



Research Article

Prevalence of hamstring tightness along with low back pain in overweight and obese Physiotherapy students.

Aarya Sudhir Mane¹, Trupti Saurabh Yadav^{2*}

¹Final year physiotherapy, Krishna college of Physiotherapy, Krishna Vishwa Vidyapeeth (KVV), Karad, India

^{2*}Masters in musculoskeletal physiotherapy, Associate professor, HOD of oncology physiotherapy department, Krishna college of Physiotherapy, Krishna Vishwa Vidyapeeth (KVV), Karad, India

Abstract

Running title: Correlation of hamstring tightness and low Back pain in overweight and obese physiotherapy students.

Background: : Increase in sedentary lifestyle has led to increase of population with increased weight resulting in muscle tightness and issues like back pain because of decrease in amount of exercise. Daily exercise can be helpful in reducing all the problems, increasing the quality of life of an individual while avoiding age related issues. Physiotherapist does prolonged standing which might lead to low back pain if proper measures are not taken, which is why this study will help create awareness while also finding the correlation between hamstring tightness and low back pain. This topic will be valuable for further prevention, diagnosis and treatment of this condition as well as it will contribute to the improvement of health and well being of the physiotherapy students.

Materials and methods: For low back pain, numerical pain rating scale was taken. For hamstring tightness Active knee extension test, V-sit and reach test and Finger to floor test were used, using goniometer, plinth, inch tape and chalk.

Results: The investigations was completed in 80 Physiotherapy students. Prevalence of hamstring tightness with mild lumbago is 40.7% with moderate lumbago is 24.6% and with severe lumbago is 7%. Tight hamstrings are significantly correlated with low back pain.

Key words: Hamstring tightness, low back pain, overweight, obese, Physiotherapy students

***Author for correspondence: Email:** drtruptiwarude@gmail.com

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Introduction

The result of the study show that there is prevalence of almost 80% of hamstring tightness in students due to prolonged sitting^[1]. Health science students are 57 % prevalent for low back pain.^[2] Students frequently experience tightness in the hamstring muscles due to prolonged sitting. Joint motion may be restricted due to this tightness. In hamstring tightness there is inability to extend the knee fully when the hip is flexed. Here the angle of knee extension is greater than 20 degrees^[2]. This tightness causes various musculoskeletal problems leading to decrease in ROM^[1,2]. Hamstring tightness is caused due to many factors contributing factors are extended sitting or sitting for lengthy periods of time without moving i.e. sedentary lifestyles, which are typical of corporate workers and students.^[2,3,4]

Decrease in flexibility of hamstrings makes one prone to injuries of knee and affects the balance^[1]. Other effects of the tightness are postural changes and its outcome on motor control pattern^[2,4]. There are consequences of injury to spine from mechanical stress while forward bending because the length of the hamstring muscles reduces which makes it susceptible to low back injuries^[5]. Gait abnormality is seen in some people because of the tightness^[3]. Muscle performance is also reduced as blood vessels under these muscles are compressed owing to the tightness^[2]. This muscle tightness also reduces flexibility of soft tissues as it's an multi joint muscle. Lack of hamstring muscles extensibility also decreases pelvic mobility which may also cause changes in the lumbopelvic rhythm. If there is shortness

of hamstring muscles there might be gait limitations, increased risk of falls and susceptibility to musculoskeletal injuries.

Low back pain or lumbago is pain in muscles or joints in lumbar region. It is caused due to many factors some are as follows mechanical overload which is commonly seen in students due to heavy school bags or in construction workers due to heavy lifting of the materials on site, incorrect posture which can be caused due to various factors like improper benches and desks^[6,7], Family history has a strong correlation and hence possibly hereditary^[8]. In young adults lumbago can be aggravated by sedentary lifestyle, smoking^[7]. Other causes also include trauma, improper lifting, arthritis, poor posture, lack of regular exercise, decreased back extensor muscle endurance, reduced abdominal muscle length and strength, decreased hamstring muscle flexibility, reduced back extensor muscle flexibility and length of iliopsoas. One of the major contributing factor to low back pain is increase in weight.

