psychosocial intervention approaches. Unfortunately, only preliminary evidence is available regarding the efficacy of structured curricula and specific treatment strategies. Group based SST is an under-studied, but worthy, candidate for further development and testing.

On the basis of above interpretations, it can be concluded that there was improvement in Social interaction skills with OT intervention inclusive of Group therapy in the selected study population.

Limitation

- Small sample size
- Limited study duration
- No gender wise comparison was done.

Further Recommendation

A more extensive study can be conducted on a larger sample with longer therapy duration. Also, Abnormal behaviours and anxiety can be considered as one of the outcome measures in further studies conducted on similar study sample.

Acknowledgement:

- I would like to acknowledge my gratitude to Priya Cibi; Centre Head, Vasant Vihar Counselling Centre, Thane for granting me permission to carry out this study.
- I would also like to express my gratitude to all the subjects and their parents for their utmost co-operation & sincerity in following the prescribed programme.

Ethical Clearance: Informed consent was taken from the parents of all subjects.

Conflict of Interest: Nil

Source of Funding: Self

Abbreviations:

ASD: Autism Spectrum Disorder
SI: Sensory Integration
ASD AS: Autism Spectrum Disorder Assessment scale
ASD SSP: Autism Spectrum Disorder Social skills profile

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Adding Visual and Proprioceptive Exercises to Dizziness Caused by BPPV: A Randomized Clinical Trial

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ABSTRACT

Background: The most common cause of dizziness in elderly is benign paroxysmal positional vertigo (BPPV). Accounting for 26% of all dizziness, The incidence of dizziness of BPPV increases with each decade. Benign paroxysmal positional vertigo (BPPV), is a common vertigo disorder in which otoconia, Normally adherent to the utricle become displaced into semicircular canals (Lanska and Remler, 1997).

It can be clear from the semicircular canals by canalith repositioning resolving the dizziness (White et al), ideally whatever the maneuver is applied several times in the course of the treatment sessions, it is possible to have recurrence which approach 50% over 1-2 years (Beyan et al, 2000).

Objective: The objective of the study is to find the addition of visual and proprioceptive exercises will show the variation in dizziness caused by BPPV.

Method: 20 subjects were divided into 2 groups Group A control group was received the Brandt daroff exercises Group B experimental group was received the Brandt daroff exercises +visual and proprioceptive exercises. After that patient received design treatment protocol for seven days. And after that all subject has to outcome measure with dizziness handicap inventory 20 subjects were taken both males and females it mean age group A and group B is 48.2 and 46.5

And pre and post treatment scores were measured by using DHI and Berg balance scale. The total duration of study was 9 weeks, 5 session per week

Results: The mean and standard deviation of DHI and Berg balance scale for group A and Group B was measured. According to independent Sample T-test DHI and Berg balance scale score T-value is 1.214 and 1.422. The results show Group B p-value was significant at 95% confidence interval.

Conclusion: The study concluded that adding the visual and proprioceptive exercises along with the brandt daroff exercises is effective in reducing the dizziness and improving the balance.

Keywords: Dizziness, Dizziness Handicap Inventory, Berg Balance Scale, Visual Exercises, Proprioceptive exercises.

INTRODUCTION

The most common cause of dizziness in elderly is benign paroxysmal positional vertigo (BPPV)

Accounting for 26% of all dizziness, The incidence of dizziness of BPPV increases with each decade

Benign paroxysmal positional vertigo (BPPV) is a common vertigo disorder in which otoconia

Normally adherent to the utricle become displaced into semicircular canals (Lanska and Remler, 1997)
It can be clear from the semicircular canals by canalith repositioning resolving the dizziness (white et al), ideally whatever the maneuver is applied several times in the course of the treatment sessions ,it is possible to have recurrence which approach 50 % over 1-2 years (Beyan et al,2000).

The inner ear vesibular system is an important contributor to balance control. The vestibular system is integral to balance control the paired vestibular organs housed within temporal bone include 3 orthogonal semicircular canals and superior and posterior and horizontal and 2 otolith organs (the utricle and saccule) together the semicircular canals and otolith organs provides continuous input to the brain about rotational and translational head motion and the heads orientation relative to gravity, this information from the vestibular organs allows for maintenance of gaze and postural stability via vestibule ocular reflex and vestibule spinal reflex.

