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Original Article

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Effect of Menopause on Balance Score

Sumit Kalra*, Nidhi Kalra*

Abstract

Background: Menopause leads to a group of disorders affecting many physiological systems. This may increase risk of injury and poor quality of life of a female. Females have greater risks of injury rate than male counterparts and effect of menopause of females musculoskeletal system is evident. The aim of the study is to check whether any significant effect of menopause on balance score of a female. *Methodology*: 80 females participated in this study out of which 40 females were having their regular menstrual cycle and 40 females have reached to menopause. All females were between the age of 40-46 years and with normal BMI as per WHO i.e., between 18.5-24.9. Balance score was calculated using star excursion balance test and time up and go test. *Result:* Both the test concludes that balance score is significantly affected in females having menopause.

Keywords: Menopause; Musculoskeletal System; Menstrual Cycle.

Introduction

The menopause marks a major life transition for women, an end to the childbearing years and the cessation of the menses. For some it can be an ill-defined concept associated with fear, loss, and sinister connotations, while for others it can be a welcome end to menstruation and the fear of unwanted pregnancy. Many premenopausal women have concerns that they will experience mental instability, sudden signs of aging, and diminution of sexuality at this time.

Unfortunately, the menopause is also an ill-defined concept for many medical practitioners. The World Health Organization defines menopause as the cessation of the menses for 1 year.

In fact, the term perimenopause, which is the time beginning immediately before the cessation of the menses and ending when the menses have been absent for 1 year, may be a more useful concept both for women and their practitioners. However, even many years before this stage, subtle changes in the female reproductive cycle may be noticeable. This is suggested by factors such as declining fertility with increasing maternal age, shortening of the follicular phase of the menstrual cycle, long cycles, and change in the pattern of menstrual bleeding. Although these normal changes may not be detectable by blood hormone measurements, they may be worrying for some women and warrant information sharing and explanation. Women are more likely to experience mood and anxiety symptoms during the years preceding the cessation of the menses than they are after menstruation has ceased [1].

Bone loss increases after menopause. However, bone strength also depends on structural characteristics such as bone size. Whether bone size increases as a result of periosteal apposition and whether a strength index accounting for both bone density and bone size might predict the risk of fracture better than bone density alone are unclear [2].

Incidence of falls increases with advancing age. Most of the elderly persons who fall, experience complications like fractures, soft tissue injuries, limited mobility and fear of falling, all of which avert independence and quality of life prevention programs for falls require identifying the risk factors of falls. Falls are related to numerous risk factors and fall risk is directly proportional to the number of the risk factors present [3].

Postural imbalance is a major risk factor for falls. Nguyen et al., found that bone mineral density,

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postural sway and quadriceps strength were the important indicators of falls. Lord et al., showed that eyes closed postural sway, reaction time; lower limb proprioception and strength of ankle dorsiflexors were significantly divergent between multiple fallers and non-fallers. Wolfson et al, reported that the decline in balance ability in the elderly was most probably related to loss of strength in lower extremity and decline in sensorimotor functions [4, 5, 6].

Body weight reproductive factors [7] and life style factors are considered to affect age at natural menopause. Many studies which examine the relationship between body weight and the age at menopause, however, are of a cross-sectional nature. Therefore, caution is necessary when drawing any conclusion concerning cause effect relationships and a prospective study is needed to elucidate the cause effect relationships between body weight and age at menopause [2, 7].

When women were classified into three groups based on BMI at age 40 or 41, the age at menopause in those women in the upper 25% was significantly higher than in those in the lower 25%. Throughout the premenopausal period, only the trend in BMI in late menopausal women shifted upward compared to that in early menopausal women. These results confirm that BMI is related to age at menopause and clarify that the greater the BMI, the later the age at menopause [7].

Study done by Sundeep Khosla et al, concludes that the use of high-resolution 3-D pQCT imaging for analyses of bone microstructure in population studies and potentially for the clinical assessment of fracture risk. They find that, relative to women, men begin adult life with better trabecular microstructure and have less micro-structural damage with aging. Collectively, these findings may help explain the lower life-long risk of fractures in men, and specifically, their virtual immunity to age-related increases in wrist (Colles') fractures [8].

It has been seen that females do have more chances of fall than their male counterparts and this fall may increase post menopause therefore this study helps us to find that does balance gets significantly affected due to menopause among females.

Menopause occurs in most women around the age of fifty. During this period the end of ovulatory function occurs, with decreased estrogen production. The faster the ovarian failure, the higher the possibility of installing severe menopausal syndrome, which is well characterized after surgical castration [8, 9].

Methodology

Sample Size: 80 females

Inclusion Criteria

- Women of age between 40-46 years
- Females having normal menstrual cycle or menopause
- BMI betwee18.5–24.9
- Normal ROM of hip knee and ankle joint

Exclusion Criteria

- Any history of recent trauma in last 3 months to lower extremity
- Female on hormonal therapy
- Any diagnosed case of psychological / neurological / dermatological disorder
- Vestibular pathologies /infections

Instruments and Tool Used

- Measuring tape
- Protractor
- Chalk
- Measuring ruler
- Foot ball
- Chair

Procedure

120 females were contacted out of which 80 females were fulfilling inclusion criteria, they were included on the study.

Group-A: 40 females with menopause

Group-B: 40 females with regular menstrual cycle

Subjects were allocated in the groups as per set criteria and on first cum first basis. To maintain the baseline, both the groups were having same number of subjects.

After explanation of procedure of study, written consent was taken from each subject. Subjects were made aware about procedure of balance testing (star excursion balance test, time up and go test) and they were asked to kick the ball kept in front as this leg will be considered for movement in SEBT and data was collected for both the balance test procedures with at least 15 minutes gap between the two procedures.

Data was analyzed using unpaired t test for SEBT test for both the groups and time up and go test.

Table 1: Comparison of SEBT scores using t test

Groups	n	Mean (in cm)	SD	t-value	P-value
Group A females with menopause	40	349	55.44	7.714	000*
Group B females with regular menstrual cycle	40	450	69.77		

Table 2:

Groups	n	Mean (in cm)	SD	t value
Group A females with menopause	40	.1518	00688	10.042**
Group B females with regular menstrual cycle	40	.1059	00741	

Discussion

The study compares the balance between two groups of females. One group is having normal menstrual cycle and the other group females are suffering from menopause. Star excursion balance test and time up and go test were used to analyze the balance score of females of both the groups. The present study suggests that females who have reached menopause are having significant difference in their balance score when compared with females having normal menstrual cycles.

Postural imbalance or body sway, apart from proprioceptive regulating mechanisms is also the function of central nervous system in terms of vestibule- cerebellar activity. So higher adiposity, which increases aromatase activity and subsequently boosts the conversion of androgens and estrogens could contribute to abnormal activation of the hypothalamic pituitary-gonadotropin axis of the central nervous system [5].

