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ISSN P 2321 - 5690

Volume 5

Issue 1

Jan. - Jun. 2017

Indian Journal of Physical Therapy

An Indian National Journal

www.indianjournalofphysicaltherapy.com





Indian Journal of Physical Therapy

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Editor's Desk



Greeting from Indian Journal of Physical Therapy!

With immense pleasure, on behalf of core committee of journal, I would like to congratulate all authors and readers to promote research in the field of Physiotherapy. Every one knows that now-a-days evidence based practice is increasing its value worldwide. For this, every clinician is planning treatment on the base of evidence and it is mandatory also. To promote evidence based practice, journal is platform to publish all these evidences. Moreover journal provides bridging between academician, researcher and clinician. Problem experienced by Clinician during his/her practice can be solved by academician/researcher by doing systematic approach to find out solution. This approach is nothing but research and I am glad to inform that it is very well accepted by our Physiotherapists.

At last, I would like to finish my words with congratulations again to all my seniors, colleagues, juniors and beloved students for being part of this journal.

Dr Dinesh M Sorani
Editor
Indian Journal of Physical Therapy



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PREVALENCE OF KNEE PROBLEMS EXPERIENCED BY NURSES

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ABSTRACT

Background-Work related Musculoskeletal Disorders are common among health care workers. The nursing population constituting about 33% of the hospital workforce is particularly at a high risk, accounting for 60% of the occupational injuries. Knee joint is the most important weight bearing joint of the body which is involved in various daily activities and hence is the commonest to undergo much wear and tear and damage.

Objective-To find prevalence of knee problems in nursing staff.

Method-Validated self administered questionnaire containing three scales- Knee Injury and Osteoarthritis Outcome Score, Knee Outcome Survey Activities of Daily Living Scale and Lysholm, which sought information on demographics, prevalence and pattern of knee problems was employed as the survey instrument. A total of 150 questionnaires were distributed to nurses in the different hospitals, all of which were returned duly filled.

Results -The average prevalence of knee problems in nursing staff was found to be 71.7% ranging from mild to moderate range of severity. Their results are as follows-KOOS 70%, KOS-ADL 65.71 %, Lysholm 77.5% with Standard Deviation of- 13.0, 11.23, 11.36 respectively .Squatting, twisting and pivoting on one knee, jumping, kneeling stair climbing have been identified as the main activities causing knee pains.

Conclusion-The prevalence of knee problems in the nursing staff is in the moderate range of severity.

KEYWORDS: KOOS; KOS-ADL; Lysholm

INTRODUCTION

Nurses routinely perform activities that require lifting heavy loads, lifting patients and transferring them out of bed and from the floor¹. They also entail exposure to constrained postures, forceful movements, high emotional strain (because of caring for large numbers of patients who may be critically ill), and work deadline pressures². These tasks put them at high risk for acute and cumulative Work related Musculoskeletal Disorders (WMSDs)¹. In addition to ergonomic factors, psychosocial risk factors such as high demand, low job control, and lack of social support have also been recognized as contributing factors to the development of musculoskeletal disorders among nursing professional¹.

Research performed in several countries show prevalence rates above 80% of the WMSD's disorders in nursing workers². Based on observations of nursing work practices, it was hypothesized that nursing job requirements affect not only the lower back but also other body joints such as the neck and shoulders, knees³. The

frequent complaints are low back pain, knee pain, neck and shoulder symptoms⁴.

Knee joint is the most important weight bearing joint of the body which is involved in various day to day activities and hence is the commonest to undergo much wear and tear and damage too⁵. In previous studies (Alexopoulos EC- 2011; Magnago ST-2010; Freimann T-2013) prevalence of knee pain was reported from 23 to 80 % ^{2,3,6}.

Although injuries to the knee and wrist are known to be associated with handling and moving patients, their incidence and prevalence in nursing is not well researched in the literature⁷. Hence, further study on this topic is essential to find the prevalence of knee problems in nursing staff. Thus the main aim of this study is to find the prevalence of knee pins in the nurses working in hospitals.

MATERIAL AND METHODS

This was an observational, cross sectional study done on the nursing staff working in the hospitals in and around the city. The study was approved by Institutional Review Board. Total of 150 nurses participated in this study out of which 28 had to be excluded as they did not have any knee pains. Male and female nurses between 18-64 years of age were included using the purposive sampling method who have been

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working for at least one year in the hospital setup. The inclusion criterion was to select the major working age group in the hospitals who have minimum one year of experience of working so that they are aware of their job profile and what all problems they are facing due to that. Nurses who have undergone any knee surgery/trauma to knee joint in past 6 months and the female nurses who were pregnant were excluded from the study as they were likely to have pain due to their physiological condition(pregnancy) or due to the surgical intervention that they have had undergone.

Knee Injury and Osteoarthritis Outcome Score (KOOS), Knee Outcome Survey Activities of Daily Living Scale (KOS-ADL), Lysholm scales were given to nursing staff & they were expected to fill them and hand them back. All participants had signed the informed consent form.

KOOS is patient\self-administered Likert scale. KOOS scale has five patient-relevant dimensions that are scored separately: Pain (9 items); Symptoms (7 items); ADL Function (17 items); Sport and Recreation Function (5 items); Quality of Life (4 items)^{8,9}.

KNEE OUTCOME SURVEY-Activities of Daily Living Scale (KOS-ADL) is a patient self report survey that includes an Activities of Daily Living Scale (ADLS). The ADLS is a 14 item scale that queries patients about how their knee symptoms effect their ability to perform general daily activities (6 items-Pain, Stiffness, swelling, giving way of knee, weakness, limping) as well as how their knee condition affects their ability to perform specific functional tasks (8 items-standing, walking going up and down the stairs etc)^{8,10}.

Lysholm scale deals with the specific knee problems like meniscal tear, chondral injuries. Lysholm scale is a Likert questionnaire which has the following components- limping, going up and down the stairs, locking sensations, buckling of the knee, squatting, and stiffness etc^{11,12}.

Data was collected and analyzed using Microsoft excels version-2007.

RESULTS

This study gives the prevalence of knee problems in nursing staff as given in Table-1.

On an average 71.7 % of the nurses are suffering from mild to moderate range of knee pain. Squatting, twisting and pivoting on one knee, jumping, kneeling stair climbing has been identified as the main activities causing knee pains.

TABLE 1: PREVALENCE OF KNEE PAINS IN NURSES

Name of scale	% Value	Mean values	Standard Deviation
KOOS	70	70/100	13.0
KOS-ADL	65.71	46.0/70	11.23
Lysholm	77.5	77.5/100	11.36

Hospitals were found to be the common work setting among the respondents of this study.

Table 2 gives the demographic details of the nursing staff.

TABLE 2: DEMOGRAPHIC DATA

Variable	Minimum	Maximum	Average
Age(years)	18	64	35.2

DISCUSSION

The study was done on 150 nurses to find the prevalence of knee problems in the nursing staff working in the hospitals in and around the city. Three validated scales KOOS, KOS-ADL, Lysholm were used to find out the prevalence of the knee problems⁸⁻¹².

The mean scores found in the study indicate that majority of the nursing staff are suffering from knee problems ranging from mild to moderate severity. The authors' also found that terminal ranges, high intensity activities are some of the causative factors for knee pain. According to Alexopoulos EC repetitious movement, awkward postures, and high force levels are the three primary risk factors that have been associated with WMSDs⁶. The prevalence of knee problems can be attributed to the fact that the nurses are routinely exposed to awkward postures, forceful movements, lifting heavy loads, lifting patients which all are activities straining the knee joints².

KOOS scale: 70% prevalence rate

The KOOS scale checks multiple components related to the knee pains and functional applicability of the joint in ADLs. KOOS scale is calculated as total score out of 100 where 100= no knee problems & 0= extreme knee problems. The pain questions check subject's pain while doing activities like twisting/pivoting, straightening & bending knee fully, going up or down stairs etc. Low pain scores can be attributed to the fact that the nursing staff have been provided with more ergonomically oriented gadgets like better structured trolleys for carrying the dressing articles, use of elevators for internal transport in the hospital etc which is supported by the study done by Nelson A¹³. Tinubu BM showed that getting help in handling heavy patients (50.4%), modification of nursing procedures in order to avoid stressing an injury (45.4%), and modifying patient's/nurse position (40.3%) were the top three coping strategies which are

applicable here too¹. Alexopoulos EC showed in their study that a high perceived physical exertion and a moderate/bad general perceived health were the strongest factor for knee pain⁶.

The nurses are facing very little problems in doing their activities of daily living (ADL). The reason for this as explained by Nelson A can be that they have gained sufficient amount of experience so as to modify their activities in an ergonomic way so that the existing knee problems don't hinder their activity¹³. Another explanation can be that experience has taught the nursing staff about injury prevention, avoiding harmful physical load, and hence have developed better coping strategies for musculoskeletal problems and knee pains as shown by Tinubu BM¹.

The subjects found that sports activities like squatting, running, jumping, kneeling were difficult to perform. These activities don't form a part of their ADLs, so the subjects were unaccustomed to these activities. Besides this, running, jumping activities are high intensity activities causing extreme amount of compressive forces on the knee joint as proved by Besier TF hence the low scores and higher association with pain and discomfort¹⁴.

KOS -ADL scale: 65.71% prevalence of knee pains

Knee stiffness, swelling, giving way/buckling of the knee, weakness, limping were not the common complaints for majority of the subjects in this study.

The authors have found that standing is difficult and painful. As shown by Mündermann A & Kuo AD in their studies, standing causes more knee pain as compared to any other activity of ADLs as standing demands more static muscle work, hence more pains^{3,15,16}. Only 50% of the population is suffering from difficulty in walking while the rest of them have adjusted their walking pattern to their present knee problems. Use of better footwear and correct biomechanical alignment can be some other factors associated with ease of walking, as depicted by Reed LF¹⁷.

According to this study, stair climbing is painful and difficult process. Stair climbing activity demands higher muscle work, increased flexibility and knee range of motion proven by Mündermann A¹⁵. Hence this activity is more painful.

The present study shows that kneeling and squatting is a big problem for many subjects. Squatting requires terminal knee range and strong quadriceps muscle strength for the eccentric activity getting up back to standing state as proved by Mündermann A & Kuo AD in their studies^{15,16,18}. Kneeling also causes extreme loading & compression on knee which can be another reason for more problems¹⁵.

Sitting with your knee bent & rising from chair are not much difficult or causing or aggravating the knee problems.

Lysholm scale: 77.5% prevalence of knee pains.

Limping, knee locking, swelling, knee buckling are not the problem areas for majority of the nurses. None of the nurses needed to use a crutch or cane.

Pain is the complaint of the majority of the subjects. Pain can be multi factorial and multidimensional, associated not only with musculoskeletal causes but also psychological, emotional social- economical causes as proved by different authors like Freimann T-2013; Magnago ST- 2010; Alexopoulos EC- 2011; Briggs KK- 2004; Attar SM-2014 in their studies respectively^{2,3,6,12,19}.

Climbing stairs is a major problem. Mündermann A proved in her study that stair climbing is an activity associated with more muscle strength, range of motion for the knee and also with higher loading forces in the knee joint (compressive and gravitational forces)¹⁵.

Nearly 75% of the nurses are suffering from difficulty to squat. This can be attributed to the extreme terminal range of knee flexion needed for doing the squatting activity and for the strong eccentric contraction of the quadriceps, glutei and other antigravity muscles for getting up^{15,20}.

Thus it can be concluded the average prevalence of knee problems in the nursing staff is 71.7% which lies in the moderate range of severity.

CONCLUSION

The prevalence of knee problems in the nursing staff is in the moderate range of severity.

ACKNOWLEDGMENTS

The author would like to acknowledge and thank Dr.Chandrashekhar Karve, chief administrator at Maharashtra medical foundation for his support and invaluable help in coordinating for the availability of nursing staff.

The contribution of Master Radhesh Joshi and Mrs.Joshi to this study is also noteworthy.

CLINICAL APPLICATION

The results founded in this study will help to create more awareness in the nursing staff about the knee problems and the methods to prevent them from occurring.

SOURCE OF SUPPORT

None

CONFLICT OF INTERESTS

Dr. Joshi has nothing to disclose. The authors declare that they have no conflict of interests.

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SURVEY OF PARTICIPATION, PERCEPTION, ATTITUDE AND BARRIERS TOWARDS RESEARCH AMONGST CLINICAL PHYSIOTHERAPIST

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ABSTRACT

Background: Research has been described as a systematic process of investigation, with the aim of contributing to the body of knowledge that shapes and guides academic and or clinical disciplines. Although the past decade have witnessed an increase in physiotherapy research but the implantation of research findings in clinical practice still remains a concern which till date has attracted relatively limited interest.

Aim: To study participation, perception, attitudes and barriers in clinical physiotherapist towards research.

Method: A cross sectional questionnaire survey was conducted amongst 291 physiotherapists. Questions about research were measured on Likert scale.

Results: Descriptive statistics were used for analyzing the responses. The clinical physiotherapist value research and consider research important to the profession, though they were neutral towards involvement in research. The common barriers they faced were lack of time and peer group support.

Conclusion: From the findings of this study we conclude that physiotherapist have positive attitude to research but are less motivated to participate in research. It is encouraging that the physiotherapist who replied to this survey value research. They have positive attitude towards evidence based practice but face difficulty in implementing it. The barrier to research was lack of availability of time and lack of peer group support.

KEYWORDS: Research; Physiotherapist; Attitude; Participation; Perception; Barriers

INTRODUCTION

Research comprises "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of humans, culture and society, and the use of this stock of knowledge to devise new applications¹."

Research is frequently seen as the life blood, hallmark or cornerstone in the development of a profession" in that it forms its scientific basis^{2,3}. In fact, lack of research could lead to the demise of the profession as a viable discipline³.

Hence the strength of physical therapy depends on research to expand its scientific basis for practice and patient care, leading to research-based practice or clinically oriented practice, a vision advocated by the American Physical Therapy Association (APTA)⁴.

Every physiotherapist can and should play a role in research in order to contribute to the scientific knowledge base or to apply research findings to practice.

As a clinical professional, the physiotherapist does not only need to acquire

skills and knowledge, but also to update his knowledge and continually seek ways of improving his treatment modalities. This is ensured by carrying out scientific enquiries into the rationale behind the use of his skills and modalities³. It is therefore important that physiotherapists carry out research regularly.

India is considered a knowledge hub of research. But in current scenario practitioners opt to go out of India to conduct research studies. There is little contribution to research by physiotherapist in India due to extra work load, lack of time and non-availability of funds to physiotherapy field.

Our credibility as a profession is at risk if we are unable to demonstrate that our treatment approaches have a significant beneficial effect to our patients and are cost effective⁵.

Hence it is important to carry out research, implement its findings to patient care, improve our standard of care, have a scientific base to our treatment method, and improve our profession's worth.

AIM

To study participation, perception, attitudes and barriers in physiotherapist towards research.

OBJECTIVES

- To find participation of physiotherapist towards research

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- To find perception of physiotherapist towards research
- To find attitude of physiotherapist towards research
- To find barriers of physiotherapist towards research

METHODOLOGY

After taking an approval from the ethical committee, a cross sectional study was conducted amongst Physiotherapists. It was a questionnaire based cross sectional survey carried out on working clinical physiotherapists. Purposive Sampling technique was used. Inclusion criteria was participants working in any clinical work setting, Participants who are qualified with a recognized degree and participants willing to take part in the study. Exclusion criteria was participants not working in India, non-responsive participants, Non clinical physiotherapists, physiotherapists absent at the time of data collection, physiotherapy interns and physiotherapists with academic duties. A questionnaire was prepared with items adopted and modified from questionnaire for similar studies conducted around the world and was validated.

PROCEDURE

Participants were selected for the study as per the criteria. They were then explained the need of study and were given the questionnaire either via online forms or were made to fill out printed questionnaires. The non-responders were sent remainder emails after 2 weeks. A total of 1000 questionnaires were distributed out of which 291 Physiotherapists responded (Response rate of 29.1%). The information obtained was documented and utilized for data analysis.

STATISTICAL ANALYSIS

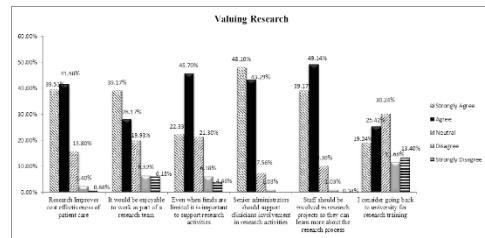
Descriptive Analysis and Microsoft Office Excel version 2007 was used for analysis of data collected. The responses were converted into percentiles, and then grouped accordingly. Data was represented in graphical form.

RESULT

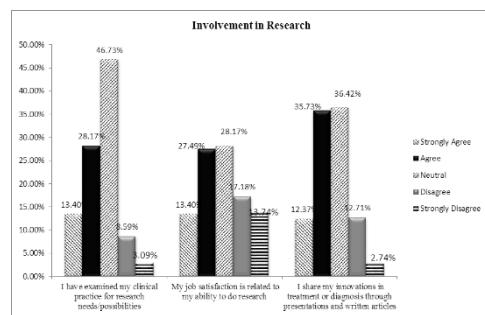
Out of 1000 physiotherapist 291 responded to the survey. Response rate was 29.1%.

Out of 291 physiotherapists 206 were female and 85 were male.