NEED OF STUDY

The concept of CNS and vestibular plasticity and compensation forms the physiological rationale for vestibular rehabilitation therapy. The compensatory process of CNS results from active neuronal and neurochemical process in the cerebellum and brainstem in response to sensory conflicts produced by vestibular pathology. This is used in the form of training which is done through accurate adjustive responses to head movements (input) which aim at reinstalling symmetric tonic firing rates in the vestibular nuclei.

It was found in the studies that balance training may be necessary after treating BPPV patients.

Objective of study: The objective of the study is to find the addition of visual and proprioceptive exercises will show the variation in dizziness caused by BPPV.

Null Hypothesis: There will be no effect of by adding the visual and proprioceptive exercises on reducing dizziness caused by BPPV.

Alternate Hypothesis: There will be significant effect of by adding the visual and proprioceptive exercises on reducing dizziness caused by BPPV.

Study design: - A randomized control trial

Study area: Departent of physiotherapy, Dr.D.Y. Patil College of Physiotherapy, Pune, India.

Inclusion criteria:-

- Age group is 18-65
- Both Males and Females
- Able to experiencing symptoms for longer period of 3 months
- Able to transfer from sitting to standing and move independently
- Able to tolerate the exercise.

Exclusive Criteria

- loss of sensation
- Spinal injuries and Perceptual disorders.
- Patients with associated Neurologic disorders
- Patients with musculoskeletal disorders

METHODOLOGY

The study was approved by ethical committee of Dr. D.Y.Patil Vidyapeeth (Pune) and.

All subjects were explained about the study. Informed consent forms were taken. Subjects have evaluated by Neurophysician, and ENT surgeon diagnosed as BPPV and referred to the physiotherapy department were recruited for the study. Patient who had fulfill the inclusion criteria included in the study. Before the treatment patient had an outcome measured with Dizziness handicap inventory, and Berg balance scale.

20 subjects were divided into 2 groups Group A control group was received the Brandt daroff exercises Group B experimental group was received the Brandt daroff exercises +visual and proprioceptive exercises (Table -3). After that patient received design treatment protocol for seven days. And after that all subject has to outcome measure with dizziness handicap inventory.

20 subjects were taken both males and females it mean age group A and group B is 48.2 and 46.5

And pre and post treatment scores were measured by using DHI and Berg balance scale.
The total duration of study was 9 weeks, 5 session per week.

The SPSS 15.0 statistical software was used to analyse the outcome measures DHI and Berg Balance Scale. The statistical scale was used Independent T-test

**DISCUSSION**

According to Shumway-cook et al\(^\text{10}\), that the most important sensory trigger for the automatic postural responses in somatosensory inputs and vestibular inputs play an important role.

The patients in the Group B improved their physical performance during gait, they still felt emotionally handicapped.

Lawrence RH et al\(^\text{13,14}\), suggested that improvement of DHI subscale physical, and functional in group A decreased in the risk of falling. It has been shown that both the risk of falling and the fear of falling lead to decreased activity decreased functional status, and greater morbidity, addition of visual and proprioceptive exercises resulted in greater reduction of fall risk in dizziness patients caused by BPPV

This study also observed that factors affecting prognostic score of DHI and Berg balance score were visual and somato sensory inputs

**RESULTS**

The mean and standard deviation of DHI for group A and Group B was measured. The Mean of DHI Scale for Group A and Group B is 0.40 and 6.40. The Standard deviation of DHI scale for Group-A 2.613 and Group-B is 0.828. According to independent Sample T-test DHI T- value is 1.214. The results show Group A p-value 0.255 was not significant at 95% confidence interval and Group B shows that p-value was significant at 0.003. (Table -1)

The mean and standard deviation of berg balance scale score for group A and Group B was measured. The Mean of Berg balance Scale for Group A and Group B is 0.84 and 4.48. The Standard deviation of DHI scale for Group-A 0.982 and Group-B is 1.613. According to independent Sample T-test Berg balance score T- value is 1.422. The results show Group A p-value 0.455 was not significant at 95% confidence interval and Group B shows that p-value was significant at 0.004.The results show that is relation between the dizziness and balance (Table 2)