Ayse Guler Okyay et al (January 2014) did a study on rats to demonstrate the biomechanical changes in rat bones occurred by surgical menopause and to search for correlation between biomechanical test results and bone mineral density (BMD) measurements. Which is concluded that bone quality was deteriorated and fragility was increased in rats, 6 months after surgical menopause? Sole BMD measurement might not be reliable in evaluation of osteoporosis and fracture risk. Biomechanical quality of bone is more important than its mineral content in determining fragility. That can be the reason for decrease in balance score of females having menopause.

Frequency of falls in middle–late age groups is higher in women than in men [4]. Increased tendency to fall in elderly persons is related to decrease postural stability and is believed to be a result of impaired general health status [1]. Decreased postural stability is also observed in postmenopausal period. Fall incidence is three times higher in postmenopausal women than in men within the same age group. Estrogen withdrawal in menopause is suggested to avert postural stability via reducing the speed of information processing of the brain [10].

The removal of the ovaries produced systemic alterations, characterized by metabolic changes that caused weight gain and changes in bone tissue, associated with alteration of the mechanical profile and reduced bone mass.

When a woman's ovaries cease to produce estrogen, however, the receptors in various organs are deprived. This can occur as a result of natural menopause, premature menopause, or surgical removal of the ovaries prior to menopause. The following are some of the effects from loss of estrogen.

Naessen et al [18], showed that postmenopausal women who were taking estrogen pills for long periods had better postural balance than women who were not. This effect of estrogen on postural balance is most probably related to the effects on neuronal transmission in central nervous system. Besides central effects, long-term estrogen replacement therapy protects elements of connective tissue and muscle strength, upgrades quality of life and

emotional state of women and these effects are believed to ameliorate postural balance function indirectly [15, 16].

Hot flashes, Skin dryness and wrinkles, Heart attack, Bone Loss and Osteoporosis, Dryness of the Vagina and Decreased Sexual Sensation, Bladder Infections

All theses thing directly or indirectly may lead to decrease in balance score of a female therefore it may be the reason that females having menopause have low balance score so it is necessary to train females for balance even if they don't show any musculoskeletal symptoms.

Concurrently, in part due to the aging population, the burden of arthritis and musculoskeletal conditions as causes of pain and disability continues to increase. In Australia, these conditions have been identified as the third largest contributor to direct health expenditure (behind cardiovascular disease and neurological disorders) [9].

A low level of vitamin D in serum, which is a common public health problem, is associated with a decrease in muscle strength and physical function [6]. Previous studies demonstrated that increases in muscle strength and decreases in body sway in response to vitamin D might decrease the incidence of falling. As osteoporotic fractures occur due to falling, vitamin D could decrease the risk of osteoporotic fractures through its positive effects on bones, muscles, and balance [18].

A possible association has been reported between the weakening of the bone structure in osteoporosis patients and the occurrence of some muscular alterations that possibly lead to a change in center of gravity, which might result in loss of balance, falling, and fractures [19].

As menopause is there females have tendency to increase weight which lead to balance deficiency so females are to be encourage to maintain their weight among normal BMI though the present study concluded that female will be effected with decrease in balance score as soon as they reach menopause.

Independent individuals will also experience decline in physical capabilities and functions as their age advances, so the target population of rehabilitation should also be individuals at younger age group.

Therefore, the vitamin D levels should be kept in mind for physical therapy modalities and vitamin D treatment approaches, especially in postmenopausal osteoporosis patients suffering from balance problems who receive traditional physical therapy management. The risk of falling should be assessed in postmenopausal females with osteoporosis by inexpensive and easily performed techniques such as measurement of back extensor, hip flexor, foot flexor, and extensor muscle strengths and lumbar ROM. The findings presented here also suggest that bone mineral density, vitamin D levels, balance, lumbar ROM, and muscle strengths are factors that affect quality of life.

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Original Article

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Efficacy of Myofascial Release and Conventional Physiotherapy in the Treatment of Myofascial Trigger Points in Patients with Cervical Radiculopathy: A Randomized Clinical Trial Protocol

Ritika Sambyal*, Monika Moitra, Asir John Samuel***, Senthil P. Kumar******

Abstract

Background: Neck pain with cervical radiculopathy (CR), nowadays, is usually confronted in physiotherapy clinics and hospitals. The prevalence of trigger points is more in patients with CR. So many studies have been done on the treatment of CR as well as myofascial trigger points (MTrPs) so far, but none focuses on the treatment of trigger points in CR. Myofascial release (MFR) is considered to be effective in resolution of MTrPs. *Objective:* To compare the effect of MFR along with conventional physiotherapy and conventional physiotherapy alone in patients with myofascial trigger points in cervical radiculopathy. *Methods:* 30 patients will be randomized into two groups according to the inclusion criteria. Group A (experimental, n=15) will be given MFR along with conventional physiotherapy; Group B (control group, n = 15) will be given conventional physiotherapy alone. Intervention will be given for 3 weeks and then reassessment will be done for the efficacy of MFR on Neck disability index (NDI), pain intensity, pressure pain threshold (PPT) on upper trapezius and upper limb neurodynamic test for median nerve (ULNT 1). *Data analysis and Result:* Shapiro–wilk test will be used for normality distribution of data and accordingly wilcoxon test or paired t-test will be used within the group and independent t-test or Mann whitney U-test will be used in between the groups for data analysis. Results will be expressed as mean±standard deviation. *Conclusion:* This study will contribute towards evidence based practice and help in determining if MFR and conventional physiotherapy will be better than conventional physiotherapy alone in treatment of MTrps in patients with CR.

Keywords: Cervical Radiculopathy; Myofascial Trigger Points and Manual Therapy.

Introduction

The average annual occurrence of cervical radiculopathy is 83.2 per 100,000 population.[1,2] Clinically, cervical radiculopathy presents as the neck and shoulder pain extending with a tingling, numbness and paraesthesia along the dermatomal pattern of one or both upper extremities [3, 4, 5]. The other symptoms include diminished reflexes and myotomal weakness [3].

All the existing treatments of cervical radiculopathy focus only on relieving pain and centralizing the radicular symptoms rather than on muscle dysfunction. But in cervical radiculopathy about 90 percent of patients complained of pain in neck and rhomboid region. In one fifth of the patients anterior chest pain was present [6].

Also, in patients with spinal neck pain and cervical radiculopathy myofascial trigger points are the frequently encountered entity[7,8]. The prevalence of trigger points are seen in certain muscles due to cervical disc lesions at specific levels [9]. In cervical radiculopathy increased number of trigger points (tender points) are seen on the involved side with predisposition towards muscles innervated by that nerve root [10]. Also as postulated by Gunn, myofascial pain is caused by spondylotic radiculopathies [11].

