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Prevalence of tightness in hip joint muscles in middle aged women engaging in prolonged desk job: Descriptive study

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Abstract

The study aims to evaluate and screen the middle-aged women desk job workers for tightness of the muscles like hamstring, iliopsoas, and piriformis around the hip joint. 59 female participants who have worked for a minimum of 7 consecutive years for at least 5 hours a day will be included. Using standard tests like passive knee extension test, modified Thomas test, and piriformis test for measuring the length of three hip joint muscles like hamstrings, iliopsoas and piriformis will be used for tightness. 89.83% have Hamstring tightness, whereas 35.59% have Iliopsoas tightness and 40.67% had piriformis tightness.

Keywords: Middle-aged women, Hip muscle tightness, Passive knee extension test (PKE), Modified Thomas test (MTT), Piriformis test (PT)

Introduction

Occupational diseases and disorders are commonly seen as problems in society. Feeling pain in the different parts of the musculoskeletal systems is one of the major reasons for absence from the workplace which is proven by various studies. Musculoskeletal disorders related to work are caused by work cumulative trauma disorders due to exposure to stressful biomechanical and social-psychological agents in workplaces for long periods seen in industrially developed and developing countries [1]. Sitting for a long time can cause various adverse effects on the health of an individual. Sitting increases the risk of cardiovascular diseases, and musculoskeletal conditions which leads to compensatory postural changes which causes pain [2].

The workers involved in static work or tasks requiring repetitive movements, prolonged bad posture, and bad environmental conditions are at high risk of work-related musculoskeletal disorders [1]. Poorly designed ergonomics for computers is another important contributing factor in causing musculoskeletal as well as visual problems [3]. The most common complaint in workplaces in industrially developed and developing countries is pain in the various parts of the musculoskeletal systems. The increase in work-related musculoskeletal disorders can lead to a decrease in the quality and quantity of work along with the individual's well-being [1].

Sedentary behaviour like prolonged sitting is associated with musculoskeletal pain [2]. A sedentary lifestyle can lead to various problems like muscle tightness, reduced joint range of motion and reduced flexibility which hampers the daily activities of an individual [4]. The muscular fatigue due to the continuous activation of the postural support muscles causes adaptive changes in passive tissue stiffness which lead to postural changes and abnormal movement [2]. The one who is sitting all day such as a desk worker or student has adaptive changes happening that may shorten the hip muscles. The prolonged sitting increases the passive stiffness at the hip joint which limits the movement around the joint [4]. The screening of the hip tightness in individuals with sitting/sedentary jobs is important to prevent further health-related orthopaedic complications in the later stage of life [5].

The ability to move a joint through its complete range of motion is described as flexibility [6]. Flexibility is the extensibility of muscle as well as joint capsule, ligaments and tendons. The importance of flexibility is related to the prevention of orthopaedic impairments in later life, especially lower back pain [4].

Flexible muscles allow proper pelvic rotation, decrease disc compression, and prevent excessive stretch of musculatures. Flexibility is an important factor when concerned with physical and health-related fitness. Lack of flexibility is associated with various problems like executing and sustaining various activities in daily life.^[7] Hip muscle screening as indicated earlier shows us the probability of an individual going in for low back discomfort. Proactive screening techniques are less employed in the Indian context and hence the utility of such techniques in the Indian context requires to be assessed ^[4].

Material and Methodology

The experimental study was conducted on desk job working women in a hospital and bank, Sangli. The study was approved by the Institutional Ethical research committee of Miraj Medical Centre, College of physiotherapy, Wanless Hospital, Miraj.

Participants

Subjects Who completed the inclusion and exclusion criteria were included in the study. The age group of women desk job workers between 35-55 years who have worked for a minimum of 7 consecutive years for at least 5 hours a day will be included. The exclusion criteria were history of any recent surgery of the lower limb in the past 6 months, fixed flexion deformity of the hip, congenital hip dislocation, any recent fracture, joint instability, dislocation, and soft tissue injury like a hamstring injury and PIVD, degenerative conditions like osteoarthritis. All the subjects were asked to give written informed consent.

Procedure

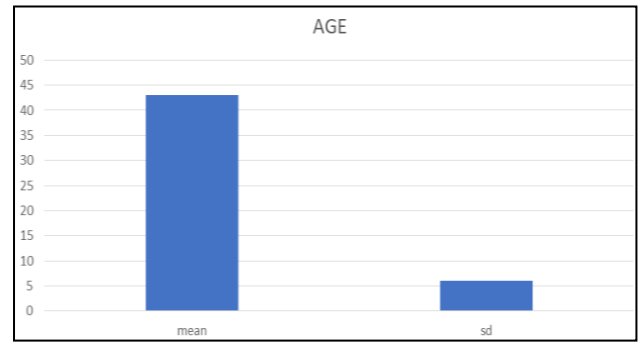
The training program was explained to the subjects in their vernacular language. Demographic data like name, age, and working hours were recorded in the data collection sheet. The subjects will be tested for hamstring, iliopsoas and piriformis muscles by using the Passive knee extension test, Modified Thomas test and Piriformis test respectively. A passive knee extension test is done in a supine position. While the opposite limb is extended, the limb which is to be tested is flexed at 90 degrees both at the hip and knee. The therapist then passively extends the knee till the maximum tolerable stretch of the hamstring muscle. The angle is then measured. Modified Thomas test the subject sits at the edge of the plinth. Then rolls back onto the bench while pulling one knee to the chest as close as they can and the other leg is hung down. The angle is then measured at the hip. Piriformis test the subject is in a side-lying position with the test leg up. Then subject flexes the tested hip to 60 degrees along with knee flexion. The examiner stabilizes the hip with one hand and applies downward pressure to the knee.