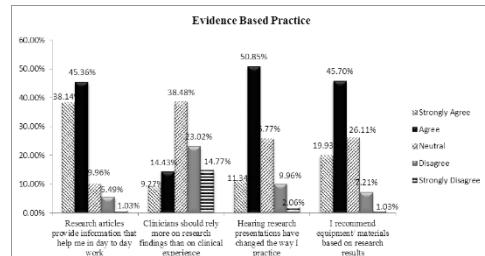
Mean average age was 28.628 years. (Standard Deviation ± 7.48) (Lowest age 22years-highest 67years)



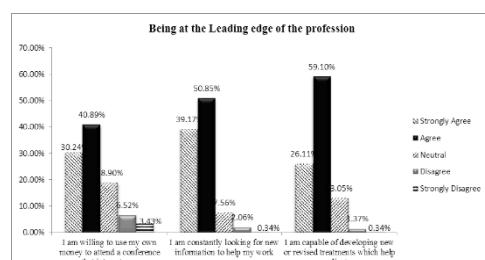
GRAPH 1



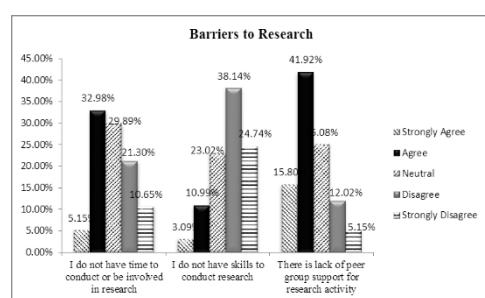
GRAPH 2



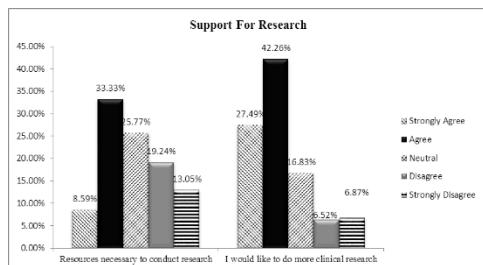
GRAPH 3



GRAPH 4



GRAPH 5



GRAPH 6

DISCUSSION

This study states that the physiotherapist have a positive attitudes towards the application of research findings to their practice and towards reading research article to update their knowledge. They agree to the importance of research for the profession and the benefit derived from research in terms of improving patient care.

Most of the respondents in graph 1 replied positively to "Research improves effectiveness of patient care". Richard and Barney⁶ in their study said "Research may, indeed, be the only legitimate foundation for standards of care" which supports our finding.

The physiotherapist surveyed agreed that they would enjoy to work as a part of a research team (graph 1). Working together in a team with other health care professionals would increase their research skills and knowledge. Collaboration with other health professionals involved in research and in apprenticeships was listed as desirable methods to gain additional research skills⁷.

Most of the physiotherapists were neutral towards going back to university for conducting research as seen in graph 1. Going back to the University for Higher Studies is not easily achievable in terms of time required to do the course and also its cost. The courses offered and accessibility to these courses is also important. Other studies also supports that therapist are not motivated to actively participate in research^{8,9}. Hamzat et al in a study stated "It could also be an indication of their lack of interest in pursuing higher degrees, especially in situations where academic qualification(s) may not necessarily translate to better condition of services, or promotions"¹⁰.

The statement in graph 1 'senior administrators should support clinicians' involvement in research activity' was strongly supported. Personal and administrative support is important in an organization to encourage research^{9,11}.

The Physiotherapist in this study responded mostly neutral towards involvement in research very few strongly agree for research

involvement as seen in graph 2. This could be explained by the Eakin¹² model which indicates that the majority of persons in a profession will be consumers of research, with some becoming researchers and only a few research leaders. Research consumers use research to inform their practice but are not involved in research execution. There is also a possibility that lack of research ideas, skills, knowledge, use of statistics, low confidence are limiting the involvement of physiotherapist towards research. A study done in Nigeria by Hamzat et al states that: It is also possible that some physiotherapy clinicians are still of the opinion that research is synonymous with heavy machinery, equipment and laboratory experiments"⁸.

Lawrence concluded that the reason for a lack of physical therapy research was the therapists' reluctance to experiment on patients⁷.

Lack of research involvement may contribute to a limited knowledge base and lack of evidence, which may threaten the profession¹³.

Similar study done in Physiotherapist in Kuwait (2014) reported that there was a common belief among physiotherapist in Kuwait that they had less of a role, as well as a reduced ability, intention and level of engagement, in initiating research¹⁴.

More than half of the respondents were neutral towards I have examined my clinical practice for research needs/ possibilities (graph 2). "An often overlooked element of clinician's skills in evidence based practice is that clinicians evaluate their own individual practice"^{15,16}.

Possible methods to stimulate research were salary increase, departmental promotions, awards and recognition, academic titles, and increased fund benefits⁷.

The use of evidence to update practice yielded equivocal results as seen in graph 3. This can be because of lack of understanding how to access current literature and use research findings to update practice. Joe Schreiber and Perri Stren quoted in a study "Therapists often have difficulty applying research findings to individual patients and are unclear as to whether high quality evidence exists to support or refute therapeutic interventions"¹⁷. A study done in Sweden¹⁷ concludes developing a more EBP approach requires time to identify and appraise research, reflect on its applicability, and apply it in clinical practice.

Haynes and Haines, analyzing the gap between research and evidence, suggested that the problems in implementing evidence included the size and complexity of the research base, poor access to evidence, organizational barriers, and ineffective education¹⁸.

In graph 3 "Clinicians should rely more on research findings than on clinical experience"

overall received a neutral response while many physiotherapist disagreed. The physiotherapists reported that their colleagues are the first people they turn to when they need more knowledge or a second opinion about a certain treatment method or to obtain support for testing a new approach¹⁷.

Similarly, the literature has shown that physical therapists in England and Australia rank colleagues of the literature as sources of information about patient management¹⁹⁻²¹.

Another possible explanation for the practitioners' disbelief is that their feelings of personal worth are tied to the belief that what they are doing is effective, which may differ from what research suggests²².

The fact that the majority of respondents saw themselves at the Leading edge of the profession (graph 4) might indicate a strong motivation to access the latest information and implement it in practice. This might again be part of valuing research and being consumers of research according to Eakin¹² even though there was limited involvement in research execution.

More than half of the respondents indicated that they used the results in practice but few also strongly disagreed. A possible reason for this might be the way in which research results are reported that made it difficult for clinicians to see a direct link with implementation^{16,17,23}.

They agreed to lack of time being a barrier to research in current study as seen in graph 5. Time has similarly been indicated as a common reason for limited participation in research in the literature^{5,7,8,14,24,25}. Time constraint as a hindrance to research could be an indication of a large clinical workload or a problem with time management on the part of the surveyed physiotherapist. Neither of these reasons could be confirmed from the results of this study.

In other studies time was closely linked with financial reasons for not conducting research because research limits patient treatment time which is quoted in Connolly's words as "inability to give up revenue producing time"⁹.

The physiotherapist were neutral towards there is lack of peer group support for research activity (graph 5). The physiotherapist while applying research findings to practice may face opposition by colleagues, seniors, manager, and other health care professionals or by patient. Joe S et al who conducted a similar study found out that there is inadequate support from colleagues, managers and other health professionals towards research^{17,26}.

Many of them disagreed to not having skills to conduct research which is seen in graph 5. This can be because in India research projects are carried out in the bachelor's degree program as it is included in the University curriculum. The physiotherapy undergraduate's students are

exposed to research and they even send their articles for publications to various journals.

The physiotherapist agreed to availability of resources to conduct research which is evident in graph 6.

This can be due to availability of large population (1.31 billion) in India, with so many cases and different diseases. Hence the availability of participants or patients to conduct research is easily available.

In agreement with previous studies^{5,7,8,14,24,25}, it is advisable that a high level of involvement in research and commitment to the profession are anticipated amongst physical therapists.

Limitations to this study were low response rate. Areas that could have been examined in further detail include: research publication's, journal reading, availability of facilities like library, access to journals, funds.

CONCLUSION

From the findings of this study we conclude that physiotherapist have positive attitude to research but are less motivated to participate in research. It is encouraging that the physiotherapist who replied to this survey value research. They have positive attitude towards evidence based practice but face difficulty in implementing it. The barriers to research were lack of availability of time and lack of peer group support.

ACKNOWLEDGEMENT

The author wishes to acknowledge all the participants in this study and would like to express their gratitude to Dr. Apurv Shimp, Dr. Rachana Dabadghav, Dr. Ashok Shyam, Dr. Savita Rairkar and Dr. Parag Sanchez for their valuable support.

CLINICAL IMPLICATION

To increase participation in research we recommend collaboration between academicians and clinical physiotherapist. This may result in publication of more scientifically proven data which will be useful for evidence based practice.

CONFLICTS OF INTEREST

None

SOURCE OF SUPPORT

None

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LUMBAR CORE STRENGTH COMPARISON BETWEEN SKATERS AND NON-SKATERS

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ABSTRACT

Core muscles play a crucial role in the interaction between repetitive limb movements and the effects they have on the body. Poor core strength is considered to be one of the leading causes of low back pain and injuries associated with sport specific performances. The aim of this study was to establish whether there was a significant difference in the lumbar core strength of skaters, when compared to that of age matched non-skaters. Measures should be taken towards achieving a good core strength as a pre-emptive as well as a curative step against low back pain, among skater and the general population not participating in any sport specific performance.

Aims & Objectives: This study sought to assess and compare the lumbar core strength of skaters and non-skaters.

Study design: Observational study

Methodology: A total of 100 participants were selected, 50 skaters and 50 non-skaters, between the ages of 15 to 25 years. The skaters were those who had a minimum of 1 year training without any complaints of low back pain, fracture, etc. and non-skaters were individuals who did not participate in any other form of training. The pressure bio-feedback method was explained to all the participants. Their consent was obtained. The core strength of the participants was then assessed and compared using Unpaired t-Test in Microsoft excel 2007.

Results: After comparing the data, it was found that the mean core strength of the skaters (case group) was 6.12 ± 1.99 , and that of the non-skaters (control group) was 4.56 ± 2.28 . The p value obtained was 0.00, which implied that there was a significant difference between the two groups, with the case group having greater core strength value.

Conclusion: Thus, it was found that, statistically, the lumbar core muscle strength of the case group i.e. skaters was significantly more than that of the control group i.e. non-skaters.

KEYWORDS: Lumbar core, strength, skaters, adolescence, adult

INTRODUCTION

Skating is defined as, “The action or activity of skating on ice skates, roller skates, or a skateboard as a sport or pastime.” Various position, elaborate moves and speed are all a part of skating. Good lumbar core strength is required for holding the positions, executing the movement and achieving high speeds^{1,2,3}.

There are predominantly two forms of skating i.e. speed and artistic. Common injuries sustained by skaters are, fractures of the tibia, femur and distal radius due to falls at the apex of the turn, cervical spine fractures also associated with falls, brachial plexus traction injuries in skaters who attempt to protect their head during a fall on outstretched arm, low back pain, muscle strain and overuse injuries of the hip adductors, hip flexors and hamstrings, overuse syndromes such as patellar tendonitis, anterior knee pain, Achilles tendonitis and exertional compartment syndrome^{4,5}.

The lumbar core muscles are pelvic floor muscles, transversus abdominis, multifidus, internal and external obliques, rectus abdominis, erector spinae (sacrospinalis). Focus on core strengthening is crucial to address and prevent

overuse injury and strain to the lumbar spine, hip, and hamstring. Core stability against dynamic movements of the extremities and capability to absorb repetitive loading forces in the trunk play a crucial role in any professional sport specific performance^{2,3}.

MATERIALS AND METHOD

A total of 100 participants were selected, 50 skaters and 50 non-skaters, between the ages of 15 to 25 years. The skaters were those who had a minimum of 1 year training without any complaints of low back pain, fracture, etc. and non-skaters were individuals who did not participate in any other form of training. The pressure bio-feedback method was explained to all the participants. Their consent was obtained. The core strength of the participants was then assessed and noted.

Statistical analysis: The data of the two groups was compared using unpaired t-Test in Microsoft Excel 2007.

RESULTS

As it can be observed from the result table, the mean core strength of the case group (i.e. the skaters group) was 6.12 ± 1.99 and that of the control group was 4.56 ± 2.28 . After comparing the obtained data in Microsoft Excel

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2007 the p value obtained was 0.00. As the p value lies between +0.05 and -0.05, the p value was found to be significant. This implied that there was a significant difference between the core strength of the two groups, i.e. the case and control group, with the case (skaters) group having a higher core strength value.

TABLE 1: MEAN CORE STRENGTH

Mean strength group)	core (case)	Mean core strength (control group)	P value	
6.12 ± 1.99		4.56 ± 2.28	0.00	significant

DISCUSSION

The objective of this research was to establish whether the lumbar core strength of skaters was equal to or greater than that of age matched non-skaters. As observed from the result table, the core strength of the skaters group was greater than that of the non-skaters group.

The subjects included in the control group were individuals who did not participate in any regular physical activities and overall lead a sedentary lifestyle. Participation of adolescence in physical activity, outside the physical education classes conducted on a fairly regular basis in most of the schools, is low.

This is due to reduced interest in physical forms of entertainment and more in indoor forms of entertainment, with minimum or no physical activity⁷. In the adolescence and adult age group i.e. 16 to 25 year age group, the level of physical activity is also low⁷. Various scholastic and career demands, timings and stresses, leaves the individual with reduced time and energy to spend on physical activities⁷. This lack of physical activity is one of the reasons that the core strength of the control group was found to be less/average.

The subjects in the case group were skaters with at least one year training. In the sport of skating, recruitment of the core muscles occurs in order to achieve and maintain the various positions and high speeds^{5,8}. For example, skaters perform jumps such as the Axel jump, described as one of the most difficult jumps which takes off from the forward outside edge of one foot and lands on the back outside edge of the opposite foot. In the initial part of this move, there is a forward and upward propulsion of the body with an acceleration in the skater's speed, and in the latter half there is a backward and downward descent, with a deceleration^{3,6}. Due to the upward propulsion and the downward descent, there is a constant change in the centre of gravity while the skater is performing this jump. Also, there is a reduced base of support as the skater pushes off as well as lands on one leg. In order to execute this move correctly as well as to maintain the body

stability and balance during the various stages of the move, the skater is required to activate his or her core^{2,6}.

One needs to practice this jump repeatedly in order to execute it with grace and finesse. Due to this, and many other such complex and intricate aspects of skating, repeatedly practiced over a year or more, there is an increase in the lumbar core strength of this group.

CONCLUSION

Thus, it was found that, statistically, the lumbar core muscle strength of the case group i.e. skaters was significantly more than that of the control group i.e. non-skaters.

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CORRELATION BETWEEN GLENOHUMERAL ROTATIONAL RANGES AND NONSPECIFIC NECK PAIN IN THROWING ATHLETES

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ABSTRACT

Background: In overhead throwing athletes, there are a few glenohumeral rotational changes observed in the throwing arm like reduced Internal Rotation and an increased External Rotation. There seems to be a prevalence of neck pain in these throwing athletes which correlate with these shoulder rotational range changes.

Materials and Methods: This is an observational study. 70 overhead throwing athletes were recruited for this study. Materials used were a standard goniometer and the Neck Disability Index (NDI) Questionnaire. The shoulder rotational ranges were measured by a goniometer in supine position. The dominant and non-dominant ranges were compared to determine the differences. Neck pain assessment by using the Neck Disability Index (NDI) was done. Shoulder rotational ranges and NDI were correlated using the Spearman's Correlation test.

Results: Significant differences were found in the rotational ranges of dominant and non-dominant shoulder. Out of 70, 42 athletes were found to demonstrate mild disability due to neck pain. The internal rotational deficit had a moderate positive correlation with NDI ($r= 0.364, p= 0.01$). Also, the Total Range of Motion (TROM) deficit had a moderate positive correlation with the NDI ($r= 0.538, p= 0.01$). No correlation between External Rotation difference and NDI was found.

Conclusion: There is a prevalence of mild disability due to neck pain in throwing athletes. Internal Rotation deficit and a reduced Total Range of motion have a significant correlation with NDI in throwing athletes.

KEYWORDS: Throwing athletes; internal rotation deficit; neck pain

INTRODUCTION

Today, the field of sports has evolved to an extent where even an average athlete has to undergo rigorous training to excel in his choice of sport. The increase in competition puts greater demands on an athlete. These demands predispose an athlete to injuries due to various factors.

Athletes who require repeated overhead throwing activity in their field of sport have been shown to develop certain amount of deficit in the shoulder internal rotation of their dominant hand and it is often accompanied by a subsequent increase in external rotation¹⁻³. These changes in the rotational ranges have been shown to predispose an athlete to various shoulder injuries¹⁻⁵.

While the relation between shoulder rotational range deficit and shoulder pain has been shown, its effect on the neck region has not been studied as much. In non-athletic population, neck disorders often affect the upper limb functions. Also upper limb activities have been shown to aggravate an existing neck pain⁶. Therefore, it is imperative to find if upper limb dysfunction can be a risk factor in developing neck pain. This study aims to determine whether the shoulder

rotational disturbances developed in a throwing athlete have any contribution towards development of neck pain in this population. It might help to predict and prevent neck problems in athletes with rotational range disturbances.

Non-specific neck pain is defined as any form of acute, subacute or chronic neck pain, where no abnormal anatomic structure as cause of pain can be identified. Neck pain in any population can affect the ability to manage activities of daily living⁶. The severity of such a neck pain and disability can be measured using a questionnaire- Neck Disability Index. It is a 10 item questionnaire and each consists of 0-5 points. The total score of 50 can be obtained and is then converted to percentage. The NDI is very widely used scale and has a proven validity and reliability⁷.