The various complementary physiotherapy treatments for trigger points or myofascial pain include dry needling,[12,13,14] acupuncture,[15] ultrasound,[15] biofeedback,[15] laser,[15,16] spray and stretch,[12,17,18] trigger point injection,[12,17]

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cold and heat therapy,[18] transcutaneous electrical nerve stimulation,[12,18] interferential therapy[18] and manual therapy[14,18] including compression,[18] stretching,[15] transverse friction massage,[15] muscle energy technique,[12,19] positional release technique[12] and myofascial release therapy [12,18,19].

Three studies have been found which concluded that trigger points are predominantly present on the side of radiculopathy[8,9,10]. MFR is considered to be effective in treating the MTrPs [12,18,19]. A study has been done to know the effect of gross MFR of upper limb and neck on pain and function in subjects with mechanical neck pain with upper limb radiculopathy which concluded that gross MFR is effective in reducing mechanical neck pain and in improving functional abilities [20] .

The patients of cervical radiculopathy have multiple trigger points with predominance to the side of radiculopathy[7,9,10]. Although many interventions are accepted for cervical radiculopathy,[2, 4, 21-24] substantial evidence regarding effect of MFR on treating trigger points in patients with cervical radiculopathy is lacking.

Aim of study is to determine the efficacy of MFR in patients with MTrPs in CR and to compare the effect of MFR along with conventional physiotherapy and conventional physiotherapy alone in decreasing neck disability, pain intensity, pressure pain threshold on upper trapezius and ULNT 1 in patients with myofascial trigger points in cervical radiculopathy.

Methodology

Study Design

A Randomized Clinical Trial

Ethical Clearance

The study was ethically approved by the institutional research ethics committee at Maharishi Markandeshwar Institute of Physiotherapy and Rehabilitation (MMIPR), Mullana (Ambala) Haryana; India

Study Setting

The study will be conducted at inpatient department of MM Hospital, Mullana (Ambala), Haryana; India.

Study Location

The source of data for this study will be Maharishi Markandeshwar Institute of Physiotherapy and Rehabilitation, Mullana (Ambala) Haryana; India.

Sampling

Criteria based purposive sampling

Sample Size

Sample size is estimated by the following formula[25]

$$N = \frac{2(Z\alpha+Z\beta)^2 (\sigma)^2}{(\mu_s - \mu_t - \delta)^2}$$

N = the sample size required in each group

α = Standard deviation of the primary outcome variable = 3

β = MCID value of outcome measure = 7.5

$Z\alpha = 1.96$

$Z\beta = 0.84$

$(\mu_s - \mu_t)$ = assumed effect = 10

$$N = \frac{2(1.96+0.84)^2 (3)^2}{(10 - 7.5)^2}$$

N = 22.579 or 23

This gives the number required in the two groups. Considering the dropout rate, the sample size is increased to 30.

Group A (Experimental group): 15 patients will be randomly allocated for MFR in cervical radiculopathy.

Group B (Control group): 15 patients will be randomly allocated for conventional physiotherapy treatment in cervical radiculopathy.

Selection Criteria

Inclusion Criteria

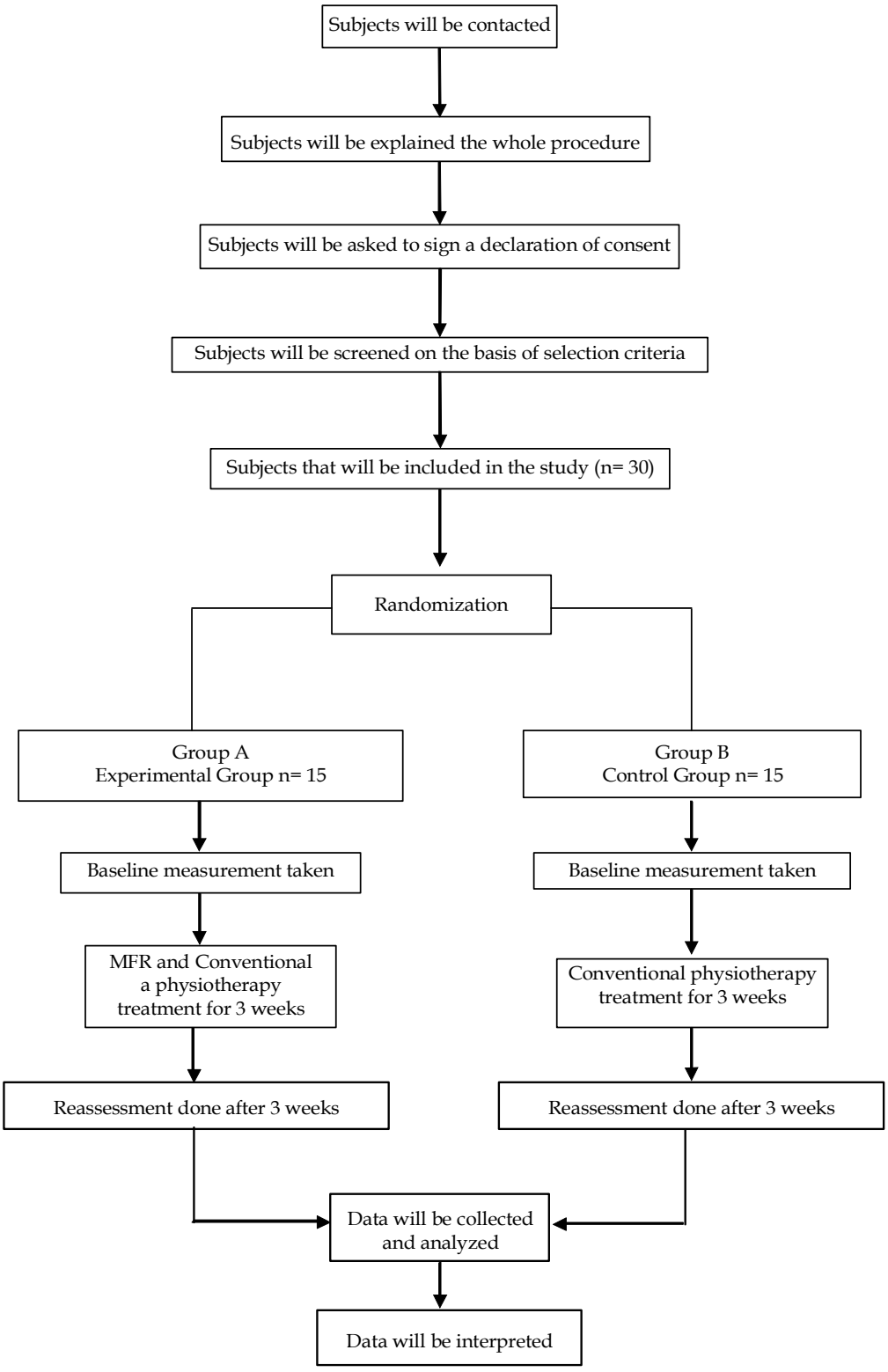
i. Age between 25-45 years
ii. Either males or females
iii. Symptoms positive to cervical radiculopathy
iv. Patients showing positive cervical foraminal compression test (spurling test), manual cervical distraction test, and ULNT 1
v. Trigger points in upper trapezius
vi. Arm pain on Numeric Pain Rating Scale (NPRS) [4-8]