Results

Data analysis was performed using Statistical Package for the Social Sciences [SPSS] software. The level of significance for PRE and POST test for passive knee extension test and y balance test for between-group was calculated using Mann Whitney.

Table 1: Shows mean and standard deviation of baseline data [Age].

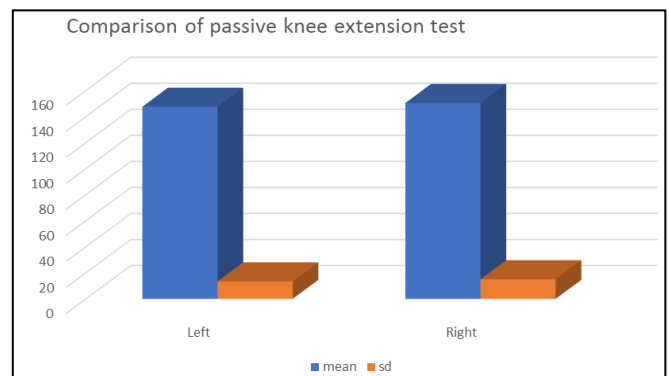
Variables	Mean	SD
N=59		
Age	43.08475	6.077908



Graph 1: Shows Mean and SD of Baseline Data [Age].

Table 2 Difference between Mean and SD of Passive knee extension test on right and left

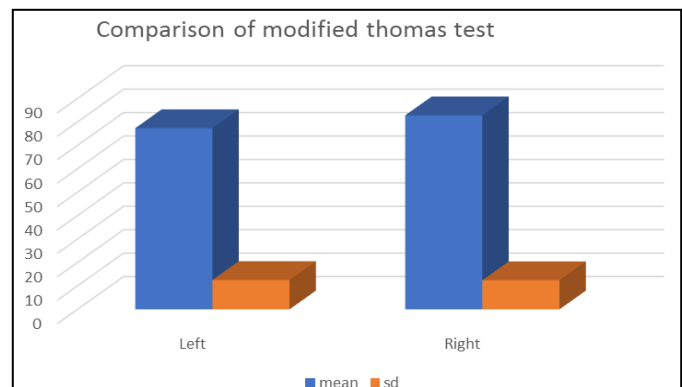
Variables	Passive knee extension test		
	Mean	SD	p- value
N=59			
Left	147.55	13.40	0.2
Right	150.40	15.09	0.0



Graph 2: Shows the Mean and SD of the passive knee extension test on the right and left.

Table 3: Difference between Mean and SD of Modified Thomas test on the right and left.

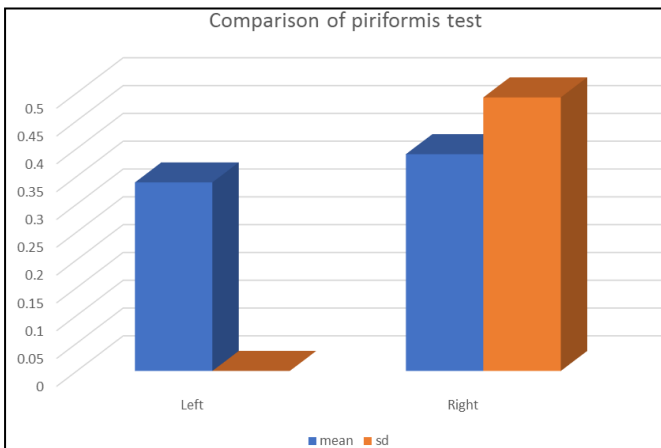
Variables	Modified Thomas test		
	Mean	SD	p- value
N=59			
Left	77.35	12.54	0.0
Right	82.83	12.43	0.0



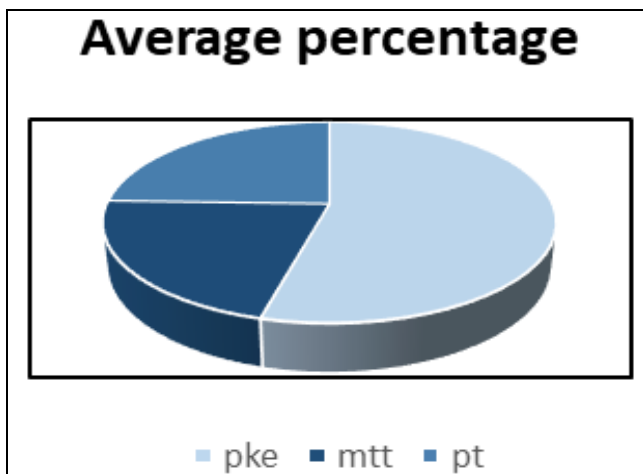
Graph 3: Shows the Mean and SD of the Modified Thomas test on the right and left.