AIM

To determine the relation between Shoulder Rotation Range and non-specific neck pain using NDI in throwing athletes

OBJECTIVES

- To determine the prevalence of neck pain in throwing athletes using Neck Disability Index.
- To determine if correlation exists between shoulder rotational range and neck pain in throwing athletes.

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METHODOLOGY

This is an observational study. After the approval from ethical committee, 70 male overhead throwing athletes between 18 to 30 years of age were recruited. Athletes with previous history of shoulder or neck injuries, athletes suffering from any other illness were excluded from the study. All the athletes recruited were male. All athletes were informed about the need for study and procedure of the study and proper written consent was taken from all participants.

Shoulder rotational ranges (Internal rotation and External rotation) were taken with a standard goniometer in supine position for dominant and non-dominant sides. The Neck Disability Index Questionnaire (NDI) was filled by all the athletes. Shoulder rotational ranges for dominant and non-dominant sides were compared. Correlation between rotational range differences and NDI was then found by using Spearman's Correlation test.

RESULTS

For the 70 athletes participating in this study, a significant difference was found in the ER, IR and TROM for dominant and non-dominant sides ($p<0.005$) as shown in Table 1. Out of the 70 athletes, 42 were found to demonstrate mild disability (6.44 ± 5.87) on NDI due to neck pain. IR deficit and TROM deficit were found to have a moderate positive correlation with NDI as shown in Table 2.

TABLE 1: RANGE OF MOTIONS (IN DEGREES)

	Dominant	Non-dominant	Mean Difference*
IR	65.83 ± 8.54	74.70 ± 6.4	-8.87 ± 5.86
ER	101.71 ± 6.39	96.77 ± 4.85	4.94 ± 3.71
TROM	167.54 ± 8.05	171.47 ± 6.44	-3.93 ± 5.09

P-value <0.05

*difference calculated as (dominant)-(non-dominant)

TABLE 2: CORRELATION OF ROTATIONAL DIFFERENCES WITH NDI

	Correlation Coefficient(r)	p-value	Correlation
IR Deficit	0.364	0.002	Moderate Positive Correlation
ER difference	0.094	0.437	No Correlation
TROM Deficit	0.538	0.001	Moderate Positive Correlation

DISCUSSION

A dominant shoulder has to perform a high velocity, repetitive action during the overhead throwing motion. This results in a few adaptive changes in the shoulder joint. Studies

have shown that a loss of IR and subsequent increase in the ER of the dominant shoulder is observed in throwing athletes. That is similar to the result obtained in this study. Numerous theories have been proposed to explain these changes in the rotational ranges which include humeral retroversion, posterior capsular tightness and muscular adaptations in the dominant shoulder.⁸

IR deficit in the shoulder joint has been associated with alterations in scapular positions in a few studies. A study by Thomas SJ, et al⁹ showed the presence of a reduced external rotation and increased scapular protraction in athletes with IR deficit. Another study by Borich MR, et al¹⁰ suggested an increased anterior tilting of scapula in shoulders with internal rotation deficit. These changes in scapular positions have been shown to be a risk factor for shoulder impingement and injuries in many studies.¹¹

Similarly, a study by Cools AMJ, et al suggested that alterations in scapular positioning might be associated with neck pain.⁸ Thus altered scapular orientation in shoulder with IR deficit might be the source of mild neck disability. This might explain the correlation between IR deficit and NDI found in this study.

TROM is a concept where the amount of ER and IR are added up to determine the total rotational arc of motion of the shoulder joint. TROM should be equal in both dominant and non-dominant shoulder.

A difference in TROM has been associated as a risk factor for shoulder injuries.³ In this study, TROM difference has been shown to moderately correlate positively with NDI. The reduced TROM of the dominant side might be due to soft tissue inflexibility developed in a throwing shoulder which includes pectoralis minor tightness and posterior capsule tightness. This tightness affects the scapular position thus causing excess anterior tilting.⁸

Studies show that scapular dyskinesia threatens the function of cervical spine by inducing abnormal compression and shear forces in the cervical spine.⁸ This might be a reason for the moderate correlation found between TROM and NDI.

CONCLUSION

This study concludes that, there is a prevalence of mild disability due to neck pain in throwing athletes. The Internal Rotation deficit and a reduced Total Range of motion have a significant correlation with NDI in throwing athletes.

CLINICAL APPLICATION

This study might help in predict and prevent neck pain in athletes with shoulder rotational disturbances. Also it demonstrates the need to consider the shoulder rotational component in evaluation and treatment of neck pain in throwing athletes.

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PREVALENCE OF MUSCULOSKELETAL DISORDERS IN RESTAURANT WORKERS

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ABSTRACT

The aim of this study was to find out the prevalence of musculoskeletal disorders (MSDs) in restaurant workers which included waiters and chefs. The study used the Modified Nordic Questionnaire to find out the most frequently affected body part, whether their work was affected due to their problem in last 12 months and if they had any problem in the last seven days. The result showed that 90% of the workers suffered from an MSD of which wrist (27%) and shoulder (20%) was maximally involved followed by lower back (10%) and knee pain (10%). This was due to their respective job demands where both the work profiles demanded for maximum upper limb use. Also a comparison of commonly affected joints was done between waiters and chefs where both of them suffered from maximum upper limb problems despite having different job profiles but chefs had a higher rate of problems. Also maximum workers suffering from MSD were working for 6-10 years.

KEYWORDS: musculoskeletal disorders; restaurant workers; waiters; chefs; upper limb

INTRODUCTION

Musculoskeletal disorders (MSDs) are defined as “physical work activities or workplace conditions on the job that are reasonably likely to be causing or contributing to injuries and disorders of the muscles, nerves, tendons, ligaments, joints, cartilage, and spinal disc (e.g., carpal tunnel syndrome)”¹. Work-related musculoskeletal disorders (WMSD) affect almost all body parts especially the back, neck and upper limbs, depending upon the physical movement characteristics, and the ergonomic and mechanical design of work tasks². WRMSDs usually occur when there is a mismatch between the requirements of the job and the physical capacity of the human body, depending upon the physical movement characteristics, ergonomics and mechanical design of work tasks. They range from acute traumas, such as fractures, that occur during an accident in the workplace to cumulative disorders (that usually take months or even years to develop) that result from repeated exposure to high or low intensity loads over a long period of time³. Restaurant workers include waiters/servers and cooks. Both the working populations have different task demands.

Task Analysis Of A Waiter - The duties of a waiter, wait staff or server is very hectic but

at the same time vital for the restaurant. Such duties include prepping section before guests sit down, offering cocktails or specialty drinks, recommending options for food, requesting special chef items, pre-clearing the tables, and serving food and beverages throughout the shift⁴.

Task Analysis Of A Cook – The different tasks a chef needs to perform includes inspection of food preparation and serving areas to make sure that safe food practices are being carried out, to stir food in large quantities so as to ensure even cooking, observing and testing food to check for adequate cooking, measuring or weighing and mixing ingredients according to recipes, using heavy kitchen utensils and equipments at times of large orders. Also they have to serve food to waiters, substitute for other cooks at times of emergency/absence⁵, to hold utensils for extended periods of time, toss woks, and barbecue meat, all of which demand a lot of repetitive movements of the upper limbs and standing for long hours without sufficient breaks⁶.

The hotel restaurant workers have a wide range of task demands as mentioned above. There are a few studies done on the different musculoskeletal problems in restaurant workers. Thus the need of study is to explore more about this occupation in India.

AIM

To find out the prevalence of musculoskeletal problems in restaurant workers.

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OBJECTIVES

- To find out different areas of musculoskeletal problems.
- To find out the most commonly affected part of the body in restaurant workers.
- To compare the result between waiters and cooks.

METHODOLOGY

Study design: Cross sectional survey

Sample size: 400

Sampling design: Purposive sampling

Study population: Restaurant workers

Study set up: Pune and Mumbai city.

Outcome measure: Modified Nordic Questionnaire

INCLUSION CRITERIA

- Restaurant workers working for more than 1 year in the restaurant and willing to participate in the study.
- Age group: 25 to 55 years, male.

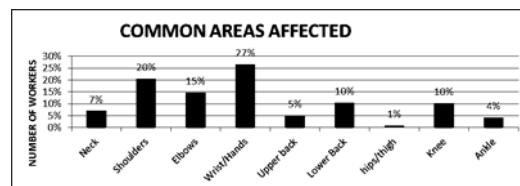
EXCLUSION CRITERIA

- Workers who have had recent injuries in last 6 months.
- Workers having any musculoskeletal or neurological problem.
- Bartenders and Hotel Managers.
- Part-time workers.
- Additional job workers.
- People playing any aggressive sports.

TECHNIQUE

The participants ($N = 400$) of the study were restaurant workers (200 chefs and 200 waiters). The mean of the age group was 32.62 and standard deviation (SD) was 7.5793. Modified Nordic Questionnaire was used for this study which had questions related to the objectives of the study. The study was approved by the Institutional Review Board. Restaurant workers who fulfilled the selection criteria were explained the need of the study before filling the consent form in the language they best understood. A written consent was taken from the participants and they filled the questionnaires during their working hours. A pilot study was carried out on 10 workers and then the required changes were made. The identity of the workers was not revealed and confidentiality was maintained. After data collection, the data was analyzed using Microsoft Excel (2007) and results were obtained.

RESULTS



GRAPH 1: COMMONLY AFFECTED BODY PARTS IN RESTAURANT WORKERS

TABLE 1: COMPARISON OF DIFFERENT BODY PARTS AFFECTED IN WAITERS AND CHEFS

Body parts	Waiters (%)	Chefs (%)
Neck	8	6
Shoulders	18	22
Elbows	15	15
Wrists/hands	26	27
Upper back	5	5
Lower back	11	10
Hips/thighs	1	0
Knees	11	9
Ankle	5	4

DISCUSSION

This study found out that 90% of the restaurant workers faced some or the other musculoskeletal problem. This finding is supported by the study of Khaleda Y where almost 78% of the restaurant workers were suffering from musculoskeletal disorders. The most common risk factors responsible for the development of musculoskeletal disorders are repetitive work, painful positions, carrying or moving heavy loads, other risk factors such as prolonged standing or walking⁷.

Maximum workers (54.75%) are in the age group of 25 – 30 years and about 32.75% restaurant workers who are having musculoskeletal disorders are in this profession for 6 – 10 years⁷. This study also found out that 65% of the workers work for almost 56 – 60 hours per week which means that the working hours is almost 8 -10 per day and 6 days a week which is a normal work schedule in most of the restaurants⁸.

Out of the total 400 restaurant workers, maximum complained of having upper limb problems where wrist/hand (27%) problems were the highest followed by shoulders (20%) and elbows (15%) which is seen in graph 1. This result holds true owing to the type of work the restaurant workers have to do. Upper limbs (the hand, wrist, elbow and shoulder), the neck and lower back are particularly vulnerable to MSDs. According to Khaleda Y's study, application of manual force to move objects causes tremendous stress on muscles and tendons of both the arms. Also repetitive work done using the same muscle/muscle groups and tendons continuously

for a prolonged period of the working day may be the reason for fatigue and injuries. It also states that in awkward postures (with the hands above shoulder height or with the wrists noticeably bent) the joints of the body are more vulnerable to injuries and the muscles therefore are less efficient for exerting force⁷. Second commonly involved body part was the low back due to awkward postures attained by the workers.

A comparative result between the commonly affected joints of chefs and waiters in table 1 showed that both the professions had maximum upper limb (wrists) involvement but chefs were more susceptible to problems due to their work profile. In chefs, 27% wrist involvement, 22% shoulder and 15% elbow problems were noticed. Xu YW et al described in their study the onsite ergonomics and task analysis of the cooks in the restaurants which supports this finding⁶. Also a study in Hong Kong says that the gross motor functions such as hand grip, elbow flexion and extension, and wrist pronation and supination were the commonly used positions of the upper limbs during cooking. Other reasons for upper limb problems were use of excessive force in chopping of food and repetitive actions of the forearm and/or the wrist required in chopping /cutting food. The main musculoskeletal risks of cooks are as follows:

- Raised left upper arm and abducted, neck flexed
- Left upper arm to rotate the wok quickly
- Left hand to hold the wok for a long time
- Alternate and quick left wrist extension and flexion
- Raised and abducted right upper arm
- Right upper limb to stir the food in the wok
- Quick right wrist pronation and supination
- Repetitive and quick task
- Frequent neck flexion
- Right arm frequently at the shoulder level to reach objects⁹.

Among 200 waiters, 26% had wrist problems, 18% had shoulder problems and 15% had elbow problems again suggesting that even waiters face a maximum of upper limb problems. A study done in Turkey supports this finding by stating that the highest mean pain intensity score was found in the forearm region¹⁰. Also waiters have to work by forward bending their neck, pronating and supinating their right hand usually which explain the finding where 67.5% have unilateral elbow involvement. They attain a bent posture when placing dish on the desk or collecting dish after eating, where the range is between 20 and 60 degree⁹.

Even the chefs most frequently use their right hand for cooking and other activities which affect their dominant elbow causing unilateral involvement. The workers also have to lift with

awkward postures and do overhead lifting, frequently overexert in handling overloaded serving trays and serving with one hand only¹¹.

Out of the total shoulder problems, maximum (68%) of them have bilateral involvement. Similarly, about 66.5% have bilateral wrist involvement. It so happens due to the job profile of both waiters and chefs where the waiter has to carry a tray in one hand and serve or clean with the other simultaneously⁴ and the chefs also use both the hands for different tasks as explained above.

Both the lower limbs also showed a bilateral involvement where 57.14% is for hips, and 83% is for both ankles and knees. Both the chefs and the waiters have to stand for prolonged periods of time. Standing for long periods of time can cause the posture to worsen progressively. Typically, workers will slowly begin to slouch and shift their weight from one foot to another to distribute the strain caused. Slouching causes a posture which is static and causes the worker to become less alert and active. If this uncomfortable position is maintained for a long duration, it can lead to circulation problems such as swollen feet and legs. When muscles are constricted, blood flow to the load-bearing muscles is hampered. These are the muscles which help in maintaining an upright position. This causes muscular strain in the legs, back and neck⁶.

Out of the total 90% workers who complained of having musculoskeletal problems, 79% of them could continue with their work despite of the discomfort caused by the pain. A study in Hong Kong states that in the catering industry, workers make an attempt to use awkward postures to lift or carry heavy objects, despite of them having an understanding or having the knowledge of how to ergonomically perform manual handling tasks in the workplace. The reason for this might be due to overlooking the severity of consequence of using incorrect postures, or they are habituated to use their incorrect postures to perform their daily work for a long period of time. They do not experience any discomfort or pain or injury by doing so, or even they have the experiences of discomfort but they are used to this discomfort². Only 21% of the restaurant workers considered their work capacity to be affected by their problem².

Only 27% of the total restaurant workers experienced some musculoskeletal disorder in the last 7 days but the remaining 73% did not face any problem in the last seven days.

CONCLUSION

There is a high prevalence of musculoskeletal disorders amongst restaurant workers where in 90% suffer from some or the

other musculoskeletal problems. Of these, the highest problems are in the wrist (27%), shoulder (20%) and the elbow (15%). The chefs and the waiters both showed a similar result of having maximum upper limb problems despite of different job profiles. Maximum workers who had an MSD were working for 6-10 years and for 6 days a week. Most of the workers (79%) could continue with their work despite of having some pain/problem.

ACKNOWLEDGEMENT

I extend my sincere thanks to all the volunteers for participating in my study.

CLINICAL APPLICATION

The hotel restaurant workers have a wide range of task demands as mentioned above. There are a few studies done on the different musculoskeletal problems in restaurant workers. But there is a need to explore more about this occupation in India. Hence this study would help us find out different MSDs in restaurant workers and also compare the result between waiters and cooks in India.

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COMPARISON OF CORE STRENGTH AND BALANCE IN SPEED SKATERS VS ARTISTIC SKATERS

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ABSTRACT

Background: Skating has been gaining popularity in Asian countries, and there are incidence of injuries noted due to falls. Since there are few established studies on skating and its association with fitness parameters like balance and core strength, this pilot study was mainly aimed to compare core strength and balance in both the types skating.

Objectives: The study was aimed to assess the core strength and dynamic balance between artistic and speed skaters and also to compare the two components in these 2 types of skating.

Materials and methods: 30 professional skaters were selected- 15 speed and 15 artistic skaters. Assessment of core was done using pressure biofeedback and balance was assessed using Star excursion balance test (SEBT).

Results: Analysis was done using unpaired T test for comparison of core strength between the 2 groups that revealed statistically insignificant results ($p > 0.05$). Unpaired T test done for balance revealed better balance in speed skaters for medial component of SEBT for right leg than artistic skaters($p < 0.05$).

Conclusion: The study concluded that core strength is equal in speed and artistic skaters however medial component of right leg of SEBT was found to be better in speed skaters.

KEYWORDS: speed skating; artistic skating; star excursion balance test; core strength

INTRODUCTION

Roller skating is travelling or moving on roller skates. There are two types of roller skating event – artistic roller skating and speed roller skating. Artistic roller skating is done on quads (on 4 wheels placed in rectangular manner) which consists of figure skating jumps, spins, and footwork into a program of 2 to 4 minutes set to music¹. It consists of various jumps like mazes or axel and are graded according to their rotations for example double axel or triple mazes². Speed skating is racing in a counterclockwise manner on inline (4 wheels in a line) or quads skates around a 400 meter oval rink consisting of two 100m corners³.

Balance is an integral part of roller skating sport. Balance is defined as the way of maintaining the line of gravity of a body within the base of support with the help of feedback from visual, vestibular, somatosensory structures⁴. Speed skaters and artistic skaters require a great sense of balance and postural control for executing proper skating techniques^{5,6}. For maintaining good balance and postural control, good core strength is required⁷.