Exclusion Criteria

i. Cervical instability
ii. Vertebral artery insufficiency
iii. Cord compression
iv. Spinal infections
v. Previous spinal injury

Protocol and Procedure

Protocol



vi. Recent motor vehicle accident involving cervical spine
vii. Systemic disease
viii. Severe osteoporosis
ix. History of psychological or physical illness

Variables

Independent variable

MFR

Conventional physiotherapy

Dependent variable

Conceptual

Functional disability

Pain intensity

Operational

Neck disability index

Numeric pain rating scale

Outcome Measures

Primary outcome measure

Neck disability

Secondary outcome measure

- Subjective
  NPRS
- Objective
  ULNT 1

Materials Used for Data Collection

For intervention

Intermittent cervical traction (ICT) {Bio Med Digital Traction; New Delhi}

Moist hot pack (MHP)

Chair

Couch

Pillow

Procedure

Before starting the study process all participants will be familiarized with the study in general and the study aims and objectives. Consent forms will be given to them prior to the study. The patients will be asked to fill the questionnaire. Then the case history will be documented and after doing the first examination treatment will be given.

30 subjects either male or female will be randomly allocated according to the inclusion criteria. They will be divided into two groups, experimental group and control group. The participants will be blind to which group they are enrolled to. Experimental group will receive MFR and conventional physiotherapy treatment for four consecutive days a week and control group will receive conventional physiotherapy treatment for four consecutive days a week. Extended home program will be given for one week followed by modified home program for another one week to both the groups. Reassessment will be done within group and in between both groups after four days, two weeks and three weeks.

Treatment Session

Group A: MFR of upper trapezius in the form of gross stretch followed by focused stretch is given.

Group B: Control group will be given MHP for 10 minutes followed by ICT and strengthening exercises of neck.

Data Analysis

Shapiro–wilk test will be used for normality distribution of data and accordingly wilcoxon test or paired t-test will be used within the group and independent t-test or Mann whitney U-test will be used in between the groups for data analysis.

Statistical analysis will be done by using Statistical package for social sciences (SPSS), version 16 (SPSS Inc. Chicago, IL, USA).

Level of significance will be set as 5 percent ($p<0.05$).

Discussion

Significance and Implication

This study will help to establish MFR as one of the treatment technique in combination with existing treatment techniques for treating MTrPs in patients with CR. This study is in progress and results will be declared in March 2016.

Acknowledgement

The study participants will be acknowledged at the end of the study.

Conflict of Interest

None declared.

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Correlation between the Leisure Time Physical Activity and the Physical Fitness of Normal Individuals Working in the Corporate Sector

Easow Betsy Ann*, Narasimman Swaminathan**

Abstract

This study was conducted to find out the correlation between the physical activity at work and leisure time physical activity of normal individuals working in the corporate sector. A total of 97 employees of various Banks and Institutes in Mangalore were recruited for this. International Physical Activity Questionnaire (IPAQ) was used to measure the physical activity levels and the Rockport One Mile Walk Test was used to measure their physical fitness. The result showed a weak correlation between leisure time physical activity and physical activity at work. It was also found that more than half the study population lacked leisure time physical activity. This study suggests that there should be more awareness programmes to inform the importance of physical activity during leisure time and also steps to encourage activity at work should be taken up.

Keywords: Physical Activity; Physical Fitness; Sedentary Lifestyle.

Background

Good health is an enroute to wellness and in present era it is not illness but wellness that matters. It is required to develop and maintain levels of fitness that are consistent with good health [2]. The physical activity level and the health status of the people of India may not be satisfactory. It is predicted by the end of 2015, India is to become the world's diabetic capital and is expected to suffer enormous income loss of $ 237 billion due to rising tide of chronic diseases – heart disease, stroke, cancer, diabetes and chronic respiratory problems at work place [4]. It is also predicted that by the end of this decade India is expected to have 60% of the world's heart patients and that Indians will have a higher rate of heart diseases and at a younger age [5]. Individuals who are physically active and lead a healthy life are less prevalent for most of the non-communicable diseases [2].

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The economic burden of physical inactivity has cost India a huge burden in the last few decades and even though India being a developing country the Indians are less active in their leisure time than any other ethnic group in the world [4]. Lack of leisure time physical activity and sedentary jobs have been associated with 1.5 – 2.4 fold elevation of Coronary Heart Disease risk and are responsible for 30% of the mortality rate.

Ironically, most of the health anomalies affecting the Indian population are preventable and the progress of the disease can be controlled by increasing the physical activity levels. Physical inactivity is one of the most important risk factor that can be modified at an early age only by understanding the ill effects of physical inactivity and poor fitness [14]. High cardio respiratory fitness levels through regular exercises not only help prevent but also reduces the risk of Coronary Heart Disease (CHD) [15, 16]. Therefore the gravity of the situation demands more awareness and an increase in the body of knowledge in this field.

This gives us a rationale to evaluate the physical fitness of the individuals in sedentary jobs [13]. There is overwhelming evidence from earlier epidemiological prospective studies that physical activity and physical fitness are related [17]. Therefore it is important to evaluate the impact of physical activity at work and leisure time physical activity on the fitness levels of sedentary persons.

The IPAQ was developed for surveillance activities and to guide the development of policies by the Government related to health enhancing physical activity across various domains [5]. The IPAQ has been translated into several languages and validated. It was found to be reliable in 12 countries of the world and can be used for good research studies [19]. It is easy to administer and has a scoring protocol that follows International Guidelines of physical activity score according to the MET's achieved [20].

The cardio respiratory fitness can be quantified by Rockport One Mile Walk Test which is one of best sub maximal test used to predict VO_2max. It provides a valid assessment for estimating maximum oxygen uptake and is considered as one of the best measures of cardiovascular health and fitness [21]. The maximal O_2 uptake is estimated based on sex and the specific prediction models including heart rate at the end of walking, age, time taken and weight of the person [22].

Thus by making use of these 2 very significant and easy outcome measures this study aims at quantifying the physical activity at work and the leisure time physical activity and correlating it with the physical fitness of normal individuals working in the corporate sector. The findings of this study will substantially help to explore the knowledge of the level of physical activity of the individuals working in the corporate sector. According to WHO Online Global Database, in developing countries the differences in physical activity are consistent with less discretionary time available and this demands changes in occupational, transportation and domestic physical activity [5]. Thus the outcome of this study will also provide an additional and valuable data to the Health Professionals and broaden the horizons of its implication in a preventive role.