**Limitations of the study**

1. The scale was subjectively objective tool.
2. Patient not attends continually for the total duration of treatment.
3. Study is small

**Table -1 : Pre and Post score measured by using the Dizziness Handicap Scale**

**Independent Sample T-Test of Group A and Group B -**

<table>
<thead>
<tr>
<th>GROUP</th>
<th>n</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>Mean Difference</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brandt Daroff Exercise (Group A)</td>
<td>10</td>
<td>0.40</td>
<td>0.828</td>
<td>0.214</td>
<td>-0.533</td>
<td>1.214</td>
<td>0.255</td>
</tr>
<tr>
<td>Brandt Daroff Exercises + Visual and Proprioceptive exercises (Group B)</td>
<td>10</td>
<td>6.40</td>
<td>2.613</td>
<td>0.675</td>
<td>-2.467</td>
<td>1.013</td>
<td>0.003</td>
</tr>
</tbody>
</table>
Table -2 : Pre and Post score measured by using the Berg Balance Score

Independent Sample T-Test of Group A and Group B -

<table>
<thead>
<tr>
<th>GROUP</th>
<th>n</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>Mean Difference</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brandt Daroff Exercise (Group A)</td>
<td>10</td>
<td>0.84</td>
<td>0.982</td>
<td>0.214</td>
<td>-2.533</td>
<td>3.214</td>
<td>0.455</td>
</tr>
<tr>
<td>Brandt Daroff Exercises + Visual and Proprioceptive exercises (Group B)</td>
<td>10</td>
<td>4.48</td>
<td>1.613</td>
<td>0.675</td>
<td>-2.467</td>
<td>1.013</td>
<td>0.004</td>
</tr>
</tbody>
</table>

Table -3: Group A received: Brandt daroff exercises

Group B received: Brandt daroff exercises in Addition with Visual and proprioceptive exercise includes

1. Close your eyes and imagine a blank back ground 1 time 30 seconds
2. Close your eyes busy back ground checker board 1 time 30 seconds
3. Single leg stance-right side 1 time 30 seconds
4. Single leg stance –left side 1 time 30 seconds
5. Heel and toe raises 1 time 30 seconds
6. Perturbation training 1 time 30 seconds

CONCLUSION

The study concluded that adding the visual and proprioceptive exercises along with the brandt daroff exercises is effective in reducing the dizziness and improving the balance. This study shows that there was improvement in physical and functional vestibular symptoms in DHI subscale is improved. And also there was improvement in balance by using the berg balance scale

So this study conclude that there is a relationship between the dizziness and balance

Hence the null hypotheses was rejected and alternate hypotheses was accepted

Funding: Self-Funding

Ethics Committee: Dr.D.Y.Patil Vidyapeeth, Pune,

Conflict of Interest: None

Acknowledgement: Nil

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14. Lawson Carol A. Foster a Annand Ponnapan b Kathleen Zaccaro c: A Comparison of Two Home Exercises for Benign Positional Vertigo: Half Somersault versus Epley Maneuver (Departments of a Otolaryngology and Audiology, University of Colorado Denver, Aurora, Colo, USA)

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Effect of Exercises in the Management of Dizziness: A Pilot Study

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²Director, School of Physiotherapy, RK University, Rajkot, Gujarat, India

ABSTRACT

Background: Dizziness is one of the geriatric problems. According to studies, thirty percent of older population suffers with dizziness and this percentage will increases at the age of 65 years. For physicians dizziness became challenge as it is associated with multiple causes. According to National Institutes of Health 54% of people experience feeling dizzy at least once during life time.

Objective: The objective of the study is to find the variation in dizziness using the exercise protocol in the patients with dizziness.

Methods: 7 subjects were taken both males and females in it mean age group is 53.2 and by using DHI scale all the 7 patients pre score is taken i.e 50.80. All subjects were explained about the study. Informed consent forms had sign. Subjects were examined thoroughly with assessment format. Assessment format is given in the annexure. Patients had evaluated by Neurophysician, and ENT Surgeon ,Hall pike Dix test, caloric test, postural nystagmography, Dizziness handicap inventory(DHI). Patient who had fulfill any three inclusion criteria included in the study. Before the treatment patient had an outcome measured with Dizziness handicap inventory, and Hall pike dix test. After that patient received design treatment protocol for seven days. And after that all subject has to outcome measure with dizziness handicap inventory, and Hall pike dix test.