Core stability and strengthening has become a very important part of training program in almost all sports⁸. It is important to strengthen

the core since it acts as a foundation for the muscles of the lower extremity to produce effective force. Lack of strengthening of core could lead to abnormal mechanical landing during the jumps⁹. The motions and skills of speed skating and holding dynamic postures of artistic skating cannot be performed by a single muscle group and requires harmonious working of many muscle groups at time, its kinematic chain being with the center of core muscle-group which mainly takes part in the stabilizing and supporting function of controlling different postures and movements.

Thus focus on core strengthening and balance is extremely important as it helps them to hold skating positions and skills which will help in better performance and reduce the risk of falling thus preventing injuries¹⁰.

As there is dearth of literature in these two forms of skating related to balance and core strength, studying these two forms of skating makes it important.

The main aim and objective of this study was to assess and compare core strength and balance between speed and artistic skaters. For assessing core strength pressure biofeedback was used and for balance star excursion balance test was used. In this study professional asymptomatic players were taken between the age of 13 to 25 years, skating for more than 3 years and who had no history of musculoskeletal injuries since the past 6 months were recruited. Hockey players, roll ball skaters and ice skaters were excluded.

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AIM

To study core strength and balance in speed skaters and artistic skaters

OBJECTIVES

- 1) To assess core strength and balance in speed skaters vs. artistic skaters
- 2) To compare strength and balance in speed skaters vs. artistic skaters

METHODOLOGY

This is an observational study. Sampling technique used was purposive sampling. After Institutional Ethical Committee approval, informed written consent was taken from 30 skaters (15 speed and 15 artistic) fulfilling the selection criteria. In this study professional asymptomatic players were taken between the age of 13 to 25 years, skating for more than 3 years and who had no history of musculoskeletal injuries since the past 6 months. Hockey players, roll ball skaters and ice skaters were excluded. Assessment of core was done using pressure biofeedback method and balance was assessed using Star excursion balance test. Statistical analysis was done using unpaired t test for comparison of two groups. The purpose of this study was explained to the coach and parents (in case of minors) the players and written informed consent was obtained prior to the testing. The subject were selected according to the inclusion and exclusion criteria. The assessment included –

- Core strength assessment
- Balance assessment

Core strength assessment: Subjects were made to lie on their back with knees bent to 90 degrees and BP cuff was placed under the posterior superior iliac spine. BP cuff was inflated to 40 mmHg. The subject were asked to squeeze/pull their stomach in and breathe normally. As the subjects performed the maneuver, the rise in the mercury was noted. And accordingly the core strength of the subjects was graded. The subjects were told to increase the pressure by 10 mmHg the therapist instructed to, “Start”, and to maintain the state for 5 seconds¹¹.

Balance assessment: Balance was assessed with the help of star excursion balance test. Star excursion balance is a series of single-limb squats using the nonstance limb to reach maximally to touch a point along 1 of 8 designated lines on the ground. The lines are arranged in a grid that extends from a center point and are 45° from one another. Each reaching direction offers different challenges and requires combinations of sagittal, frontal, and transverse movements. The reaching directions are named in orientation to the stance limb as anterior, anteromedial, anterolateral, medial, lateral, posterior,

posteromedial, and poster lateral. The goal of the task is to have the individual establish a stable base of support on the stance limb in the middle of the testing grid and maintain it through a maximal reach excursion in 1 of the prescribed directions. While standing on a single limb, the participant reaches as far as possible with the reaching limb along each reaching line; lightly touches the line with the most distal portion of the reaching foot without shifting weight to or coming to rest on this foot of the reaching limb; and then returns the reaching limb to the beginning position in the center of the grid, reassuming a bilateral stance (If the individual touches heavily or comes to rest at the touch-down point, has to make contact with the ground with the reaching foot to maintain balance, or lifts or shifts any part of the foot of the stance limb during the trial, the trial is not considered complete¹²).

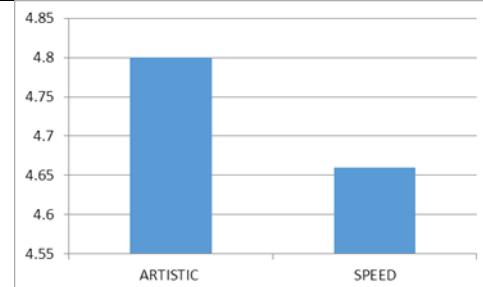
RESULTS

TABLE 1: BETWEEN GROUPS SUBJECT DEMOGRAPHIC DATA

	artistic skaters	speed skaters
Sample size [N=30]	n=15 (F-11,M-4)	n=15 (F-7,M-8)
Age (mean ± SD)	17.4 ±3.26	18.2 ±3.8

TABLE 2: INTRA GROUP ANALYSIS

	Artistic skaters mean±SD	Speed Skaters mean±SD	p value
Core strength			
both groups	VALUE??	VALUE??	0.82
SEBT			
Anterior right	75.9+ 8.15	77.86+11.24	0.56
anterior left	80.0+12.9	81.5+9.63	
Anteromedial right	88.86+12.26	82.53+8.65	0.11
Anteromedial left	89.52+10.82	82.53+8.65	0.29
Medial right	73.62+15.31	87.16+12.93	0.014
Medial left	76.9+17.85	80.06+15.97	0.61
Posteromedial right	95.08+15.32	93.9+16.93	0.84
Posteromedial left	84.26+15.22	86.76+16.15	0.32
posterior right	85.53+16.86	90.7+13.93	0.36
posterior left	4.26+15.22	90.53+16.49	0.28
posterolateral right	83.56+16.54	83.86+11.85	0.95
posterolateral left	91.92+17.94	91.1+17.62	0.85
lateral right	68.5+12.83	72.13+10.88	0.41
lateral left	74.9+16.35	86.26+14.39	0.05
anterolateral right	89.32+11.25	85.46+13.3	0.39
anterolateral left	92.06+17.7	88.73+14.11	0.57



GRAPH 1: COMPARISON OF CORE STRENGTH IN SPEED AND ARTISTIC SKATERS

DISCUSSION

This was study done in order to compare core strength and balance between speed skaters and artistic skaters.

In this study it was seen that the mean difference of core strength was better in artistic skaters than speed skaters but statistical results were insignificant. Comparable core strength values in speed and artistic skaters could be due to training effect of continuous skating on unstable base of support, similar training strength and balance drills in both the groups resulting in good core strength (≥ 6) in both the groups¹³. Zhang Shan-bin in his study has stated that applying core strengthening exercises would improve the skaters performance¹⁴.

The small change in mean difference of core strength was favoring artistic skaters. This could be attributed to lots of jumps or spins and perturbations involved in the artistic skating technique. In artistic skating there are technical jumps and spins which require good core strength to control jump landings and to hold the spin position for longer time². Whereas speed skating is just racing in a counterclockwise manner on inline or quads skates around a 400 meter oval rink³.

Roller skating requires the highest level of dynamic balance. Therefore improving balance is an important factor. In similar studies done, Astrid zech in his study stated that balance training was effective in improving postural sway and functional balance when compared with untrained control participants¹⁵. Previous studies have shown that developing good core has been shown to improve balance¹³. In speed skaters the medial component of SEBT was found to be better than artistic skaters which can be attributed to the cross over technique performed by speed skaters which is similar to medial component of SEBT. Cross over technique is performed while turning around the corners by lifting right leg over the other or vice versa. A skater performs this technique around 6 to 7 times as he/she moves thru the 180 degrees of 100 meter corner³. Proper cross-over technique is important to achieve top performance in speed skating³. Thus according to the results seen in this study, the values of speed and artistic skating were found to be comparable.

CLINICAL APPLICATION

This study can be used as a reference for further studies related to roller skating.

CONCLUSION

The study concluded that core strength is equal in speed and artistic skaters however medial component of right leg of SEBT was found to be better in speed skaters.

ACKNOWLEDGEMENTS

We thank for the support from Dr. Rachana Dabaghav (Assistant professor and Research co coordinator at Sancheti Institute College of Physiotherapy) and Dr. Ashok Shyam (M S Ortho, Research officer at Sancheti Institute of Orthopedics and Rehabilitation) for their guidance. The authors also wish to acknowledge all the participants for their cooperation during the process of assessment and for permitting us to conduct the study.

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IMMEDIATE EFFECT OF TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION VERSUS CRYOTHERAPY ON CALF MUSCLE SPASTICITY IN CEREBRAL PALSY PATIENTS – AN ELECTROPHYSIOLOGICAL COMPARATIVE STUDY

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ABSTRACT

Background: The disorder of reflex and motor function in Cerebral Palsy (CP) patients causes negative impact on the performance of movement patterns and affects the functional activities.

Aim: Electrophysiological comparison of the effect of Transcutaneous Electrical Nerve Stimulation (TENS) and Cryotherapy on Calf muscle spasticity in CP patients.

Study design – Comparative Experimental Study

Method: The study included 20 CP patients aged 5-18 years with Calf muscles spasticity. Subjects were randomly divided into two groups: TENS Group and Cryotherapy Group. Motor Nerve Conduction (MNC) Studies and H-Reflex for Tibial Nerve were assessed and then each group received two different therapies, following which again the electrophysiological tests were done.

Results: After the use of the TENS, a reduction in the HM Ratio ($p<0.0001$) and increase in H-Reflex latency ($p=0.0003$) was observed. However, after the use of Cryotherapy, an increase of the HM Ratio ($p<0.0001$) was observed, which was accompanied by an increase in the H-Reflex Latency ($p=0.0002$).

Conclusion: The findings of the study suggested that TENS would lead to immediate reduction of spasticity, whereas Cryotherapy would lead to immediate increase of spasticity of Calf muscle in CP patients.

KEYWORDS: Spastic Diplegic Cerebral Palsy; TENS; Cryotherapy; H- Reflex; Modified Ashworth Scale (M.A.S.)

INTRODUCTION

Spasticity is a major challenge to the rehabilitation team. Spasticity can prevent or hamper function, cause pain, disturb sleep, cause unnecessary complications and present major difficulties for care workers¹. Spasticity has been narrowly defined as a motor disorder characterized by velocity dependent increase in tonic stretch reflexes (muscle tone) with exaggerated tendon jerks¹. The extent and type of spasticity can fluctuate widely according to position, fatigue, stress and drugs. One limb may have one pattern of spasticity whilst another may have a different pattern¹.

Spasticity in children with brain injury, cerebral palsy or spinal cord injury is very common but often difficult to treat². Cerebral palsy is the most common cause of physical disability affecting children in developed countries, it is the term used for a group of nonprogressive disorders of movement and posture caused by abnormal development of, or damage to, motor control centers of the brain. Prevalence of CP at school age is 2 per 1000 live births in industrialized nations³.

Cerebral palsy (CP) results mainly from damage to the developing brain before, during, or

after birth. It causes various clinical features including developmental delay, motor dysfunctions, proprioception disturbance, postural impairment, seizures, speech disorders, hearing impairment, visual problem and mental retardation².

CP has been classified into various types. However, the most common type of CP is Spastic Diplegia. The term “Diplegia” is used to describe CP which affects the lower extremities primarily, with relatively normal upper extremity function⁴. The main physical problem of Diplegic CP is spastic gait. It is characterized by flexion, adduction and internal rotation at the hips, flexion at the knees, valgus at the hindfoot with tight Achilles tendon and supination with abduction at the forefoot². Spasticity is assessed clinically by MAS or Tardieu scale as well as Electrophysiologically by H-Reflex (HM Ratio)⁵.

There are numerous ways to treat spasticity. These include stretching, strengthening, orthotics, casting, therapeutic electrical stimulation, nerve or muscle blocks, medications, tendon lengthening and other orthopedic procedures, and dorsal rhizotomy. The goal of these treatments is to increase range of motion of a joint and decrease spasticity. This may help to increase functional mobility².

Spasticity in calf muscles has been managed pharmacologically and surgically to improve standing & gait, surprisingly, non-pharmacological management of spasticity calf muscles has not been documented thoroughly.

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Amongst non-pharmacological are TENS and Cryotherapy⁶. Results on the action of TENS and Cryotherapy in the treatment of spasticity are conflicting, and studies on their short-term effects are scarce, hence this study was planned.

AIMS & OBJECTIVES

- To study the electrophysiological effect of TENS on Calf muscle spasticity in CP patients.
- To study the electrophysiological effect of CRYOTHERAPY on Calf muscle spasticity in CP patients.
- To study the electrophysiologic comparison of the TENS and CRYOTHERAPY on Calf muscle spasticity in CP patients.

Experimental Hypothesis- Use of TENS and cryotherapy would have a statistically significant effect on Calf muscle spasticity in Spastic Diplegic CP Patients.

Null Hypothesis - Use of TENS and cryotherapy would not have a statistically significant effect on Calf muscle spasticity in Spastic Diplegic CP Patients.

METHODS AND MATERIALS

Study Population: Spastic Diplegic CP

Age: 5 – 18 years

Sample Size: 20 patients, GROUP A – 10, GROUP B – 10

Study Setting: Shri K. K. Sheth Physiotherapy Center

Sampling Method: Convenient Sampling

Study Design: Comparative Experiment Study.

INCLUSION CRITERIA

- Spastic Diplegic CP with Calf spasticity (M.A.S.: Grade 1 - 3)
- Age Group: 5-18 years
- Both Genders
- Willingness to participate in the study

EXCLUSION CRITERIA

- Ongoing Complains of seizures
- Mentally Retarded
- Surgical treatment at Calf Muscle
- Allergy to Icing
- Unco-operative Patients

MATERIALS

EMG-NCV INSTRUMENT (RMS EP MK-II, Version 1.1), Spirit, Cotton, Surface Electrodes, Electrode Gel, Micropore, TENS Machine, Ice Packs, Straps, Pillow, Towel, Treatment Table.



FIGURE 1: MATERIALS USED



FIGURE 2: ELECTROPHYSIOLOGICAL ANALYSIS

METHODOLOGY

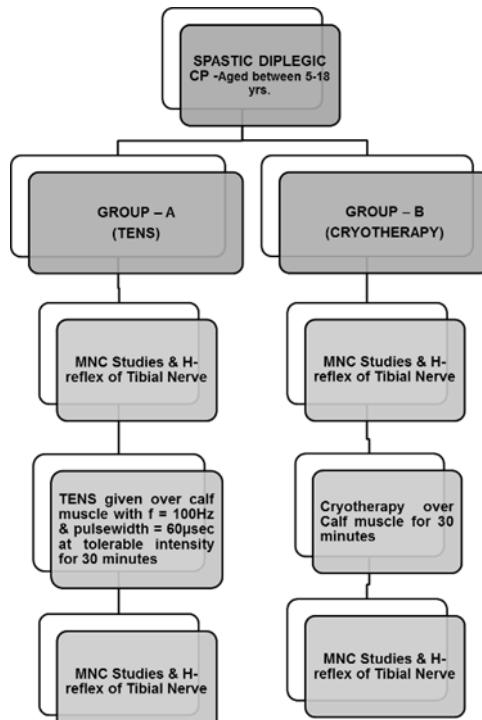




FIGURE 3: ELECTRODE PLACEMENT

OUTCOME MEASURES

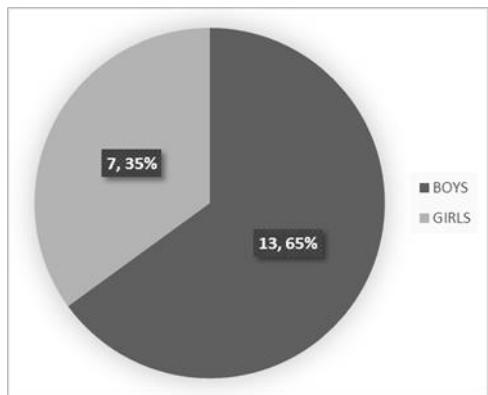
Electrophysiological Analysis – Tibial Nerve MNC Studies & H- Reflex (HM Ratio and H – Latency)

STATISTICAL ANALYSIS

The entire data obtained from the pre and post assessment of H-Reflex within the group was analyzed using paired t- test and calculated using Graphpad Version 3.10

RESULTS

GENDER DISTRIBUTION

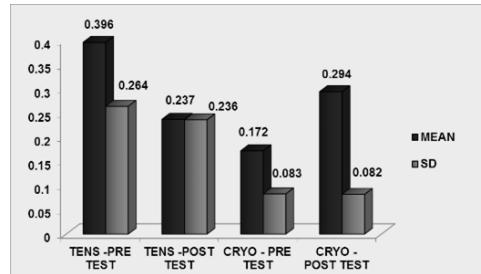


GRAPH 1: GENDER DISTRIBUTION

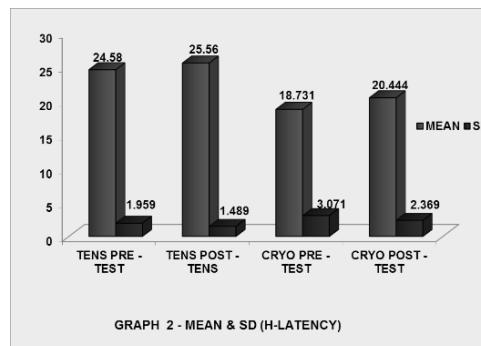
RESULTS OF STATISTICAL ANALYSIS

- Obtained value for HM ratio of TENS group from two-tailed t test, were p value < 0.0001, considered extremely significant with $t = 5.314$
- Obtained value for HM ratio of Cryotherapy group from two-tailed t test, were p value < 0.0001, considered extremely significant with $t = 7.369$
- Obtained value for H-Latency of TENS group from two-tailed t test, were p value was 0.0003, considered extremely significant with $t = 4.642$

- Obtained value for H-Latency of cryotherapy group from two-tailed t test, were p value was 0.0002, considered extremely significant with $t = 5.014$



Graph 2: Mean & SD (HM Ratio)



Graph 3: Mean & SD (H LATENCY)

Thus all the data obtained were highly significant at 95% confidence interval.