As has been eloquently pointed out by K. S. Reddy , " an empowered community , an enlightened policy and an energetic coalition of Health Professionals must ensure that the development of (developing countries) is not accompanied by distorted nutrition and distorted health[23]" . Hence the objective of this study was to evaluate the leisure time physical activity and it is correlation with physical fitness of the normal individuals working in the corporate sector including banks.

Materials and Methods

In this cross sectional study ninety seven subjects with in the age of 30 – 45 without cardio respiratory, musculoskeletal and neurological impairment were included for this study through purposive sampling. Subjects with the history of recent hospitalization and under medication for hypertension and diabetes were excluded. All the subjects were able to read English language. Out of the 97 subjects 61 were female while only 36 were males.

All the subjects had sedentary jobs involving sitting for more than 4 -5 hrs as the study population. This study was approved by the institutional ethical committee. Written informed consents were obtained from the participants prior to the commencement of the study.

Data collection started during the mid-week of July and continued upto the 1st week of October .The study was done after 4.30 pm on windless days. Everyday a minimum of 2 subjects completed the walk test. A total of 97 subjects completed the study including 36 males and 61 females. They were requested to sign the consent form as their willingness to participate in the study before the start of the study.

A thorough medical history was taken and brief assessment of the Neurological, Musculo-Skeletal and Cardio-Vascular Systems was done to exclude subjects falling in the exclusion criteria. The subjects were given prior timings for the test and were instructed not to have any substances eg. Tea, coffee, hot water prior to the walk as it could affect the performance of the walk. They were requested to wear comfortable clothing (loose and unrestrictive) and suitable footwear for the walk.

Subjects were asked to fill the International Physical Activity Questionnaire [long form] consisting of 27 questions regarding their physical activity at work, transport, leisure and home in the last 7 days. The IPAQ consists of instructions how to complete the questionnaire and the subjects were allowed to clarify their queries with the researcher while filling it.

The study area selected for the study was a by lane of Father Muller Medical College premises. A distance of 200 meters was measured with ground measuring tape and 2 cones of different colors were placed at the 2 ends. The selected area of study was a level terrain with hard ground surface area. Same starting position was maintained for all subjects.

After filling in the questionnaire the subjects were given specific instructions about the walk. Demographic data was obtained in the Performa which measured specific baseline measurements of height, weight, blood pressure and resting heart rate in standing was taken and noted down. Subjects were given precaution about signs or symptoms of any

distress, breathlessness, palpitations or giddiness during the walk and were instructed to terminate the walk immediately.

The subjects were instructed that they have to cover a distance of 1 mile by walking the distance between the 2 cones 8 times as fast as possible. At the "GO" signal the participants began the walk and the stopwatch was started immediately by the researcher and the researcher was steady at the starting point. Constant motivation was provided to the subject by the researcher and information of the time taken and the laps covered were given when the subject approached the starting point.

On completion of the 1 Mile walk, the heart rate was measured immediately through pulsatory method for complete 60 secs in standing and the stop watch was stopped to the nearest second. The heart rate for the next 1 min, 2 min and after 5 mins respectively were measured and noted down in the post assessment chart. The subjects were made to sit and were made to do deep breathing exercises for cool down for a period of 10 – 15 mins. Any discomfort or distress experienced by the subject was noted down.

The $V0_2$ max was calculated by using the regression equation with other parameters of age, gender and weight from the Pre – Assessment Performa. The heart rate immediately after the walk and the time taken to complete the test were also used in the equation. The body weight measured in kilograms was converted to pounds and gender score of 0 = females and 1= males was put into the regression equation. The calculation was done by the VO_2 max calculator.

Regression Equation

Maximal oxygen uptake in ml per kg per min =132.853 – (0.0769 * body weight in pounds) – [0.3877 * age in years] + [6.315 * (gender score)] – [3.2649 * (time in minutes to walk a mile)] – [0.15655 * (heart rate at end of walk)]

With reference of the IPAQ scoring protocol the physical activity at work and the leisure time physical activity was categorized in High , Moderate and Low groups according to the MET'S achieved during the activity. The data was entered into an Excel sheet and analysis of the required variables was done.

The data of physical activity during work and the leisure time physical activity was correlated with physical fitness and analyzed.

Statistical Analysis

The data of physical activity and fitness were in category namely High, Moderate and Low and therefore the appropriate test selected for the analysis was Chi Square test. This test is a statistical measure used in the context of sampling analysis to make comparisons between theoretical populations and actual data when categories are present. It is also a test of choice when the sample is large.

The data were analyzed using the SPSS – 18 software which is an inbuilt program used for analyzing such a diverse data.

Results

Table 1: Distribution of subjects according to gender

		No. of subjects	Percent
Gender	Female	61	62.9
	Male	36	37.1
	Total	97	100.0

Distribution of subject as per leisure time physical activity

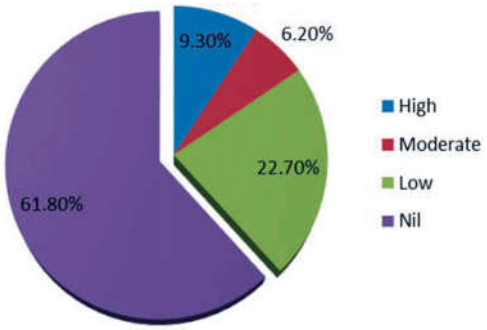
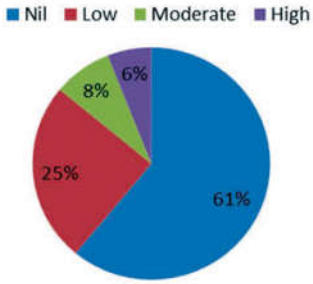


Fig. 1:

Table 2: Distribution of subjects according to Age

	No. of subjects		Percent
AGE (yrs)	30 - 35	34	35.1
	36 - 40	33	34.0
	41 - 45	30	30.9
	Total	97	100.0

Distribution of subject as per physical activity during work



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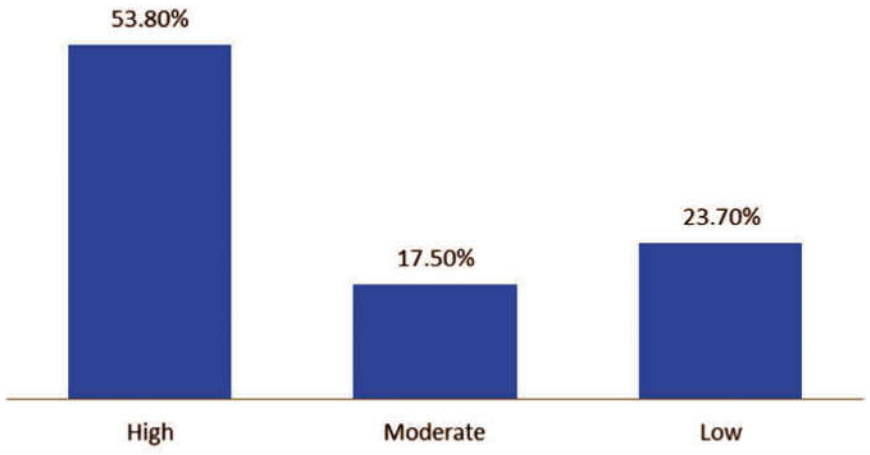