Results: The mean value of the subject age group is 53.2 , and the mean value of pre treatment and post treatment of Dizziness score by using the DHI is 48.00 and 38.14 when this values are statistically analyzed by using the Wilcoxon signed ranks test the Table value shows i.e T value is 2.7831 and p value is 0.018.

Conclusion: Patient with dizziness shows significant improvement post exercise protocol. Hence the null hypothesis is rejected and Alternate hypothesis is accepted.

Keywords: Dizziness, DHI(Dizziness Handicap Inventory), Physiotherapy, Exercise Protocol, Pilot Study.

INTRODUCTION

The brain coordinates information from the eye, the inner ear, and the body’s senses to maintain balance. If any of these information sources is disrupted, the brain may not be able to compensate, Which results in dizziness. Dizziness is one of the geriatric problem.According to studies, thirty percent of older populations suffer with dizziness and this percentage will increases at the age of 85 years. For physicians dizziness for older age group became challenge as it is associated with multicausal. The vestibular system is integral to balance control. The paired vestibular organs, housed within the temporal bone, include 3 orthogonal semicircular canals (superior, posterior, and horizontal) and 2 otolith organs (utricle and saccule). Together, the semicircular canals and otolith organs provides continues input to the brain about rotational and
translationl head motion and the head’s orientation relative to the gravity. This information from the vestibular organs and their central pathways allows for the maintenance of gaze and postural stability via the vestibular ocular reflex and vestibulo spinal reflex, respectively.

Otologic dizziness is the most common type of dizziness in the elderly. This is mainly due to an increased tendency for the elderly to develop benign paroxysmal positional vertigo (BPPV).

There is also a gradual deterioration of inner ear function with age, causing as many of 5% of unsteady older persons to have bilateral vestibular weakness. An attempt to model this process can be found here.

**NEED OF STUDY**

The Indian aged population is currently the second largest in the world. The absolute number of the over 60 population in India will increase from 76 million in 2001 to 137 million by 2021. From 5.4 percent in 1951, the proportion of 60+ people grew to 6.4 per cent in 1981 and is projected to be close to 8.1 percent in 2001. The decadal percent growth in the elderly population for the period 1991-2001 would be close to 40, more than double the rate of increase for the general population.

Dizziness is one of the geriatric problems. According to studies, thirty percent of older population suffers with dizziness and this percentage will increases at the age of 65 years. For physicians dizziness became challenge as it is associated with multiple causes.

According to National Institutes of Health 54% of people experience feeling dizzy at least once during life time.

**Objective of study** : The objective of the study is to find the variation in dizziness using the exercise protocol in the patients with dizziness.

**Null Hypothesis** : There will be no effect of exercise protocol on reducing dizziness assessed by using the Dizziness Handicap Inventory (DHI).

**Alternate Hypothesis** : There will be significant effect of reducing dizziness by using exercise protocol assessed by using the Dizziness Handicap Inventory (DHI).

**Study design**: Pilot study

**Study area**: Department of physiotherapy, Dr.D.Y.Patil College of Physiotherapy, Pune, India.

**Inclusion criteria**:-
- Age group is 18-65
- Both Males and Females
- Able to experiencing symptoms for longer period of 3 months
- Able to transfer from sitting to standing and move independently
- Able to tolerate the exercise.

**Exclusive Criteria**
- loss of sensation
- Spinal injuries and Perceptual disorders
- Patients with associated Neurologic disorders
- Patients with musculoskeletal disorders

**METHODOLOGY**:

7 subjects were taken both males and females in it mean age group is 53.2 and by using DHI scale all the 7 patients pre score is taken i.e 50.80. The DHI sub components like physical, emotional, functional were assessed by using the statistical t-test. And the Pre and Post values of DHI total score is assessed by using the Wilcoxon signed ranks test.