Lack of exercise is one of the reason that leads to obesity. Obesity is linked with low back pain as the mechanical load along with lumbar disc disorders, specially abdominal obesity which is seen in women^[6,8]. Degenerative process in lumbar spine and low grade systemic inflammation is caused due to mechanical load^[6]. These people are prone to injuries and other health problems and hence must be aware about the issues they could encounter in the future.

Warning signs for low back pain include high Body mass index (BMI), psychosocial factors like anxiety, depression, stress, acute low back pain progressing to a chronic one. There are various elements contributing toward LBP hence should be identified early in life to prevent it from moving from acute to chronic and hence improve quality of life. As it is among the primary causes that the people frequently visit hospitals^[8].

Hamstring tightness can also lead to posterior pelvic tilt as these muscles are attached to tuberosity of ischium which decreases lumbar lordosis leading to low back pain^[1,2,9]. This tightness reduces extensibility leading to low back pain as the muscles are indirectly attached to the muscles and fascia of low back pain^[5,9]. Hamstring tightness is a contributing factor to lumbago and hence is of importance while preventing and treating it as there is indirect involvement of the muscle tightness in pathogenesis of low back pain^[2,3,5].

Materials and Methods

This current research was of assessing hamstring tightness and low back pain in overweight and obese Physiotherapy students. This was carried out in Krishna college of Physiotherapy, KVV, Karad. Certification was obtained from protocol committee. Then approval was taken from authorities and ethical committee. 80 Participants were chosen according to inclusion and exclusion criteria. There were 450 students among which only 100 were overweight and obese. Of which 20 were excluded as they did not fit in the inclusiveness of having the

low back pain. Informed consent was taken and data was collected.

To measure low back pain, Numerical pain rating scale (NPRS)^[10] was taken. The subjects were asked to rate their pain on a scale from 1 to 10 while sitting for long hours or at rest or during activity where mobility of back was included like during forward bending.

For hamstring tightness special tests like active knee extension test (AKET)^[11], V-Sit and reach test^[12] and Finger to floor test^[13] were used for assessment and for data collection. In AKET^[11] test, the subjects were in supine position with the leg that is being assessed was flexed in hip and knee at 90 degrees. The contralateral limb was in extended position with foot in neutral position and was stabilized by other therapist. The measurements were taken with the help of goniometer. The goniometer is kept on the lateral epicondyle of the knee that is being assessed. Then the subjects were asked to extend the knee actively, while maintaining the same position for 2 to 3 seconds. If the extended knee is less than or equal to 20 degrees then the measurements are considered normal. If the range is more than 20 degrees then the subject has hamstring tightness. This measurement was taken thrice and average was noted of the three.

In V-Sit and reach test^[12] chalk and inch tape were used. The floor is marked with a straight line and a perpendicular line in center. The subject sits and keeps the legs straight at the end points of the straight line and bends over the perpendicular line to touch the intersecting point simultaneously while keeping both the hands together, without bending the knees. It is measured in positive inches if it extends over the level of the legs, in negative inches if it reaches below the level of the legs, and in zero inches if it reaches at the precise intersection. There is hamstring tightness present if the measurement is negative; if the result is 0 or positive, the hamstring tightness is absent.

In Finger to floor test^[13] the subjects were asked to stand with equal distance around 20cm in between their legs. They were then asked to bend forward while keeping both hand together and they were instructed to touch both the hands simultaneously to the ground without bending the knees. If the students failed to touch the ground then they had hamstring tightness which was then measured with the help of inch tape. This measurement was taken from the tips of fingers to the ground. If the students touched the ground without much difficulty then they did not have hamstring tightness.

Based on collected data the statistical analysis was done and Pearson's correlation method was used to determine the correlation between hamstring tightness and low back pain.

Result

In the current research there were 80 participants out of which 15 male and 65 female were assessed. Low back pain and hamstring tightness were correlated using Pearson's correlation analysis.

Age, Gender, Body mass index (BMI)

Table 1. Age, Gender, BMI

1. Age	Frequency
18-20	30
21-23	42
24-25	8
Gender	Frequency
Male	15
Female	65
BMI	Frequency
25-30	60
30-34	17
35-40	2
>40	1

Interpretation:-

In the above table the subjects are classified according to their age, gender and weight. Age group 18-20 consisted of 37.5%. The common age group is of 21-23 which consists of 52.5% of total participants. The least common age group is of 24-25 which is only of 10%. There were 81.25% women participants and

18.75% of male participants. The overweight participants with BMI 25-30 consisted of 75% of total participants. The participants with grade one obesity with BMI 30-34 is 21.25%. The participants of BMI 35-40 consists of 2.5%. With the least amount of participants being third grade obese with BMI >40 are 1.25%.