DISCUSSION

The study results suggests that after the use of the TENS, a reduction in the HM Ratio ($p<0.0001$) and increase in H-Reflex latency ($p=0.0003$) was observed. However, after the use of Cryotherapy, an increase of the HM Ratio ($p<0.0001$) was observed, which was accompanied by an increase in the H-Reflex Latency ($p=0.0002$).

The decreased HM Ratio following TENS application suggests that this treatment led to a reduction in the motor neuron excitability. Martin et al suggested that activating large diameter afferent nerve fibers through TENS may modulate interneuron activities in several spinal segments, which then activate inhibition mechanisms of the presynaptic nerve⁶. An alternative hypothesis is that somatosensory stimulation through TENS due to continuous activation of peripheral nerve fibers causes insensitivity to prolonged central excitation accompanied by lower corticomotor neuron excitability.

An increase in HM Ratio and H- latency was observed following application of cryotherapy suggesting that there was increase in

motor neuron excitability. Similar results were found by Dewhurst et al., suggesting that the mechanism responsible for increasing H-reflex during local cooling might be explained by greater synchronism of prolonged depolarization in afferent fibers⁶. It has been suggested that a change in temperature alters the opening and closing duration of sodium channels along the axon. Thus, cooling reduces depolarization velocity, allowing more sodium to enter the cell, increases latency, amplitude and action potential duration⁷.

CONCLUSION

TENS would lead to Immediate Reduction of Spasticity, whereas CRYOTHERAPY would lead to immediate Increase of Spasticity of Calf Muscle in CP Patients.

FURTHER RECOMMENDATIONS

In the light of limitations in the present study, future study can be done using a larger and more homogeneous sample, as well as investigation of long term effect of TENS and CRYOTHERAPY on Spasticity.

ACKNOWLEDGEMENT

We express our heartfelt gratitude to our dear parents & colleagues for their guidance & support which made this research work possible.

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PROPRIOCEPTIVE EXERCISES IN ANKLE SPRAIN IN SPORTS PERSON-AN EVIDENCE BASED SEMINAR

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ABSTRACT

INTRODUCTION: Ankle injuries is one of the most prevalent sports related injuries. Proprioception is a complex neuromuscular process concerned with the internal kinesthetic awareness of body position and movement. It plays an important role in joint stability and injury prevention. Examples of proprioceptive exercises include balancing on a wobble board, throwing-catching or dribbling a ball whilst in single leg stance, etc.

NEED OF THE STUDY: Chronic ankle instability, associated with multiple ankle sprains, can lead to difficulty with walking, running & jumping. Proprioceptive exercise helps with overall balance.

CONCLUSION: Physical training strengthens muscles and reduces risk of reinjury. Proprioceptive deficiencies can be improved through balance exercises that help to increase muscle reaction time and the contraction patterns that favor the correction of excessive inversion.

KEYWORDS: proprioceptive exercises; ankle sprain

INTRODUCTION

Proprioception is a specialized variation of the sensory modality and encompasses the sensations of joint movement and joint position¹.

Kinesthesia

The ability to sense active or passive movement of the limbs and body.

Joint Position Sense

The sense of position of a specific segment^{2,3}.

Often determined though measuring the accuracy of a patient to replicate a joint angle either actively or passively in open or closed kinetic chains⁴.

Injuries to the ankle joint are among the most common of all sport-related injuries¹.

Sports that register the highest incidence of ankle sprains are those requiring sudden, stops and pivoting, such as soccer, volleyball, and basketball¹.

These specific movements often result in ankle inversion during plantar flexion, which is the most common type of ankle sprain¹. (Figure 1)

Research has shown that 25–40% of athletes who suffer from an ankle sprain will experience a recurrent sprain due to acquired instability. However, more recent research points out the importance of restoring proprioception to the damaged muscles and ligaments following an ankle sprain¹.

Ankle sprains are caused by sudden inversion or eversion of the ankle, causing the

ligamentous structures to be stretched beyond their normal physiological and functional lengths⁵.



Figure1: Ankle inversion leading to ankle sprain

Ankle sprains have three grades of severity⁵. (Figure 2)

Grade 1 is a mild sprain with slight stretching and some damage to the fibrils of the ligament, there is little to no instability, minimal swelling, and ability to bear weight is intact.

Grade 2 is a moderate sprain with partial tearing of the involved ligaments, some instability, moderate pain, swelling, minimal bruising, and difficulty weight-bearing.

Grade 3 is a severe ankle sprain with ligament rupture, gross instability, severe pain, swelling, extensive bruising, and inability to bear weight.

Ankle proprioception provides essential information to enable adjustment of ankle positions and movements of the upper body, in order to successfully perform the complex motor tasks required in elite sport⁶.

Methods of proprioceptive rehabilitation include single-leg stance, balance, and coordination exercises and ankle disk training

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(Figure 3). These help to improve the neuromuscular control in athletes¹.

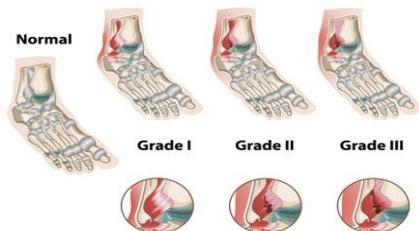


Figure 2: Grades of ankle sprain

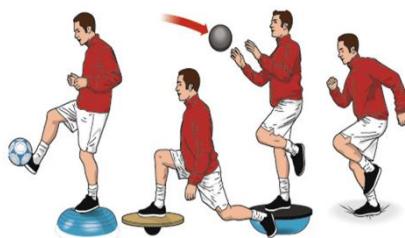


Figure 3: Proprioceptive rehabilitation exercises

METHODOLOGY

Proponents of an evidence-based approach define evidence very broadly as any empirical observation about the apparent relation between events. Thus, sources of evidence can range from unsystematic clinical observations of individual clinicians to systematic reviews of multiple randomized clinical trials (RCT).

The different forms of evidence may each provide recommendations that result in good outcomes for patients, but it is clear that some forms of evidence are more reliable than others in giving guidance to clinicians and their patients.

Organizations and authors have used various systems to grade the levels of evidence and strength of recommendations, Oxford Centre for Evidence-based Medicine Grades of Recommendations as well as the GRADE system of recommendations⁷.

Level of evidence for treatment effectiveness⁷.

Level-1	Systemic review of RCT of study that substantially agree.
Level-2	Individual RCT with narrow confidence window Observational study with dramatic effect
Level-3	Nonrandomized controlled cohort study
Level-4	Case control, case series, or historically studies
Level-5	Mechanism –based reasoning

DISCUSSION

In 2014, Mehdi Kasbparast, Hamidreza Keshavarzi, Shahnaz Molaei, Omid Yaghoobpour Yekani did a pilot study on The effectiveness of proprioceptive balance board training program: an

intervention mechanism in the reduction of ankle sprain on 47 subjects. 28 were included in the experimental group and 19 in the control group by simple random sampling. The program consisted of 10 basic exercises on and off the balance board, with variations on each exercise and a gradual increase in difficulty and intensity during the 7 week. The exercise program included (1) maintaining a single leg stance on a flat surface with eyes open and closed; (2) performing functional sport activities such as throwing, catching, and dribbling on 1 leg; (3) maintaining double-leg stance while rotating the balance board; (4) maintaining a single-leg stance on the balance board with eyes open and closed; (5) performing functional sport activities while in single-leg stance on the board; (6) and (7) were the repeated phase of 4 & 5 with longer time (15 minutes). The functional sport activities included dribbling and catching a ball with hand and kicking. The results of this study revealed that proprioceptive balance board training is affected on reduction of ankle sprain¹⁰.

In 2013, A. Ben Moussa Zouita, O. Majdoub, H. Ferchichi , K. Grandy, C. Dziri, F.Z. Ben Salah conducted a pilot study on The effect of 8-weeks proprioceptive exercise program in postural sway and isokinetic strength of ankle sprains of Tunisian athletes on 16 subjects. 8 had unilateral ankle sprain symptoms (experimental group) and 8 had bilateral non injured ankles (control group). The program includes 24 sessions displayed over 8 weeks (3 sessions/ week). Every session lasts between 20 and 30 minutes. The results of tests–retest and between both groups (injured vs. healthy) show that after eight weeks of proprioceptive work, significant increase of maximal strength, decrease in times of acceleration and deceleration at the level of plantar flexors and better stability of the injured limb at slow and average ($P < 0.05$). The study concluded that proprioceptive training exercises can effectively stabilize an unstable ankle above for muscular and postural control. However, 8 weeks does not assess whether we have achieved maximum effect¹.

In 2010, Eric Eils, Ralf Schroter, Marc Schroer Der, Joachim Gerss, Dieter Rosenbaum did a randomized controlled trial on Multistation proprioceptive exercise program prevents ankle injuries in basketball over 232 subjects. Subjects were randomly divided into training or control group. 102 were allocated to controlled group and 96 to training group. Control group continued with their normal work out routines. The training group consisted of 96 players who performed a multistation proprioceptive exercise program. The result of the study shows that during the season, 21 ankle injuries occurred in the control group and 7 injuries in the training group. The risk for

sustaining an ankle injury was significantly reduced in the training group by approximately 35%. Additional biomechanical tests revealed significant improvements in joint position sense and single-limb stance in the training group. The study concluded that the multistation proprioceptive exercise program effectively prevented ankle injuries in basketball players⁹.

In 2006, Timothy A. McGuine, James S. Keene did a randomized controlled trial on The Effect of a balance training program on the risk of ankle sprains in high school athletes. Seven hundred and sixty-five high school soccer and basketball players (523 girls and 242 boys) were randomly assigned to either an intervention group (27 teams, 373 subjects) that participated in a balance training program or to a control group (28 teams, 392 subjects) that performed only standard conditioning exercises. Subjects in the intervention group performed a 5-phase balance training program. Phases 1 through 4 consisted of 5 exercise sessions per week for 4 weeks before the start of the season. In phase 5 (maintenance phase), the subjects performed the program 3 times per week for 10 minutes throughout the competitive season. In all phases, each exercise was performed for 30 seconds, and the legs were alternated during a 30-second rest interval between each exercise. The exercises included maintaining a single leg stance on a flat surface with eyes open and closed, performing functional sport activities such as throwing, catching, and dribbling on 1 leg; maintaining double-leg stance while rotating the balance board; maintaining a single-leg stance on the balance board with eyes open and closed; performing functional sport activities while in single-leg stance on the board. The results of the study states that the rate of ankle sprains was significantly lower for subjects in the intervention group ($p = .04$). Athletes with a history of an ankle sprain had a 2-fold increased risk of sustaining a sprain (risk ratio, 2.14), whereas athletes who performed the intervention program decreased their risk of a sprain by one half (risk ratio, 0.56). The ankle sprain rate for athletes without previous sprains was 4.3% in the intervention group and 7.7% in the control group, but this difference was not significant ($P = .059$). The study concluded that the balance training program will significantly reduce the risk of ankle sprains in high school soccer and basketball players⁸.

In 2004, Michael E. Powers, Bernadette D. Buckley, Thomas W. Kaminski, Tricia, Hubbard, Cindy Ortiz did a pilot study on Six Weeks of strength and proprioception training does not affect muscle fatigue and static balance in functional ankle instability on 38 subjects (22 male and 16 female). Muscle fatigue was determined using the median power frequency

from an electromyographic signal, and static balance was assessed using center-of-pressure values obtained from a triaxial force plate. The result shows that there were no significant effects of the strength or proprioception training on our measures of muscle fatigue and static balance. Strength training, proprioception training, and the combination of the 2 failed to improve postural-stability characteristics in a group of subjects with FAI¹¹.

LEVEL OF EVIDENCE

Author	Title of study	Type of study	Level of evidence
Mehdi Kasbparast et al.,(2014)	The effectiveness of proprioceptive balance board training program: an intervention mechanism in the reduction of ankle sprain	Pilot study	Level-4
A. Ben Moussa Zouita et al.,(2013)	The effect of 8-weeks proprioceptive exercise program in postural sway and isokinetic strength of ankle sprains of Tunisian athletes	Pilot study	Level-4
Eric Eils et al.,(2010)	Multistation proprioceptive exercise program prevents ankle injuries in basketball	Randomized controlled trial	Level-2
Timothy A. McGuine et al.,(2006)	The Effect of a balance training program on the risk of ankle sprains in high school athletes.	Randomized controlled trial	Level-2
Michael E. Powers et al.,(2004)	Six Weeks of strength and proprioception training does not affect muscle fatigue and static balance in functional ankle instability	Pilot study	Level-4

CONCLUSION FROM EVIDENCES

Based on all supporting evidences which were reviewed from data bases, it can be concluded that Proprioceptive exercises are effective in treatment of ankle sprain in sports injuries.

ACKNOWLEDGEMENT

I would like to thank my parents & friends for their support & guidance.

CONFLICT OF INTEREST

There was no personal or institutional conflict of interest for this study.

SOURCE OF FUNDING

No fund was needed.

ETHICAL CLEARANCE

From K. K. Sheth Physiotherapy College, RAJKOT.

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A STUDY TO FIND OUT FREQUENCY OF DE QUERVAIN'S TENOSYNOVITIS IN MOBILE USERS - AN OBSERVATIONAL STUDY

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ABSTRACT

Background: Thumbs are commonly used for text messaging scrolling, which are not as well designed for fine manipulative or dexterous work. Repetitive use as in text messaging, scrolling can lead to the injury to the tendons of the thumb. The aim of study is to investigate the frequency of De Quervain's tenosynovitis and its association with mobile use more than one year.

Method: Sample size was 100 students which were selected through convenience sampling. Data was collected according to inclusion criteria and De Quervain's tenosynovitis was diagnosed through Finkelstein test. The participants were instructed to make a fist with the thumb enfolded inside the fingers. The examiner stabilized the forearm and passively ulnar deviated the wrist. Pain at the radial wrist over the Abductor pollicis longus and Extensor pollicis brevis tendons, a positive test indicated. The data was analyzed by SPSS version 20 and Chi-square was applied to analyze the data.

Result: Male/ female ratio was 1:3 all student were using regular touch screen cell phone. Out of 100 student 70 student having pain in thumb & wrist for this student finkelstein test shows positive result. There is significant positive correlation between mobile users and de quervain's tenosynovitis ($p < 0.05$).

Conclusion: The result of the study concluded that almost half of the students use their mobile phones for texting more than 1year & 1 hours per day and because of their high speed of texting, scrolling they experienced pain over the base of the thumb/wrist which shows the De Quervain's positive in that student and there is a positive association between the thumb pain and frequent text messaging and scrolling.

KEYWORDS: De quervain's tenosynovitis; Mobile use; Finkelstein test.

INTRODUCTION

Fritz De Quervain was the first in 1895, who defined De Quervain's tenosynovitis (DQ) as a painful complain of the wrist as stenosing tenosynovitis of thumb abductors around the radiostyloid process¹.

The literature review reveals the precise etiology of De Quervain's tenosynovitis which includes an acute trauma or an extreme, unaccustomed/new exercise. However, more commonly it may be the result of cumulative micro trauma. Thus, adults who use their hands and thumb in repetitive manner are more likely to have De Quervain¹.

Tendons are rope like structure that attaches muscle to bone. Tendons are covered by slippery thin soft tissue layer, called synovium. This layer allows the tendons to slide easily through a fibrous tunnel called a sheath. Any swelling of the tendons or thickening of the sheath, results in increased friction & pain.

De Quervain's tenosynovitis predominantly impacts the abductor pollicis longus (APL) and the extensor pollicis brevis (EPB) tendons, which pass through the first dorsal compartment of the wrist. The etiology of this

disease is due to repetitive and continued strain of the APL and EPB tendons as they pass under a thickened and swollen extensor retinaculum².

This pain is exacerbated by motion and activity requiring ulnar deviation with a clenched fist and thumb metacarpophalangeal (MP) joint flexion. Specific activities that may incite complaints include wringing a washcloth, gripping a golf club, lifting a child, or hammering a nail. Inflammation is increased with continued performance of these or similar functional activities².

The patients may experience the associated symptoms beside the pain is dysesthesias, such as numbness, tingling, burning, and cramping.

Mobile phone users are at risk of developing various repetitive strain injuries (RSI) type of conditions to the soft tissues due to repetitive use of the phone in text messaging, scrolling. Musculoskeletal problems of the upper limb and especially the thumb has been reported in mobile phone users due to text messaging, scrolling³.

Text messaging, scrolling is the common term for sending short text messages using the short message from mobile phones. With the new occupational and professional demands the prevalence of this condition is also increasing gradually⁴.

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The most standard finding in De Quervain's tenosynovitis is a positive Finkelstein test.

OBJECTIVE & AIM OF STUDY

To find out the frequency of de quervain's tenosynovitis in mobile phone users.

HYPOTHESIS OF STUDY

Null hypothesis: There is no significant correlation between frequency of de quervain's tenosynovitis and use of mobile phone.

Alternative hypothesis: There is significant between correlation frequency of de quervain's tenosynovitis and use of mobile phone.

METHOD

An observational study design with 100 students.

Inclusion criteria

- Age between 18 to 25 years
- Both male & female
- Daily one hours of mobile use since one year with one hand for messaging play game or searching.