Table 3: Correlation between Physical Fitness and Physical Activity at Work

		PHYSICAL ACTIVITY at work				
		High	Low	Moderate	Nil	Total
PHYSICAL FITNESS	High	5	10	7	35	57
		8.8%	17.5%	12.3%	61.4%	100.0%
		83.3%	41.7%	87.5%	59.3%	58.8%
	Low	1	4	1	11	17
		5.9%	23.5%	5.9%	64.7%	100.0%
		16.7%	16.7%	12.5%	18.6%	17.5%
	Moderate	0	10	0	13	23
		.0%	43.5%	.0%	56.5%	100.0%
		.0%	41.7%	.0%	22.0%	23.7%
Total		6	24	8	59	97
		6.2%	24.7%	8.2%	60.8%	100.0%
		100.0%	100.0%	100.0%	100.0%	100.0%

x2(exact) p = 0.126, Ns

Table 5: Correlation between Physical Fitness and Leisure Time Physical Activity

		PHYSICAL FITNESS			
		High	Low	Moderate	Total
LTPA	High	7	0	2	9
		77.8%	.0%	22.2%	100.0%
		12.3%	.0%	8.7%	9.3%
	Low	12	6	4	22
		54.5%	27.3%	18.2%	100.0%
		21.1%	35.3%	17.4%	22.7%
	Moderate	4	0	2	6
		66.7%	.0%	33.3%	100.0%
		7.0%	.0%	8.7%	6.2%
	Nil	34	11	15	60
		56.7%	18.3%	25.0%	100.0%
		59.6%	64.7%	65.2%	61.9%
Total		57	17	23	97
		58.8%	17.5%	23.7%	100.0%
		100.0%	100.0%	100.0%	100.0%

x2 = 7.54, p=0.274, NS

Discussion

This study was conducted to evaluate the correlation between physical activity at work and leisure time physical activity with physical fitness. The tools used to measure the cardio respiratory fitness was the Rockport One Mile Walk test or Rockport Fitness Walking test (RFWT) and the physical activity was calculated using the International Physical Activity Questionnaire (IPAQ).

In this study of the total participants; 61 i.e. 62.9 % were females while the rest were males. This could be well suited for the fact that the researcher was a female and thus it was easier to approach and get more number of female participants. The female participants were more interactive among themselves after the test and could therefore motivate more number of female subjects to participate in the study.

The age group between 30 – 45 was selected for this study as it is the vital age group which has the preventive effect of Leisure time Physical Activity on Coronary Heart Disease, Hypertension and Diabetes[41]. Barengo N. C concluded that moderate and high levels of leisure time and occupational activity were associated with a decreased risk of cardiovascular disease and all cause mortality among both sexes from 30 – 59 years [7]. The target age group of 30 – 45 years would include the deleterious effects of a sedentary job to set in and also exclude other factors such as menopause and age related changes in the system as co morbidities to prevent physical activity or decreased fitness.

This study showed that of the total population studied only 9.3% had high Leisure Time Physical Activity and 61.8 % had No Leisure Time Physical Activity. The similar result was also suggested by Caroll S et al who found that 16.5 % were physically inactive during leisure time and only 11.1% had vigorous leisure time physical activity. That study was conducted in United Kingdom, which included 740 men who self reported about their leisure time physical activity with a questionnaire. The maximum oxygen consumption was indirectly predicted with modified sub maximal cycle ergometer. Their results showed that there is an inverse association between predicted $VO_{2\ max}$, leisure time activity and plasma fibrinogen concentrations. They considered the confounding influence of age, obesity or BMI and social class on the fitness level [37].

The similar fact was also suggested by Alteiri et al where Leisure Time Physical activity between the age group of 30 -39 was only 8.6 %. This case control study was conducted in Italy for 4 years which focused on the role of occupational and leisure time physical activity on the risk of myocardial infarction. It had 507 patients of which 378 were men and 129 women. Their study concluded an inverse association for occupational activity at any age but its strongly exerted at this age group [26].

Most of the studies were all conducted in Western countries with a different set of population and study design. To the best of the researcher's knowledge this study was the first of its kind in India measuring the physical activity levels of the people in the Southern part of the country. The potential sources of unexplained variance of activity and fitness could be related to the genetic heterogeneity in the Indian population [42].

The International Physical Activity Questionnaire IPAQ that was used to measure the physical activity levels was designed for surveillance purpose for a large sample. The categories of physical activity mentioned in IPAQ depended on the MET's achieved. Household chores and daily activities for 4- 5 hrs are equivalent to the MET'S achieved in an hour of aerobic session [30]. This criterion of classification of the category into High, Moderate and Low does not match the Indian population set up. This could be one of the reasons for a reduced level of leisure time physical activity but high fitness in Indians [43].

This study also shows a poor response to physical activity at work. The data analyzed concluded that 6.2 % of the subjects had high activity at work while 60.8 % possess No physical activity at work. The similar findings were supported by Barengo N and colleagues suggesting that sedentary lifestyle were responsible for more than 30 % of the Coronary Heart Disease. They also stated that sedentary individuals could increase their physical activity in leisure time but may gain more benefit from being more active on their way to work or at work [7].

Occupational activity accounts for approximately 41 % of the daily energy expenditure. In both sexes physical activity at work was the single largest contributor to daily energy expenditure [33]. In this study with a data stating that more than 50 % of the subjects have no activity at work the corporate sector justifies being the target group.

Analysis of this study revealed a weak correlation of physical activity at work with physical fitness. In a similar study done by Talbot, Laura A et al at Baltimore the cardio respiratory fitness was determined from a maximal treadmill test. Their study included a large sample of 1116 normal individuals with 619 men and 497 women. Their study revealed

a very strong correlation between LTPA and physical fitness [10]. Using the sub maximal test of Rockport One Mile walk test may have influenced the parametric measurement of $VO_{2\ max}$ or maximal oxygen uptake.

This study justified the use of the RFWT as it doesn't require much equipments, simple to administer and can be used for larger population as well. In a similar study to this by Stewart K et al they measured the aerobic fitness with the maximal oxygen uptake using treadmill testing and muscle strength. There was a significant correlation between activity and fitness [36]. Thus we can conclude that the results would have been altered if this study also used a maximal exercise testing to quantify the cardio respiratory fitness.