Table 4: Difference between Mean and SD of Piriformis test on right and left

Variables	Piriformis test	
	Mean	SD
N=59		
Left	0.33	0.47
Right	0.38	0.49



Graph 4: Shows the Mean and SD of the Piriformis test on the right and left.



Graph 5: Shows the average of subjects involved in hip tightness

Discussion

The person who is sitting all day such as desk job workers has adaptive changes taking place that can shorten the hip muscle. This study was intended to find out the prevalence of hip tightness in female middle-aged desk job workers. The sedentary population frequently complain of low back pain caused by muscular imbalance because they are usually involved with a prolonged sitting job with a certain amount of walking and standing occasionally to carry out job duties. Sitting in a chair for eight hours or more may develop tightness of back and hip muscles such as hamstrings, iliopsoas, piriformis etc. and create strain on joints as the muscles are continuously in a contracted position to maintain the sitting position.

In the present study, it was found that out of 59 female desk-job workers working for 5 hours a day for a minimum of 7 consecutive years are included with no history of recent fracture, degenerative condition, soft tissue injury, deformity. 89.83% of subjects have hamstring muscle tightness, and the average Hamstring tightness was observed on the right side more than the left. 35.59% of subjects were found to have variable degrees of Iliopsoas muscle tightness, with right side Iliopsoas muscle tightness slightly exceeding the left side. 27.11% of subjects were on the right side and 23.72% on the left side. Whereas 40.67% of subjects were found to have piriformis muscle tightness on both right and left sides.

Previous studies by Pradip B *et al.* (2018) [4] concluded that there is significant hip tightness in males engaging in prolonged desk jobs. Results showed the tightness in hamstring, iliopsoas and piriformis. Hence it is concluded that

a majority of desk job professionals developed tightness in muscles making them prone to low back pain or other symptoms associated with back or hip. Since this study proved that desk job workers are more prone to hip tightness.

Furthermore, Malika Mandal *et al.* (2017) Identified the prevalence of piriformis tightness in sedentary individuals. 200 subjects were included according to inclusion and exclusion criteria. Tightness of piriformis muscle was assessed using the piriformis test. Results showed 79.5% of prevalence in both males and females. It concluded that in a sedentary population the prevalence of piriformis tightness is very high and it leads to piriformis syndrome and later on low back pain. Hence this study indicates that the prevalence of piriformis tightness is high in the sedentary population.

Another study done by Boukabache, *et al.* (2021) [2] found an association between passive hip extension and prolonged sitting/physical inactivity. There is a possibility that these findings indicate a physiological adaptation in passive muscle stiffness. In this study, 144 subjects were included and the modified Thomas test is performed to identify the relation between the hip extension and the prolonged sitting. Results showed there was 6.1° more passive hip extension in the high activity & minimal sitting group when compared to the low activity & prolonged sitting group.

Phyllis A *et al.* (2008) examined the reliability of inclinometer and goniometric measurements of hip extension flexibility by using the modified Thomas test. 42 healthy subjects were used for this study. The modified Thomas test was performed on each subject using both an inclinometer and a goniometer. The results showed that the two instruments can be used interchangeably for measuring hip extension flexibility. Hence it is concluded that the high correlations found in the study provide strong evidence that the inclinometer and goniometer are reliable instruments for measuring hip extension flexibility.

The tightness in the hamstring causes the adaptive shortening of the muscles leading to posterior pelvic tilt along with the flattening of the lumbar spine which causes pain in the low back. Iliopsoas muscle connects the lumbar spine to the hip so in case of the tightness or shortening it increases the anterior pelvic tilt which puts the excess strain on the spine. Piriformis is the postural muscle and they tend to become overactive, hypertonic, weak and shortened in length. While sitting it gets overactive and hypertonic which causes tightness. The hip tightness due to the prolonged sitting job can be managed with various conservative strategies like ergonomic advice about proper positions while working, frequent breaks, stretching and strengthening exercises to do at the workplace to reduce the stress on the body. Modification of the workplace, as well as wrong habits while working, is very important to maintain a healthy lifestyle.

Conclusions

This study was done to check for the hip tightness in middle-aged female desk-job workers for hamstring, iliopsoas, and piriformis muscles. Out of 59 subjects, 89.83% of subjects have hamstring muscle tightness, 35.59% have iliopsoas muscle tightness and 40.67% of subjects have piriformis muscle tightness. The P-value of the study is 0.0, which is less than a 5% level of significance. Therefore, the study concluded that hip tightness is present in desk job workers with a longer duration of work which is prone to health-related problems in a later stage of life. It will also help to screen and spread awareness regarding the various musculoskeletal disorders.

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