Exclusion criteria

- Upper limb pathology
- Upper limb fracture
- Phone used with two hand
- Daily phone use is > one hours.

MATERIAL

- Paper
- Pen
- Record data collection sheet
- Consent form

PROCEDURE

Individually informed consent was taken from all the 100 students selected for the study on the basis of inclusion and exclusion criteria. Also including information such as type of mobile phone used by the students for text, hours of mobile phone use for texting, playing game & searching. The participants were instructed to make a fist with the thumb enfolded inside the fingers. The examiner stabilized the forearm and passively deviated the wrist. Pain at the radial wrist, over the Abductor pollicis longus and Extensor pollicis brevis tendons, a positive test indicated. When it is significantly more tender than the other side.

Data entry and analysis were done using computer software SPSS version 20. Frequency and percentages were taken for categorical variable. Chi-square was applied to determine association between different variables and

Finkelstein test. P value < 0.05 was considered significant.

RESULTS

Out of the total number of students who participated in the study 79 were females and remaining 21 were males with a male to female ratio of 1:3 respectively. In out of 79 females students 17 and out of 21 males students. Table 1.1 showed Descriptive Statistics.

Finkelstein test when done on students almost more than half (n=73) showed positive results. It was noted that as frequency of mobile phone usage increased progressively more and more people showed positive Finkelstein test. P value showed P= 0.00 which show highly significant correlation between de quervain's tenosynovitis and mobile phone user.

Table 1: Descriptive Statistics

	N	Mean	SD	Min	Max
Test	100	.8200	1.12	.00	11.0

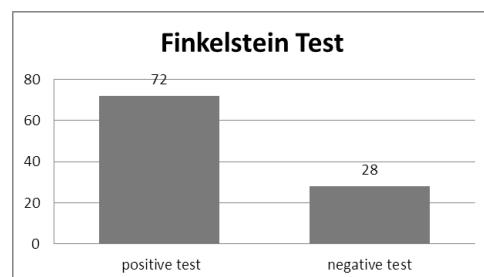
Table 2: Chi -Square Test

	Observed N	Expected N	Residual
Negative	28	50	-22
Positive	72	50	22
Total	100		

Table 3: Test Statistics

	Test
Chi-Square	19.360 ^a
Df	1
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 50.0



Graph 1: Results of Finkelstein Test

DISCUSSION

Finding of this study suggest that there is high correlation between de quervain's tenosynovitis and duration of mobile phone use.

Younger peer group access and exposure to different types of information and communication equipment such as computers and mobile phones has intensely increased over recent years⁶. During the past decade in Sweden only,

15-24-year-age group have 100% access to mobile phones and 93% on average utilize it for sending text messages (SMS), play game⁷. Use of mobile phones has increased in USA in teens for text messaging from 38% in 2008 to 54% in 2009⁸.

When considering students related to healthcare profession most common reasons related to SMS texting include academic related activities. De Quervain's tenosynovitis most commonly arises due to the overuse of the thumb musculature which is characterized by pain that spread over the surface of radial aspect of the wrist and intensified by ulnar deviation of the hand⁹. An extensive community based study performed in United Kingdom displayed that prevalence of de Quervain's tenosynovitis was 0.5% in males compared to 1.3% in females¹⁰.

In 2007, The New Zealand Medical Journal published an article on texting tenosynovitis where they figured two previous reports of texting tenosynovitis¹¹.

A variety of mobile phones were used by participants differing in size and weight that may have produced varied results. Also posture while texting was never noted. Studies have stated difference of results for those messaging while standing compared to sitting as it creates a different impact on the muscles of upper limb, with more exertion on muscles while standing during messaging¹².

In the 21st century mobile phones have become more of a necessity than a luxury. With the dawn of smart phones and advance versions expected in future it is inevitable that diseases related to extensive use of cell phones will increase in numbers specifically musculoskeletal problems. The main brunt will be faced by the younger generation who are still in the phase of development and are prone to extensive use through short message service (SMS) messaging. In the 21st century mobile phones have become more of a necessity than a luxury¹³.

With the dawn of smart phones and advance versions expected in future it is inevitable that diseases related to extensive use of cell phones will increase in numbers specifically musculoskeletal problems¹⁴.

The main brunt will be faced by the younger generation who are still in the phase of development and are prone to extensive use through short message service (SMS) messaging and gaming. In order to inhibit the development of musculoskeletal disorders, a better understanding of the texting technique and connection to the muscle activity and the kinematics is needed¹⁵.

As De Quervain's tenosynovitis is a serious issue leading to dysfunction of the affected hand further insight would help researchers to get a background for physical guidelines for texting

on mobile phones and recommend appropriate behavioral changes for averting this under recognized cause of tendinopathy. Limitation is overcome by further recommendation.

CONCLUSION

The result of this study concluded that almost half of the students use their mobile phones for texting more than 50 SMS per day and because of their high speed of texting they experienced pain and weakness over the base of the thumb/wrist which shows the more chances of De Quervain's tendinopathy.

CLINICAL IMPLICATION

This research will advise mobile phone users to text with both hands, take frequent breaks, not type too fast and to give proper support to their forearms and back while texting.

LIMITATION

- Small sample size
- Size of mobile phone screen
- Size of thumb
- 1st web space of hand

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A STUDY TO COMPARE DYNAMIC BALANCE BETWEEN INDIVIDUALS WITH FLAT FEET AND INDIVIDUALS WITH NORMAL ARCHED FEET USING Y- BALANCE TEST – AN OBSERVATIONAL STUDY

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ABSTRACT

Background: The foot is the most distal segment in the lower extremity chain and represents a relatively small base of support on which the body maintains balance. Although it seems reasonable that even minor biomechanical alterations in the support surface may influence postural-control strategies. Flexible flatfoot is defined as the postural appearance of the foot, with depressed medial longitudinal arch, pronated subtalar joint and the calcaneus assuming a valgus position underweight bearing conditions. The term “flexible” means that while the foot is flat when standing (weight-bearing), the arch returns when not standing. Dynamic balance is the ability of an object to balance while in motion. Y balance test is useful tool to measure dynamic balance which measures dynamic balance in three different directions, anterior, posteromedial and posterolateral direction.

Method: 10 subjects with bilateral flexible flat feet as assessed by sit to stand navicular drop test and 10 subjects with normal arched feet both in the age group 18-25 years were chosen for the study. The sample size therefore was 40 feet (20 flat feet and 20 normal arched feet). Group A (n= 10) subjects was individuals with flatfeet and group B (n= 10) subjects was individuals with normal arched feet. All the subjects were asked to perform Y – Balance test. Subjects were asked to keep their non-testing leg on the center of the grid. Subjects was asked to reach in all three directions (anterior, posteromedial and posterolateral) by great toe of testing leg as much as he can. Distance covered by the subjects in all three direction was recorded. Then same procedure was repeated for another leg. Data analysis was done by the Unpaired -'t' test using SPSS software version 20.

Result: There was no significant difference found between flatfeet and normal arched feet.

Conclusion: Dynamic balance is not affected in flat feet individuals.

KEYWORDS: Dynamic balance; Flat feet; Sit to stand navicular drop test; Y- balance test.

INTRODUCTION

The foot is the most distal segment in the lower extremity chain and represents a relatively small base of support on which the body maintains balance. Although it seems reasonable that even minor biomechanical alterations in the support surface may influence postural-control strategies¹. Foot performance significantly depends on its shape. Biomechanical foot changes affect its dynamic stability. Foot is the last part of lowest extremity, and this small supporting surface provides balance of the entire body. It seems that any biomechanical changes in this supporting surface may affect body posture².

Flexible flatfoot is defined as the postural appearance of the foot, with depressed medial longitudinal arch, pronated subtalar joint and the calcaneus assuming a valgus position underweight bearing conditions³. The term “flexible” means that while the foot is flat when standing (weight-bearing), the arch returns when not standing. Flexible flatfoot is one of the most common types of flatfoot. It typically begins in childhood or adolescence and continues into adulthood. It usually occurs in both feet and progresses in severity throughout the adult years.

About 20-30% of the population generally has flat feet⁴. Functional Foot Stability is defined as ‘the ability of the foot to continually adjust its position to maintain the body in an upright, balanced position’⁵.

Balance is defined as the process that maintains the center of gravity within the body's support base³. Balance needs constant adjustments with joint positioning and muscular activity³. Balance is one of the basic needs for daily activities and static and dynamic activities⁶. Balance is a physiological and mechanical situation and the desire of moving body within the optimal level of support⁶. Factors that influence balance include sensory information obtained from the somatosensory, visual, and vestibular systems and motor responses that affect coordination, joint range of motion (ROM), and strength⁷.

Dynamic balance is the ability of an object to balance while in motion. Ability to maintain postural stability under dynamic conditions is an important underlying component of physical activity performance⁵. Structural deviations in the ankle and foot complex predispose the individual to changes in weight bearing, muscle imbalance static as well as dynamic balance in ambulation resulting in

compensatory strategies which often predispose the individual to overuse injuries⁵.

The human foot serves to balance the individual directly or indirectly during a variety of static and dynamic activities such as standing, walking, running, swimming, and diving. During a static or dynamic stance, the foot is a “mobile adaptor” which provides optimal function with minimal risk of injury. The foot is the only direct source of contact with a supporting surface and therefore it plays an important role in all weight bearing tasks. When the components of foot effectively work together, it provides a balanced foundation for the body. Changes to foot structure, therefore, have the potential to alter the load distribution functions of the foot⁸.

The architecture of the foot ankle complex is inclusive of bone, muscle and ligaments which support the medial longitudinal arch giving it its shape, strength and stability⁹. Variations to the arch structure lead to the high and flat arches as described. Deviation from the normal arch can be due to an ordinary variant, hereditary and/or neurological problem⁹.

The ankle and foot complex play a critical role in maintaining erect posture, as also in adaptation to supporting surfaces, in correcting postural sway in single limb stance, in shock absorption and in transition of ground reaction force (GRF) in order to aid the push off during normal gait. Functional variance and minimal biomechanical alterations in the ankle and foot complex in turn alters the contact with the surface area and the peripheral sensory input in weight bearing posture¹⁰.

The presence of abnormalities in the foot structure may affect the function of the position of static, dynamic, movement and especially affected the displacement of the body. Flat foot deformities may disrupt the motion sensing receptors. So balance requires motion sensing receptor information processing to evaluate the body's position in space and the ability to control power generation system and it can involve posture in a complex interaction and also involves joint in entire range of motion for maximum balance⁶¹². Flat feet cause changes in foot mobility, foot posture, and load distribution under the foot which influences dynamic balance, that is essential in activities of daily living and for optimal performance in sports activity¹¹.

The navicular drop test (NDT) has been widely used as a clinical method to assess foot mobility. The NDT has also been associated with lower limb musculoskeletal injuries. Brody was one of the first to describe the NDT and he noted that it was helpful in evaluating the amount of foot mobility, specifically pronation, in runners¹³. Brody stated that the height of the navicular bone in subtalar joint neutral position is subtracted from

the height of the navicular bone in relaxed standing posture. Brody further noted that a normal amount of navicular drop was approximately 10 mm. Since Brody's initial description of the NDT, several authors have attempted to determine the reliability of the measurement as well as establish normative values in a healthy population. Studies have reported NDT values ranging from 6 to 9mm¹².

The Y Balance Test is a modified version of the Star excursion balance test (SEBT) developed to improve the repeatability of measurement and standardize performance of the test. The test utilizes the anterior, posteromedial, and posterolateral components of the SEBT¹³. YBT are that it takes less time to complete and has a standard protocol and high interrater and intrarater reliability¹⁴. So, purpose of the study was to compare dynamic balance in individual with flatfeet and an individual with normal arched feet using Y balance test.

AIM OF THE STUDY

Aim of this study is to compare dynamic balance between individuals with flatfeet and individuals with normal arched feet using y-balance test.

OBJECTIVES OF THE STUDY

To check dynamic balance in individuals with flatfeet using Y balance test.

To check dynamic balance in individuals with normal arched feet using Y balance test.

To compare dynamic balance between individuals with flatfeet and individuals with normal arched feet using Y balance test.

HYPOTHESIS

Null Hypothesis: There is no significant difference in dynamic balance between individuals with flatfeet and individuals with normal arched feet using Y balance test.

Alternative Hypothesis: There is significant difference in dynamic balance between individuals with flatfeet and individuals with normal arched feet using Y balance test.

METHOD

A total number of 20 subjects were selected (10 subjects with flexible flatfeet and 10 subjects with normal arched feet). Purposive sampling method was used for data collection. It was an observational study. Subjects were selected for study by giving consideration to inclusion and exclusion criteria. Inclusion criteria was 1) Bilateral Flexible flatfeet 2) Age group 18-25 years 3) Both male and female subjects 4) Ability to follow commands 5) Co-operative

patients. Exclusion criteria was 1) Structural flatfeet 2) Any neurological problem of lower limb and spine 3) Any pathological conditions of lower limb and spine, e.g. back pain, OA knee 4) Any past history of injury of lower limb and spine 5) Congenital abnormalities 6) Limb length discrepancy 7) Lower limb amputation 8) Pregnancy 9) Body mass index (BMI) > 30.

MATERIAL

- Record or data collection sheet
- Pen & paper
- Consent form
- Chair
- Measure tape
- Marker
- Weighing machine

PROCEDURE

A total number of 20 subjects were selected. (10 subjects with flexible flatfeet and 10 subjects with normal arched feet). Subjects were selected for study by giving consideration to inclusion and exclusion criteria. All the subjects were explained about the goal of the study the test procedures & written consent was obtained. All the subjects were divided into two group according to feet type. Group A (n= 10) subjects were individuals with flatfeet and group B (n= 10) subjects were individuals with normal arched feet. All the participants with normal arched feet and flexible flatfeet were diagnosed on basis of sit to stand navicular drop test (SSNDT).

Sit To Stand Navicular Drop Test (SSNDT) (Brody 1982):

The sit to stand navicular drop test is useful to diagnose flatfeet. It was calculated by difference between height of navicular from the floor when the subtalar joint is neutral in non-weight bearing (sitting position) and the height of navicular from the floor when in relaxed stance in a full weight bearing position.

Measurement procedure:



Figure 1: (Sit to stand navicular drop test)(SSNDT)

- The subject was placed in a sitting position with their feet flat on a firm surface with knee flexed to 90° and ankle joints in neutral position.
- The most prominent point of the navicular tubercle while maintaining subtalar neutral position was identified and marked with a pen.
- Place the index card on the floor vertically passing the navicular bone and the level of most prominent point of the navicular tubercle was marked on card.
- Then the individual was asked to stand without changing the position of the feet and to distribute equal weight on both feet.
- In the standing position the most prominent point of navicular tubercle relative to the floor was again identified and marked on the card.
- Finally, the difference between the original height of the navicular tubercle in sitting position and weight bearing position was assessed with a tape measure rendering the ND amount in millimeter.

6-9 mm distance is considered as normal arched feet. Less than 6 mm is considered as flatfeet. After diagnosis of flatfeet both the group (group A and group B) was asked to perform Y balance test.

For calculation of Y balance score limb length of all subjects was taken.

To measure Limb Length

The subject was in supine position. Distance between anterior superior iliac spine and ipsilateral medial malleolus was measured by measure tape.

Y Balance Test^{14,15}

All the subjects was explained about test procedure. Subjects were asked to keep their non-testing leg on the center of the grid. Patient was asked to reach in all three directions (anterior, posteromedial and posterolateral) by great toe of testing leg as much as he can. Distance covered by the subjects in all three direction was recorded. Then same procedure was repeated for another leg.



Figure 2: Y balance test

Score of Y balance test was calculated by following formula.

$$\text{Score of Y Balance Test} = \frac{\text{Anterior} + \text{Posteromedial}}{\text{Posterolateral}} \times 100$$

RESULTS

Unpaired t-test revealed that there were not significant differences ($P > 0.05$) between groups.

Table1: mean, standard deviation and unpaired t test

	Mean	SD	Sample size	P value	Inference
Normal	86.89	8.15	10	0.791	NS
Flatfeet	85.61	6.97	10		

NS = not significant

DISCUSSION

In this study, there is no significant difference in dynamic balance between two groups. Most of people activity is performed in dynamic balance areas. Therefore, in this research it was decided to evaluate dynamic balance.

Joints, skin and muscles are the main sources of proprioception, foot shape characteristics can affect the angle of skin, joint and muscle tension and therefore can affect afferent feedback for postural control and balance of the body. Therefore, in this research, the association between foot characteristic and dynamic balance were investigated. However, this study did not show any strong association between foot characteristic and dynamic balance. Dynamic balance can be affected due to loose planter ligaments and low muscular mass leads to loss of stability mechanisms. But it can be compensated because the studies shown patients who have normal foot arches or even increased arch when there is no weight bearing, but upon connection with the supporting surface and putting pressure and weight on the lower extremity, the arch decreases and foot flattens. These patients had a better balance compared to others. This can be attributed to increased contact points in foot during weight bearing, which results in increased stimulation of plantar cutaneous receptors among others.

In studying the arch height, it was discovered that when the arch height is less, the balance is better. These results are consistent with the study of Lin CH, et al. probably due to increased connection points of the foot with the ground, which in turn improves proprioception and balance.¹⁵

Moreover, development of heel valgus results in limited contact of the heel with the ground surface; therefore, fewer sensory receptors participate in sending necessary information to maintain balance. In this regard, a similar study was performed by Cobb et al¹⁶.

It seems that Decreased arch height do not have much effect on the indicators of dynamic balance evaluated by the Y Balance test.

CONCLUSION

There was not a significant difference in dynamic balance between flexible flatfoot group (A) and normal arch group (B).