Furthermore the normative values for the maximal oxygen consumption for the population in the West cannot be compared with the Indian population. These confounding factors may have reduced the sensitivity of the Rockport Walk test.

The study also showed a weak correlation between LTPA and fitness unlike other studies. Here, the females predominated the sample and very few females have leisure time physical activity. Indian females have a very poor attitude to exercise and they are mostly engaged in household work. Research back up says that women have 4 fold greater energy expenditure related to household chores while the men have 3 fold greater discretionary exercise related energy expenditure. In the study by Mario Vaz and Bharathi they have said that in developing countries the contribution of household activity to overall physical activity status maybe substantial. It also states that the relative contributions of various domains of activity are likely to vary between countries [33].

This study consisted mainly women who are engaged in more than 3 - 4 hrs of domestic work. Only 2 % of the female subjects had housemaids. The correlation of the domain of domestic work was not included in this study. Therefore it is likely to have the results blunted and not find a good correlation between fitness and leisure time physical activity.

This valuable data is of prime importance to physiotherapists who have a preventable and a curable role in many of the non communicable problems affecting India. With such significant results about lack of activity among the study population the physiotherapists need to bring about an awareness, alertness and assertiveness towards exercise and physical activity.

Simple measures of increasing physical activity at work like encouraging to use stairs than lift, keeping vehicle parking area at quite a distance from the work area and using audio visual displays to encourage leisure time physical activity can be taken up.

Moreover a different track selected for the walking test might have helped to improve the specificity of Rockport One Mile walk test.

A similar study can be taken up in the future with a larger population of sedentary people using a simple maximal exercise testing tool feasible for Indian population.

Conclusion

The findings of this study concluded that there is a weak correlation between physical activity at work and leisure time activity with physical fitness. The proposed hypothesis can neither be accepted nor could be rejected. This study also pointed out that most of the subjects lacked or had no physical activity at work. Future studies in this field with a larger sample and equal distribution of both genders would help to prove the association between physical activity and cardio respiratory fitness.

It also found that more than half the study population lacked leisure time physical activity. There is a moderate to fair correlation between leisure time physical activity and physical fitness. Thus there is an immediate need to bring about awareness about the significance of physical activity during leisure time.

Further studies in this regard are recommended and measures to improve physical activity at work should be taken up.

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Review Article

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Role of Genetic Susceptibility in Second Impact Syndrome: A Focused Review

Harshita Yadav*, Manisha Uttam**

Abstract

Second Impact is a set motion cerebral vascular congestion which results in cerebral swelling. Death usually occurs due to transtentorial brainstem herniation. Due to rapid deterioration following acute injury some genetic markers like apolipoprotein (APOE) is associated with neurogenic responses resulting in low performance in sport related head injury. If the symptoms persists for long duration this may further predispose it to second impact which might be associated with APOE allele carriers as postulated by many authors. Further evaluation for the associated factors between APOE and second impact syndrome (SIS) is needed which helps in understanding genotype linkage with severity of head injury.

Keywords: Repetitive Head Injury; Concussion; Traumatic Brain Injury; Genetic Markers; Cerebral Edema; Cerebral Haematoma.

Introduction

SIS of "Catastrophic head injury", term had been coined by Richard Schneider in 1973, sharing a similar pathophysiology to repeated concussive injury. SIS syndrome typically occurs when an athlete sustaining an initial head injury and then suffering a second head injury before the symptoms associated with the first impact have resolved[1].

Pathophysiology

The pathophysiology behind SIS is the failure of cerebral vascular autoregulatory mechanism which ultimately leads to increased intracranial pressure and further results in herniation of temporal lobe or lobes below tentorium through foramen magnum [1-4]. Typically, time taken after second insult to brainstem failure is three to five minutes [1,4]. Cerebral autoregulation is the "tone" of arteries which helps them to uniformly either dilate or constrict for maintenance of cerebral blood flow. Disturbance or absence of this tone is associated with altered blood pressure which results in either hypotension or hypertension. Thus, failure of pressure autoregulation occurs in a linear fashion predisposing it to increased severity of head injury. It is evident that there is 20-30% of patients with autoregulatory dysfunctions following mild head injury and 80% with severe head injury tends to have autoregulatory dysfunction [5].

Focusing on symptoms of sports related head injury and concussion, headache is the one which persists long after first head injury. It becomes a typical sign after second impact along with other symptoms like labyrinthine dysfunction, visual, motor or sensory changes or mental difficulty which usually comes after first impact along with the headache [1].

Risk Factors

SIS being a rare syndrome as postulated by many authors results in diffuse cerebral swelling and a usually fatal outcome. It is being continuously reported by authors that boxers are first one to be listed in risk category of catastrophic brain injury such as subdural haematoma when compared to other sports [6,7]. Only 2 case reports, one being on 16 year old ice hockey player and other on 17 year old gridiron football player have been evidence found for existence of probable SIS in children. As other authors have argued for different cerebral autoregulation response to minor head injury for

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cerebral swelling when compared children with adolescents[3].

Since, a clear picture of risk factor for post traumatic acute brain swelling has not been understood yet, but through present literature it is found that children and adolescent are at higher risk [8,9]. Also, clinical evidence is found stating SIS cases in young males [3,8]. From medical literature on neurosurgical catastrophic brain injury after minor head injury approximately 30% of the cases were found to be female. Therefore, a true gender difference regarding cerebral response to trauma remains unclear. It is speculated from recent discussion that second impact resulting from repetitive head injury (multiple concussion) may have persistence of diffuse cerebral swelling which is a mechanism of post traumatic head injury. Giza and Hovda concluded that it is difficult to state a true duration of vulnerability to second injury [10].

Genetic Susceptibility

A window for potential role on genetic markers influencing outcome from head injury has shown a limelight, suggesting possible consequences, associated factors through its capacity for re-organization, neuronal regrowth and repair. APOE is a plasma lipoprotein which plays a role in nervous tissue healing. All peripheral APOE is synthesized in liver, whereas APOE is preponderant apolipoprotein within central nervous system, where it is majorly synthesized by Astrocytes. Three major isoforms of APOE refers to as APOE 2, APOE 3 and APOE 4 are products of alleles (ε2, ε3, and ε4) at single gene locus and occurs with frequency of 75, 78% and 15% respectively [12,13].

A link between APOE genotype, head injury and alziemer's disease was first reported by Mayeux et al [14]. Also, Nicoll et al. finding indicates, APOE may increase genetic susceptibility to the effects of head injury [15]. APOE genotype was determined and subsequently correlated with neuropathological findings. It appears that any head injury, sports related single concussion or multiple concussions may trigger the position of β- amyloid especially in those who have APOE ε4 [16]. There are studies, which indicate poor outcome in APOE ε 4 carriers for recovery during rehabilitation after head injury [17].