All subjects were explained about the study. Informed consent forms had sign. Subjects were examined thoroughly with assessment format. Assessment format is given in the annexure.

Patients had evaluated by Neurophysician, and ENT Surgeon, and Dizziness handicap inventory (DHI). Patient who had fulfill the inclusion criteria included in the study. Before the treatment patient had an outcome measured with Dizziness handicap inventory, and Hall pike dix test. After that patient received design treatment protocol for seven days. And after that all subject has to outcome measure with dizziness handicap inventory.

In the procedure Firstly the patient had assessed the pre treatment score by using the DHI

Immediately exercise protocol designed on the
Visual, Vestibular, Proprioceptive Components (Table -4) are included in the exercises, this exercises were given on daily basis to all the 7 subjects (as shown in annexure) exercise protocol is given. After completion of 7 days of treatment all the subjects were post assessed by using the DHI score and it has been noted.

**DISCUSSION**

According to Kerbs that the gaze stabilization exercises are especially appropriate for the patients with bilateral vestibular loss. According to Shumway-cook etal\(^\text{10}\), That the most important sensory trigger for the automatic postural responses in somatosensory inputs and vestibular inputs play an important role. Based on this above authors article evidences in our exercise protocol also had included the gaze exercises, and somato sensory exercise exercises and also the strengthening exercises. In this study it has observed that the pre treatment and post treatment values of DHI for the subject 1 is 60 and 36. when compare to the other subjects It shows the Subject 1 has practiced more times /day.

**RESULTS**

The mean value of the subject age group is 53.2 (Table I) and the mean value of pre treatment and posttreatment of Dizziness score by using the DHI is 48.00 and 38.14 when this values are statistically analyzed by using the Wilcoxon signed ranks test the table value shows i.e T value is 2.7831 and p value is 0.018. (Table -2)

Hence the subcomponents of DHI i.e physical, emotional and functional when measured by using the t-test the pre treatment values are 13.80, 12.20,14.20 and post treatment values are 16.00, 15.00 and 19.80 (Table-3).when this values were analysed by using the statistical test t-test. By observing the difference of mean values of DHI and DHI table value which statistically Analyzed shows a significant difference.

**Limitations of the study**

1. Patients is not Co-operative.
2. Time duration is less.
3. Patient not attend continually for the total duration of treatment.
4. Study is small and it is only pilot study

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Age</th>
<th>Gender</th>
<th>Height cm</th>
<th>Weight (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>47</td>
<td>M</td>
<td>158</td>
<td>82</td>
</tr>
<tr>
<td>2</td>
<td>52</td>
<td>M</td>
<td>160</td>
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<td>M</td>
<td>162</td>
<td>80</td>
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<td>4</td>
<td>51</td>
<td>M</td>
<td>158</td>
<td>76</td>
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<td>F</td>
<td>154</td>
<td>78</td>
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<tr>
<td>7</td>
<td>57</td>
<td>M</td>
<td>163</td>
<td>76</td>
</tr>
</tbody>
</table>

**Table 2: Patients with dizziness shown significant change in pre and post of DHI outcome measure.**

<table>
<thead>
<tr>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
<th>T-Value</th>
<th>p-Value</th>
<th>Result</th>
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<tbody>
<tr>
<td>Pre –Post Score</td>
<td>Negative Ranks</td>
<td>7</td>
<td>4.00</td>
<td>28</td>
<td>Z=2.371</td>
</tr>
<tr>
<td>Positive Ranks</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ties</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CONCLUSION

The research pilot study was conducted to investigate how exercise therapy affects on dizziness with diagnosed bppv patients, the exercises was designed based on the visual, vestibular and proprioceptive components, hence the result of the study shows there is difference in reducing DHI score (i.e 48.00 to 38.14), hence the null hypothesis was rejected and alternate hypothesis was accepted.

Funding : Self Funding

Ethics Committee: Dr.D.Y.Patil Vidyapeeth, Pune Approved

Conflict of Interest : None

Acknowledgement : Nil

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7. **Material and Methods.**
8. **Findings.**
9. **Discussion / Conclusion.**
10. **Acknowledgement.**
11. **Conflict of Interest.**
12. **Source of Support.**
13. **References in Vancouver style.**
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