So, Dynamic balance is not affected in flatfeet individuals.

LIMITATIONS OF THE STUDY

Small sample size, Size of foot was not considered.

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EFFECTS OF NEURAL MOBILISATION ON NECK DISABILITY IN CERVICAL RADICULOPATHY

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ABSTRACT

Background & Purpose: Cervical radiculopathy results in neck pain, however the primary symptoms are upper extremity pain, numbness and weakness which often results in significant functional limitations and disability. Neural mobilization is set of techniques designed to restore plasticity of the nervous system. The purpose of this study is to examine effect of neural mobilization along with other conservative treatment in management neck functional disability in cervical radiculopathy patients.

Participants: 30 patients with cervical radiculopathy within age group of 30-60 years, both male and female, who fulfilled inclusion and exclusion criteria were divided into group A (experimental) and group B (control), 15 in each group.

Methodology: Group A received neural mobilization with conventional physiotherapy treatment including Interferential current therapy(IFT), intermittent cervical traction(CT) and isometric neck exercises while group B received IFT, CT and isometric neck exercises for 10 sessions. The outcome measure neck disability index (NDI) was measured before starting the study and at the end of 10 sessions.

Analysis: The signed rank test and Mann Whitney U test were used for intra-group and intergroup statistical analysis respectively.

Results: Both groups showed significant improvement ($p<0.01$) in NDI. Group A showed greater improvement.

Conclusion: Neural mobilization with conventional therapy is effective in treatment of cervical radiculopathy in terms of decreasing neck functional disability.

KEYWORDS: cervical radiculopathy, neural mobilization, neck disability

INTRODUCTION

Cervical radiculopathy (CR) is frequently encountered in physical therapy with an annual incidence of 83·2 per 100 000 people and there is an increased prevalence in the fifth decade of life.^{1,2}

Cervical radiculopathy is the result of cervical nerve root pathology often caused by space occupying lesions such as cervical disc herniation, spondylosis, or osteophytosis. These space occupying lesions affect the pain generators of bony and ligamentous tissues within the cervical spine, producing upper extremity radicular symptoms (i.e. pain, numbness, weakness, paresthesia).^{3,4}

Location and pattern of symptoms will depend upon nerve root level affected.⁵ The seventh and sixth cervical nerve roots are most commonly affected.¹

People with neck pain combined with upper extremity symptoms experience greater levels of disability than do people with neck pain alone.⁶

Treatment strategies for patients with cervical radiculopathy range from conservative management to surgery. Evidence suggests that patients who are treated conservatively may experience superior outcomes compared to those who undergo surgery.⁷ However, there is little evidence to suggest which non-operative interventions are the most effective.⁸

Neural mobilization is a set of techniques designed to restore plasticity of the nervous system, defined as the ability of nerve surrounding structures to shift in relation to other such structures.

It contributes to restoring the ability of neural tissue itself to stretch and tension and stimulates the reconstruction of normal physiological function of nerve cells.⁹

Very few studies have seen the effect of nerve mobilization in cervical radiculopathy.

The purpose of this study is to assess effects of neural mobilization along with other conservative treatment in management functional disability of neck in cervical radiculopathy individuals.

AIMS AND OBJECTIVES

AIM

To study the effectiveness of neural mobilization along with conventional therapy on functional disability of neck in management of cervical radiculopathy.

OBJECTIVES

To find out effect of neural mobilization on functional disability of neck in management of cervical radiculopathy.

To find out effect of conventional physiotherapy treatment on functional disability of neck in management of cervical radiculopathy.

To find out additive effect of neural mobilization with conventional therapy on functional disability of neck in management of cervical radiculopathy.

HYPOTHESIS

Null hypothesis

There will be no significant difference between effect of neural mobilization along with conventional therapy and conventional therapy on neck disability in management of cervical radiculopathy.

Experimental hypothesis

There will be significant difference between effect of neural mobilization along with conventional therapy and conventional therapy on neck disability in management of cervical radiculopathy.

METHODOLOGY

MATERIALS

- Consent Form
- Assessment Form
- Weighing machine
- IFT machine
- ICT machine
- Treatment table

STUDY DESIGN: Quasi experimental study

STUDY SETTING: All the patients were taken from general hospital, Ahmedabad.

SAMPLE DESIGN: Convenience sampling

SAMPLE SIZE: 30 patients of cervical radiculopathy, divided between control and experimental group

INCLUSION CRITERIA

- Age: 30 – 60 years
- Sex: male and female
- Neck pain radiating to any one upper limb since more than 3 weeks
- Positive ULTT 1 with structural differentiation positive for neural involvement
- Willing to participate in the study

EXCLUSION CRITERIA

- History of sudden onset
- Prolapsed intervertebral disc(grade III & IV)
- Cervical instability
- Severe osteoporosis
- Spinal conditions like myelopathy/tumors/infection
- Traumatic injuries of upper limb and cervical spine
- Under treatment of steroid injections/Spinal surgeries

PROCEDURE

Suitable subjects taken who fulfilled inclusion and exclusion criteria after complete assessment

Filling up of the consent form and randomly allocated to control and experimental group

CLINICAL INTERVENTIONS

Group A: neural mobilization^{10,11} and conventional therapy (ICT, IFT and isometric neck exercises)¹²⁻¹⁴

Group B: conventional therapy alone

Protocol was given for 10 days with one session per day (6 days/week)

NEURAL MOBILIZATION

Patient was placed in supine lying position on the plinth and ULTT1 position was given with Scapular depression, Shoulder abduction, Forearm supination, wrist and finger extension, Shoulder lateral rotation, Elbow extension, Contralateral cervical side bending. Neural mobilization was done using wrist component.

Initially, two series of oscillations procedures of a few seconds duration were performed at a frequency of 2-4 oscillations per second. As the patient's condition improved, the duration of the procedure was extended to 20-30 seconds, with increase in the amplitude and more series of oscillations.

CONVENTIONAL THERAPY

Intermittent cervical Traction was applied to the patient in supine position with neck flexed (traction force 1/10th of patient's body weight) for 15 minutes.

IFT (carrier frequency 4 KHz; beat frequency 100 Hz, gradually sweep was introduced) was given by quadripolar method with intensity as per patient's tolerance for 15 minutes.

Isometric neck exercises were given for flexion, extension, side flexion and rotation with manual resistance. (10 repetitions were performed with 6 second hold). The intensity of the isometric exercises can be from light to strong, depending on the patient's symptoms and tolerance.

OUTCOME MEASURE

Recording of NDI on the 1st and the 10th day (last day) of the treatment¹⁵.

The Neck Disability Index (NDI) is a self-report questionnaire used to determine how neck pain affects a patient's daily life. NDI consists of ten questions. Each of the 10 sections is scored separately (0 to 5 points each) and then

added up. The score is often reported as a percentage (0-100%)

RESULTS

Data analysis was done using SPSS software version 16.

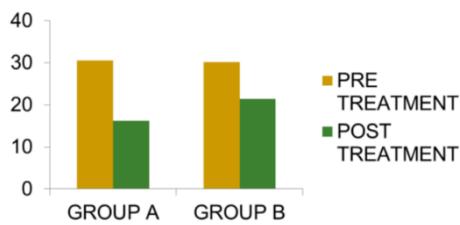
Baseline measures between the groups were similar.

P value for NDI: 0.736(>0.05)

For within group analysis, non-parametric Wilcoxon Signed Rank Test was applied for NDI score of group A and B which showed significant difference ($T: 120$, $p<0.01$) indicating improvement in both the groups.

TABLE 1: COMPARISON OF MEAN VALUES OF NDI, PRE TREATMENT AND POST TREATMENT IN BOTH GROUP A AND GROUP B

Group	Pre treatment	Post treatment	T value	p value
	Mean + SD	Mean + SD		
Group A	30.48+5.26	16.24 +4.80	120	< 0.01
Group B	30.18+4.27	21.46 +3.62	120	



GRAPH 1: WITHIN GROUP ANALYSIS OF NDI SCORE

Between the groups, non-parametric Mann Whitney U test (Wilcoxon Sum Rank Test) was used and there was also significant difference of NDI score between group A and B ($z -2.63$, $p <0.0001$)

TABLE 2: COMPARISON OF POST TREATMENT MEAN VALUES OF NDI BETWEEN GROUP A AND GROUP B

Scale	Z value	p value
NDI	-2.63	0.008

DISCUSSION

Results of the present study shows that neural mobilization using upper limb tension test along with other conventional therapy is effective in treatment of cervical radiculopathy in terms of decreasing neck functional disability. Improvement in other group receiving conventional therapy was also seen but improvement in NDI was more in neural mobilization group.

This results are in accordance with work done by Donald murphy et al, 2006. They have studied clinical outcomes of patients with

cervical radiculopathy treated nonsurgically. Twenty-four of 31 (77.4%) patients had a clinically significant improvement from baseline to the end of treatment, and 25 of 27 (92.6%) had a clinically significant improvement from baseline to long-term follow-up. Bournemouth Disability Questionnaire and NPRS were outcome measure⁸.

The reason for improvement in both the groups might have been the effect of ICT, IFT and exercises which were used in both the groups.

Traction unloads the component of spine¹⁶. IFT close the pain gate mechanisms and thereby reduces the pain perception¹⁴. Isometric exercise improving strength, endurance and tone of the neck muscles.

Better improvement in experimental group might be effect of neural mobilization which was additionally given. Neural mobilization gives positive impact on symptoms by improving intraneuronal circulation, improving axoplasmic flow, improving neural connective tissue viscoelasticity and reducing the sensitivity of AIGS (Abnormal impulse generating sites)¹⁷.

Neural mobilization with other conservative treatment showing improvement is also in accordance with work done by Murphy et al. for lumbar canal stenosis with lumbar distraction and neural mobilization¹⁸.

LIMITATIONS

- Absence of randomization
- Small sample size
- No long term follow up
- Subjective outcome measure
- Neural mobilization for other nerves of upper limb not included.

FUTURE RECOMMENDATION

Further studies can be done with random sampling; large sample size and long term follow up.

Other studies using different nerves of upper limb with objective outcome measures can be done.

CONCLUSION

Neural mobilization along with other conventional therapy is effective for decreasing neck functional disability in management of cervical radiculopathy.

CONFFLICT OF INTEREST

None

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ECCENTRIC EXERCISE IN TENNIS ELBOW – AN EVIDENCE BASED PRACTICE

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ABSTRACT

Tendinopathy can result from overuse and is experienced in the affected tendon as pain with activity, focal tenderness to palpation, and decreased ability to tolerate tension, which results in decreased functional strength. Research has shown that an eccentric exercise program can be effective in the treatment of tendinopathies. The earliest studied was the Achilles tendon, and subsequent studies have shown benefits using eccentric exercises on other body regions including the patellar tendon, proximal lateral elbow, and rotator cuff.

KEYWORDS: Tennis elbow; eccentric exercise.

INTRODUCTION

Upper limb plays an important role in everyone's daily life and hand is the effectors organ of the upper limb which supports it mechanically and allows it to adopt the optional position for any given action from the functional point of view.

Tennis elbow is characterized by pain at the lateral aspect of the elbow, commonly associated with resisted wrist or finger extension and gripping activities. Lateral epicondylitis is also known as: lateral epicondylalgia, lateral epicondylosis, Lateral epicondylitis, or tendonitis of the associated forearm extensor muscles (e.g. extensor carpi radialis brevis tendonitis). It is a condition with complex etiological and pathophysiological factor¹.

The first description of symptoms indicating a painful condition in the Common Extensor Origin was given in 1873 by Runge, who called the condition writer's cramp².

Tennis elbow is one of the most common lesions of the arm. This injury is a major challenge, as it is difficult to treat, prone to recurrence and may last for several weeks or months, with an average duration of a typical episode which has been reported to be between six months to two years³.

The dominant arm is more commonly affected and the incidence of tennis elbow in practice is approximately 4 to 7 per 1000 patients per year with the annual incidence of 1-3% in the general population which increases to 19% in 30-60 years old population specifically and appears to be more long standing and severe in women³.

Exercise program incorporating

eccentric muscle activity are becoming increasingly popular as they are considered to provide a more effective treatment than other forms of exercise therapy. Some studies proposed the used of eccentric training for promoting collagen fiber cross-linkage formation within the tendon, thereby facilitating tendon remodeling.

Eccentric muscle contractions are defined as contractions in which an active muscle is stretched. Muscles tend to shorten upon activation, eccentric contractions occur when the external forces acting on a muscle are greater than the forces produced by the muscle. Rather than working to pull a joint in the direction of the muscle contraction, the muscle acts to decelerate the joint at the end of a movement or otherwise control the repositioning of a load. (As shown in figure 1)

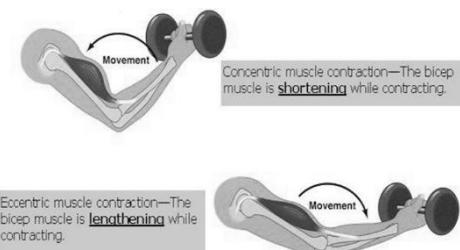


Figure 1: Eccentric Muscle Contraction

The three principles of eccentric exercises are: (i) load (resistance); (ii) speed (velocity); and (iii) frequency of contractions⁴.

Load (resistance): One of the main principles of eccentric exercises is increasing the load (resistance) on the tendon. Increasing the load clearly subjects the tendon to greater stress and forms the basis for the progression of the program. Indeed, this principle of progressive overloading forms the basis of all physical training programs. Therapists believe that the load of eccentric exercises should be increased

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according to the patient's symptoms; otherwise the possibility of re-injury is high⁴.

Speed (velocity): Another basic principle of successful eccentric exercises is the speed (velocity) of contractions. The speed of eccentric training should be increased in every treatment session, thus increasing the load on the tendon to better simulate the mechanism of injury, which usually occurs at relatively high velocities. However, other therapists claim that eccentric contractions should be performed at a slow velocity to avoid the possibility of re-injury⁴.

Frequency of contractions: The third principle of eccentric exercises is the frequency of contractions. Sets and repetitions can vary in the literature, but therapists claim that three sets of ten repetitions, with the elbow in full extension, forearm in pronation and with the arm supported, can normally be performed without overloading the injured tendon, as determined by the patient's tolerance⁴.

Many eccentric exercise are available for tennis elbow like wrist Flexion & Extension Exercise (as shown in figure 2), Ball Squeeze Exercise (as shown in figure 3),Flex Bar

Exercise (as shown in figure 4),Wrist curls Exercise(as shown in figure 5),Supination Pronation With Weight Exercise (as shown in figure 6),Wrist Extension With Broom Handle Exercise(as shown in figure 7),Radial Deviation With Weight Exercise(as shown in figure 8).



Figure 2: Wrist Flexion & Extension



Figure 3: Ball Squeeze Exercise



Figure 4: Flex Bar Exercise



Figure 5: Wrist Curls Exercise

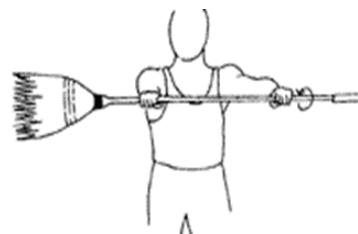


Figure 7: Wrist Extension with Broom Handle

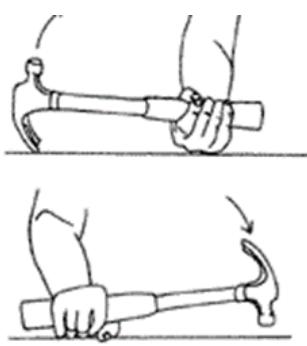


Figure 6: Supination & Pronation Exercise



Figure 8: Radial Deviation with Weight Exercise

METHODOLOGY

Proponents of an evidence-based approach define evidence very broadly as any empirical observation about the apparent relation between events. Thus, sources of evidence can range from unsystematic clinical observations of individual clinicians to systematic reviews of multiple randomized clinical trials (RCT).

The different forms of evidence may each provide recommendations that result in good outcomes for patients, but it is clear that some forms of evidence are more reliable than others in giving guidance to clinicians and their patients.

Organizations and authors have used various systems to grade the levels of evidence and strength of recommendations, Oxford Centre

DISCUSSION

LEVEL OF EVIDENCE

No	Author	Title of study	Review of articles	Type of study	Level of evidence
1	Frances L Cullinane et al.,(2014)	Is eccentric exercise an effective treatment for lateral epicondylitis?	Eccentric exercise as part of a multimodal therapy programme for improved outcomes in patients with lateral epicondylitis.	Systematic review	Level -1- Systemic review of RCT of study that substantially agree
2	Miguel Ortega-Castillo et al.(2014)	Evaluate the Effectiveness of the Eccentric Training in Symptomatic Upper Limb Tendinopathies	Eccentric training may reduce pain and improve strength in upper limb tendinopathies.	Systematic review	Level -1- Systemic review of RCT of study that substantially agree
3	Bryan Murtaugh et al., (2013)	Eccentric Training for the Treatment of Tendinopathies	Eccentric exercises have been shown to be effective in the treatment of tendinopathies at various locations of the body	Systematic review	Level -1- Systemic review of RCT of study that substantially agree
4	Dennis Y. Wen et al;(2011)	Eccentric Strengthening for Chronic Lateral Epicondylosis.	No effective result	Randomized Study	Level -2- Individual RCT with narrow confidence window Observational study with dramatic effect
5	Timothy F. Tyler et al;(2010)	Addition of isolated wrist extensor eccentric exercise to standard treatment for chronic lateral epicondylosis	Markedly improved with the addition of an eccentric wrist extensor exercise to standard physical therapy	Randomized Study	Level -2- Individual RCT with narrow confidence window Observational study with dramatic effect

In 2014, Frances L Cullinane et al., did a systemic review on Is eccentric exercise an effective treatment for lateral epicondylitis? To establish the effectiveness of eccentric exercise as a treatment intervention for lateral epicondylitis. Studies were included incorporated eccentric exercise, either in isolation or as part of a multimodal treatment protocol, assessed at least one functional or disability outcome measure, and the patients had undergone diagnostic testing. This study concluded that the majority of consistent findings support the inclusion of eccentric exercise as part of a multimodal therapy program for improved outcomes in patients with lateral epicondylitis⁶.