In clinical genetic literature, APOE ε4 allele is found to be associated with attentional impairments and white matter abnormalities and increased risk of Late – onset sporadic Alzheimer's (LOSA) disease. Adverse functional outcomes acutely early and late after severe but not clearly after mild and moderate head injury and also after hemorrhagic but not after ischemic stroke, cardiac surgery and cardiopulmonary resuscitation and probably subarachnoid hemorrhage [18]. Controversially, Smith et al found a relationship between APOE ε 4 allele and severity of contusion and ischemic brain damage but not with other pathological changes after head injury [18,19]. Different authors concluded that APOE ε4 carriers are less able to avoid secondary damage and repair damage tissue after injury. A study by Crawford et al helps in depicting the impaired performance in memory test using some memory and cognitive measures found that patient with ε 4 allele carriers had worse memory after head injury as well as poorer outcome [16, 20].

Ariza et al postulated that influence of APOE on cognitive function and behaviour six to nine months after severe and moderate head injury [16]. Terrelle et al. reported that carrying the APOE promoter allele was associated with self reported concussion history and greater concussion severity in collegiate athletes [21, 22]. This helps in stating that APOE may also influence various clinical aspects of head injury, concussion, SIS including more marked cerebral oedema, increased hematoma volume, greater incidence of moderate/severe contusion injury and ischemic brain damage which further increases the hospital mortality rate [23-25]. Recent evidences from transgenic closed head injury models also supportitive role of APOE in inflammatory response and neuronal repair mechanism following head injury [26-28].

A study by Kuther et al. reported that older professional players carrying ε4 allele and exhibited lower cognitive performance scores versus their non ε4 carrying counterparts. One study reported that 75% of individuals carrying 3APOE rare allele had a history f concussion in collegiate athletes [3, 29]. From a series of studies it is suggested that ε4 allele may exert not only long term influences manifested phase but also short term effects on head injury by worsening the pathological course of head injury in acute stage [16]. The above discussion, helps in understanding the APOE plays a key role with neurogenic responses to the injury in sports. Giving evidence that APOE carriers are at greater risk when compare to non carriers along with which risk of multiple concussion resulting in second impact increases. Since, there is paucity of researchers examining the association between SIS and APOE genotype, therefore there is need to explore the relationship between the SIS and APOE through some clinical trials.

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Short Communication

Physiotherapy and Occupational Therapy Journal
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Physiotherapy and Education: Attitudes to Develop Learning or Learning to Develop Attitudes?

Senthil P. Kumar*, Asir John Samuel**

Abstract

Professionals' attitudes determine their knowledge and behavior towards teaching and learning in education. Physiotherapists (PTs) are an essential part of a multidisciplinary rehabilitation team to provide holistic care for people with a variety of medical conditions targeting along a symptom control-quality of life continuum. This short report summarized the findings from research studies on attitudes of PTs towards education from an evidence-informed perspective through a preliminary search of PubMed database.

Keywords: Physiotherapists; PubMed databae; Continuum; Rehabilitation.

Introduction

Professionals' attitudes determine their knowledge and behavior towards teaching and learning in education. Physiotherapists (PTs) are an essential part of a multidisciplinary rehabilitation team to provide holistic care for people with a variety of medical conditions targeting along a symptom control- quality of life continuum [1].

This short report aimed to summarize the findings from research studies on attitudes of PTs towards education from an evidence-informed perspective through a preliminary search of PubMed database.

Main Findings

PT Students Versus Others

Wellock[2] compared opinions, attitudes, and interests of physical therapy students with other students from 18 freshmen groups at the University of Michigan and found that PT students ranked highest on the Biological Science Interest, Social Adjustment, and Emotional Adjustment scales, and lowest on the Infrequent Response, Social Undesirability, and Creative Personality scales.

Rose et al [3] assessed the attitudes of 474 students in medicine, nursing, occupational therapy, and physical therapy toward interprofessional education using the Interdisciplinary Education Perception Scale and Readiness for Interprofessional Learning Scale. The study found differences among professions with students in medicine and physical therapy rated members of their own professions significantly higher in the areas of competence/ autonomy and need for cooperation as compared with those in nursing and occupational therapy.

PT Students- Bachelors Versus Masters

Warren and Pierson [4] compared the characteristics and attitudes of a total 766 students from 22 entry-level bachelor's and master's degree PT students, and found that Master's degree respondents anticipated greater involvement in research and teaching and felt better prepared to practice across a broad spectrum of clinical practice and to perform activities related to research, teaching, management, and direct access practice. The study findings not only suggested differences to exist between entry-level bachelor's and master's degree students in physical therapy but also implicate

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curriculum planning, recruitment and scholarship efforts, and policy formation in physical therapy education.

Peer Mentorship

Quesnel et al [5] surveyed 260 Canadian Master of Physical Therapy (MPT) students' knowledge, attitudes, and practices regarding peer mentorship using an online questionnaire. "Most respondents (68.7%) reported that they did not experience peer mentorship during their MPT programme. A few respondents (5.4%) reported having received formal training on peer mentorship as part of their PT curriculum. Respondents generally held positive attitudes toward peer mentorship: 65.9% agreed that including peer mentorship is important, 89.5% agreed that peer mentorship can assist with learning in clinical internships, and 84.1% agreed that peer mentorship can help the transition from student to professional."

Transition in Levels of Qualification

Mistry et al [6] surveyed 1,397 Canadian physical therapists for their attitudes toward the transition from bachelor's to master's degrees and the implementation of clinical doctorate degrees in physical therapy and found that "45% favored the transition from bachelor's to master's degrees, and 21% did not; 27% favored a transition from a master's to a doctoral degree, while 53% did not. Finally, 56% favored the implementation of a post-professional clinical doctorate (PPCD) in PT, and 23% did not.

Country Wise Comparison

Gotlib et al [7] surveyed 667 first-year physiotherapy students from 21 university-level schools in the Czech Republic, Latvia, Malta, Poland, Spain and the U.K and reported following findings; "79% said that a personal interest was the main reason why they had decided to study physiotherapy and most students from the Czech Republic, Latvia, Malta, Poland, Spain and the U.K. claimed that it is easy to find a job in other EU countries than those of themselves."

Discussion

Our short report found only limited number of studies on this context and this insufficient evidence together with limited focus on such an important academic issue is an urgent need from a professional development perspective in India. One such example is problem-based learning and PT attitudes [8]. Inadequate knowledge and poor attitude could exclude the application of the principles of logic and scientific methods to the implementation of physiotherapy curricula, and could result in fragmented knowledge, with a potentially negative impact on teaching and learning.

The studies and their findings warrant comprehensive policy-based interventions targeting interprofessional education and curricular revision in order to eradicate the knowledge deficits and negative attitudes which may lead to inappropriate teaching-learning behavior among PTs.

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