In 2014, Miguel Ortega-Castillo et al., did a systematic, critical review of the literature to find out the Effectiveness of the Eccentric Training in Symptomatic Upper Limb

for Evidence-based Medicine Grades of Recommendations as well as the GRADE system of recommendations⁵.

Level of evidence for treatment effectiveness⁵

Level-1	Systemic review of RCT of study that substantially agree.
Level-2	Individual RCT with narrow confidence window Observational study with dramatic effect
Level-3	Nonrandomized controlled cohort study
Level-4	Case control, case series, or historically studies
Level-5	Mechanism –based reasoning

The articles were taken from Clinical Rehabilitation Journal, Yoga & Physical Therapy Journal, the American College of Sports Medicine, Sports Physical Therapy Journal, Journal of Shoulder and Elbow Surgery Board of Trustees, Br J Sports Med.

Tendinopathies. After selection 12 studies satisfied the eligibility criteria. In 11 studies, pain decreased significantly with eccentric exercise. Strength was assessed in 9 studies; within-group evaluations show that strength significantly improved in the eccentric-group in 7 studies, whereas inter-group changes were only significantly better in the eccentric-group in 3 studies for all the parameters and in 2 studies for some of the parameters and concluded that eccentric training may reduce pain and improve strength in upper limb tendinopathies⁷.

In 2013, Bryan Murtaugh et al., conducted review study on Eccentric Training for the Treatment of Tendinopathies. This study concluded that Eccentric exercises have been shown to be effective in the treatment of tendinopathies at various locations of the body⁸.

In 2011, Dennis Y. Wen et al., did a prospective randomized study on Eccentric Strengthening for Chronic Lateral Epicondylitis to compare a wrist extensor eccentric strengthening exercise program with a wrist extensor stretching/modality program for the treatment of chronic lateral epicondylitis on 28 adult subject with chronic lateral epicondylitis. Pain scores with visual analog scale from 0 to 100 were obtained at baseline and then at 4, 8, 12, 16, and 20 weeks after the start of the exercise program. This study concluded that despite previous reports documenting favorable results with eccentric exercises for other tendinopathy, the authors were unable to show any statistical advantage to eccentric exercises for lateral epicondylitis during these periods compared with local modalities and stretching exercises.⁹

In 2010, Timothy F. Tyler et al., did a prospective randomized trial on Addition of isolated wrist extensor eccentric exercise to standard treatment for chronic lateral epicondylitis on Twenty-one patients with chronic unilateral lateral epicondylitis were randomized into an eccentric training group and a Standard Treatment Group. DASH questionnaire, VAS, tenderness measurement, and wrist and middle finger extension were recorded at baseline and after the treatment period and thenconcluded that all outcome measures for chronic lateral epicondylitis were markedly improved with the addition of an eccentric wrist extensor exercise to standard physical therapy¹⁰.

CONCLUSION FROM EVIDENCES

Eccentric exercise have been shown that the effective in the treatment of tennis elbow along with the other conventional treatment. Also reduce the chance of the re-occurrence of condition because in eccentric exercise muscle get strengthen.

ACKNOWLEDGEMENT

I would like to thank my parents & friends for their support & guidance.

CONFLICT OF INTEREST

There was no personal or institutional conflict of interest for this study.

SOURCE OF FUNDING

No fund was needed.

ETHICAL CLEARANCE

From K.K.SHETH Physiotherapy College, RAJKOT.

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SHORT COMMUNIATION

A SURVEY ON MUSCULOSKELETAL PROBLEMS IN WOMEN WEARING HIGH HEEL SHOES

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ABSTRACT

Background: Wearing high heel is especially stressful for the joint of foot because all the body weight rests here; foot is then forced into narrow pointed toe box compounding the associated musculoskeletal problems.

Therefore a survey was carried out to see the musculoskeletal problems in women wearing high heel shoes.

Methodology: A survey was carried out in Morres College, Anjuman College of engineering; kingfisher & Franklin airlines. Total 40 subjects read and signed an institutionally approved informed consent form. Questionnaires were provided to the subjects and the responses were documented on data collection form.

Result: In our study we found that (75%) women were symptomatic for musculoskeletal problem who wore high heel shoes.

Conclusion: Concluded that musculoskeletal problems were in descending order in plantar fasciitis , Tendoachilles tightness, lowback pain and then in metatarsalgia , Morton's neuroma, hallux valgus, corn, callus, bunion.

KEYWORDS: Tendoachilles Tightness; Lowback pain; Morton's Neuroma; Hallux Valgus; Metatarsalgia; Hammer toe; Corn; Calluses; Bunion

INTRODUCTION

A women wearing high heel looks more elegant, graceful and stylish and looks aesthetical taller, slender. Professional women working in the office prefer to wear high heel shoes.

Types of shoes worn are 1. Still toe 2. Platform

High heel more than 6" raises the wear's feet significantly higher than toes. High heel forces your body weight to be thrown forward and make your legs, feet, hip and spine work against the way they were designed to work^{1,3}.

Wearing high heel is especially stressful for the joint of foot because all the body weight rests here, foot is then forced into narrow pointed toe box compounding the problems, the common musculoskeletal problem associated with high heels are^{1,5}:

Low Back Pain (LBP): Since high heel causes the body lean forward it is compensated by tilting pelvis forward and changing spine curvature by increasing lordosis .This all creates more stress for the nerves of lumbar spine and tighten your low back causing back pain .

Anterior knee pain: It also increases the prevalence of anterior knee pain by stressing the quadriceps muscle and is one of the risk factor for Osteoarthritis (OA) in old age.

Tendoachilles Tightness (TA): A constant plantar flexion in high heel shoes, stress the TA, causing its tightness. The tightness is

about 15 degrees is significant.

Foot: A) Plantar Fasciitis (PF): Refers to syndrome of inflammation of band of tissue that runs from the heel along the arch of foot because of wearing high heel the plantar fascia is tensed and micro trauma produced causes its inflammation resulting in PF.

B) Metatarsalgia: In this pain with burning sensation occurs over the plantar aspect of foot when the excessive proportion of body weight is taken up by the forefoot. By wearing high heels pain is felt under metatarsal head.

C) Morton's Neuroma: Due to constant use of high heels with compact toe box there is compression and thickening of nerve tissues that develop 3rd, 4th toe.

D) Callus: It is especially toughened area of skin which has become relatively thick and hard in response to repeated friction pressure and other irritation by wearing high heel shoes.

E) Bunion: It is localized painful swelling at the base of big toe that can accompany hallux valgus. It is frequently associated with inflammation of nearby bursa caused due to wearing tight fitting high heel shoes. Because of frequent usage of light shoes, toes tend to take shape of shoe big toe overlap smaller toe causing enlargement and swelling.

G) Hammer toe: Common deformity of foot in which either 2nd, 3rd , 4th toe is bend at middle IP joint so that tip of toe is bend downward while middle of the toe is bend upward resembling a hammer.

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METHODOLOGY

Approval for the study was taken from the Institutional Ethics Committee.

A cross-sectional study was carried out in Morres College, Anjuman College of engineering, kingfisher & Frankfinn airlines.

INCLUSION CRITERIA

- Age Group 18-25 Years
- Height Of Heel >5cm
- Duration Of Wearing Of High Heel Shoes > 3 Hrs / Day
- Frequency Of Wearing High Heel Shoes > 4 Times / Week

EXCLUSION CRITERIA

- Previous history of injury in ankle,kneeback < 1 month.Those found eligible for study were explained the study in detail in the language best understood by the subject

By Purposive sampling total 40 participants were recruited who read and signed an institutionally approved informed consent form. Questionnaires were provided to the subjects and the responses were documented on data collection form.

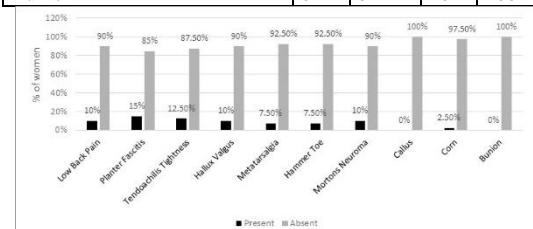
STATISTICAL ANALYSIS

Statistical analysis was done by using descriptive and inferential statistics using Chi-square test and software used in the analysis were SPSS 17.0 version,GraphPad Prism 6.0 and EPI-INFO 6.0 version and $p<0.05$ is considered as level of significance.

RESULTS

TABLE 1: Distribution of women according to symptoms

Symptoms	Present		Absent	
	No	%	No	%
Low Back Pain	4	10	36	90
Planter Fascitis	6	15	34	85
Tendoachilles Tightness	5	12.5	35	87.5
Hallux Valgus	4	10	36	90
Metatarsalgia	3	7.5	37	92.5
Hammer Toe	3	7.5	37	92.5
Morton's Neuroma	4	10	36	90
Callus	0	0	40	100
Corn	1	2.5	39	97.5
Bunion	0	0	40	100

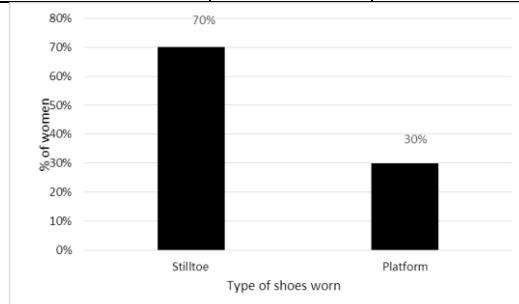


GRAPH 1: Distribution of women according to symptoms

Low back pain, hallux valgus and Morton's neuroma was present in 10% of women, planter fasciitis in 15%, tendoachilles tightness in 12.5%, metatarsalgia and hammer toe in each 7.5% of women and corn in 2.5% of women respectively.

TABLE 2: Distribution of women according to type of shoes worn

Type of shoes worn	No of women	Percentage (%)
Stilltoe	28	70
Platform	12	30
Total	40	100

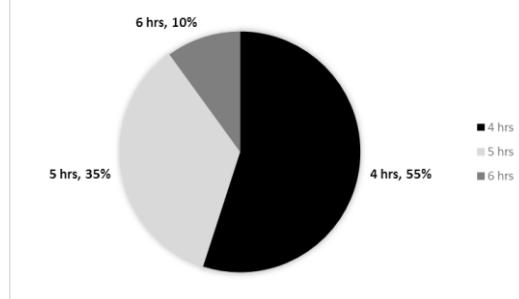


GRAPH 2: Distribution of women according to type of shoes worn

28(70%) of women worn still toe type of shoes and 12(30%) women worn platform type of shoes respectively.

TABLE 3: Duration of wearing high heel shoes and performing the activity standing walking

Duration of wearing high heel shoes	No of women	Percentage (%)
4 Hrs	22	55
5Hrs	14	35
6Hrs	4	10
Total	40	100

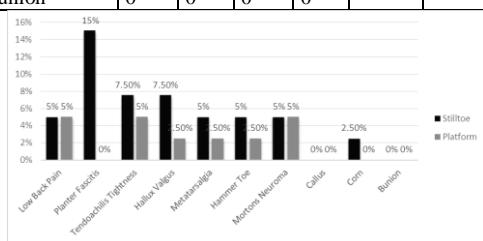


GRAPH 3: Duration of wearing high heel shoes and performing the activity standing walking

Duration of wearing high heel shoes was 4 hrs in 55% of women, 5 hrs in 35% of women and 6hrs in 10% of women respectively.

TABLE 4: Relationship between musculoskeletal problems and type of shoes worn

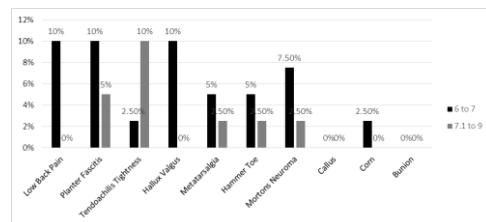
Symptoms	Stilltoe		Platform		χ^2 value	p-value
	No	%	No	%		
Low Back Pain	2	5	2	5	0.84	0.35,NS
Plantar fasciitis	6	15	00		3.02	0.08,NS
Tendoachilles Tightness	3	7.5	2	5	0.27	0.60,NS
Hallux Valgus	3	7.5	1	2.5	0.05	0.81,NS
Metatarsalgia	2	5	1	2.5	0.01	0.89,NS
Hammer Toe	2	5	1	2.5	0.01	0.89,NS
Morton's Neuroma	2	5	2	5	0.84	0.35,NS
Callus	0	0	0	0	-	-
Corn	1	2.5	0	0	0.44	0.50, NS
Bunion	0	0	0	0	--	

**GRAPH 4: Relationship between musculoskeletal problems and type of shoes worn**

Low back pain was present in 5% stilltoe and platform type of shoes worn(χ^2 -value=0.84,p-value=0.35), planter fasciitis was present in 15% of stilltoe(χ^2 -value=3.02,p-value=0.08), tendoachilles tightness in 7.5% of stilltoe and 5% of platform(χ^2 -value=0.27,p-value=0.60), hallux valgus in 7.5% of stilltoe and 2.5% of platform χ^2 -value=0.05,p-value=0.81), metatarsalgia in 5% of stilltoe and 2.5% of platform(χ^2 -value=0.01,p-value=0.89), hammer toe in 5% of stilltoe and 2.5% of platform(χ^2 -value=0.01,p-value=0.89), Morton's neuroma in each 5% of stilltoe and platform(χ^2 -value=0.84,p-value=0.35) and corn was present in 2.5% of stilltoe type of shoes worn(χ^2 -value=0.44,p-value=0.50).

TABLE 5: Relationship between musculoskeletal problems and heel height

Symptoms	6 to 7		7.1 to 9		χ^2 -value	p-value
	No	%	No	%		
Low Back Pain	4	10	0	0	2.14	0.14,NS
Plantar Fascitis	4	10	2	5	0.002	0.96,NS
Tendoachilles Tightness	1	2.5	4	10	5.87	0.015,S
Hallux Valgus	4	10	0	0	2.14	0.14,NS
Metatarsalgia	2	5	1	2.5	0.001	0.97,NS
Hammer Toe	2	5	1	2.5	0.001	0.97,NS
Morton's Neuroma	3	7.5	1	2.5	0.11	0.73,NS
Callus	0	0	0	0	-	-
Corn	1	2.5	0	0	0.49	0.48,NS
Bunion	0	0	0	0	-	-

**GRAPH 5: Relationship between musculoskeletal problems and heel height**

Low back pain was present in 5% of women wearingshoes of heel height 6-7 (χ^2 -value=0.214,p-value=0.14), planter fasciitis was present in 10% women wearing shoes of heel height 6-7 and 5% of 7.1 to 9 (χ^2 -value=0.002,p-value=0.96), tendoachilles tightness in 2.5% womenwearing of 6-7 and 10% of 7.1 to 9(χ^2 -value=5.87,p-value=0.015), hallux valgus in 10% women of 6-7(χ^2 -value=2.14,p-value=0.14), metatarsalgia in 5% women wearing shoesof 6-7 and 2.5% of 7.1-9(χ^2 -value=0.001,p-value=0.97), hammer toe in 5% women wearingshoes of 6-7 and 2.5% of 7.1-9 height (χ^2 -value=0.001,p-value=0.97), Morton's neuroma in each 7.5% of 6-7 and 2.5% of 7.1-9 (χ^2 -value=0.11,p-value=0.73) and corn was present in 2.5% of 6-7 heel height (χ^2 -value=0.49,p-value=0.48).

Plantar fasciitis is inflammation of band of tissue that runs from the heel along the arch of foot. Wearing high heel shoes and performing activities like walking, stair climbing and performed standing produces stress and micro trauma on plantar fascia resulting its inflammation and pain, also wearing high heels causes excessive pronation of foot and produces stress on medial arch further tensing the plantar fascia.

CONCLUSION

In our study we found that plantar fasciitis was most common musculoskeletal problem in women wearing high heel shoes. Musculoskeletal problems were in descending order in plantar fasciitis, Tendoachilles tightness, lowbackpain, Morton's neuroma, hallux valgus, Metatarsalgia, corn, callus, and bunion.

CLINICAL IMPLICATION

Since wearing high heel shoes leads to musculoskeletal problems which ispotentially modifiable / preventable by changing footwear.

Further study can be done with large sample size, considering problems in detail.

ACKNOWLEDGEMENT

I express my gratitude for the co-operation and support provided by Dr Mrs N.K.Deshpande (PT), Dr S. Ostwal (PT), Dr S. Ruby (PT), Dr Babarand Dr Sawalakhe. Special thanks to staff, residents and doctor colleagues. Also we extend our solemn thanks to all the subjects for their co-operation.

SOURCE OF FUNDING

Nil

SOURCE OF SUPPORT

None

CONFLICT OF INTEREST

Nil

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Published, Printed and Owned: Dr Dinesh Sorani (MPT)
Designed and Printed: R K Computers and Printers, Rajkot
Published at: "Matru Ashish", 4-Kanaknagar society, Near Sant Kabir Road, Rajkot-360003
Editor:Dr Dinesh Sorani (MPT), Mobile: +91-9426786167, Email: editor@indianjournalofphysicaltherapy.com