Numerical pain rating scale (NPRS):-

Table 2. Values of NPRS

Pain scale	Frequency
Mild[1-3]	48
Moderate[4-6]	23
Severe [7-10]	9

Interpretation:-

The above table depicts the pain in lower back experienced by the participants. Most people experienced the pain which was

mild with its prevalence being 60%. Moderate pain was experienced by 28.75% of participants. Very few people had severe low back pain with its prevalence leading to 11.25%.

Active knee extension test (AKET):-

Table 3. Values of AKET

AKET	Male	Female	Total
Below 20 (normal)	4	25	29
Above 20 (positive)	11	40	51

Interpretation:-

The above table illustrates that 36.25% have no hamstring tightness while the remaining population of 63.75% have hamstring tightness.

V-sit and reach test:-

Table 4. Values of V-sit and reach test

V-sit and reach test	Male	Female	Total
Normal	2	12	14
Positive	13	53	66

Interpretation:-

Most of the participants that is 82.5% have tested positive in this test indicating hamstring tightness while remaining 17.5% having no tightness.

Finger to floor test:-

Table 5. Values of Finger to floor test

Finger to floor test	Male	Female	Total
Normal	4	14	18
Positive	11	51	62

Interpretation:-

According to the test performed 77.5% have tested positive in this test indicating hamstring tightness while remaining 22.5% of people have no tightness.

Prevalence of hamstring tightness along with low back pain

Table 6. Prevalence of hamstring tightness and low back pain

Tests	Pain scale		
	Mild[1-3]	Moderate [4-6]	Severe [7-10]
AKET	31(38.75%)	17(21.25%)	4(5%)
V-sit and reach test	35(43.75%)	21(26.25%)	7(8.75%)
Finger to floor test	32(40%)	21(26.25%)	6(7.5%)
Average	32.6(40.7%)	19.6(24.6%)	5.6(7%)

Interpretation:-

Prevalence of hamstring tightness with mild LBP is 40.7%, with moderate LBP is 24.6%, and that with severe LBP is 7%. The accompanying table illustrates that the likelihood of experiencing hamstring tightness increases with pain intensity. It is untrue that severe pain has the lowest prevalence of

hamstring tightness, whereas mild pain has the highest prevalence. The rate of prevalence decreased as fewer subjects experienced severe pain than mild pain. However, when hamstring tightness was examined for each type of pain, it was shown that the likelihood of experiencing hamstring tightness increased as the level of pain of increased.

Correlation of low back pain with hamstring tightness

Table 7. Correlation between hamstring tightness and low back pain

Correlation	r	r ²	95% CI		P- value
			U	L	
With AKET	0.1212	0.01468	-0.1013	0.3321	0.2844
With V-sit and reach test	-0.2719	0.07392	-0.4639	-0.05543	0.0147
With finger to floor test	0.3246	0.1054	0.1129	0.5082	0.0033

Interpretation:-

The above table is about association of NPRS with each hamstring tightness test that includes Active knee extension test, V-sit and reach test and Finger to floor test. Here it is seen that P-Value with AKET test is not significant, but it is significant in V-sit and reach test (0.0147) and finger to floor test (0.0033). This concludes that there is connection between low back pain and hamstring tightness.

Discussion

This research intends to find the prevalence of hamstring tightness along with low back pain while focusing on population of overweight and obese Physiotherapy students and finding the correlation between hamstring tightness and low back pain. Anatomically upper portion of pelvis and vertebral column are connected with the help of different muscle groups^[15]. The functions of which are to maintain spine motion, posture and stabilization. Restriction in range of pelvis might be seen due to hamstring tightness, which leads to pelvic motion limitation resulting in low back pain^[16]. To attain the required result assessment was done with pain rating scale for lumbago and 3 tests for hamstring tightness in 80 individuals.

The population in this study falls under the category of overweight with over 75% of total subjects. Similar population is observed in the study done by Evelyn Thomas, Geethadevi M about Prevalence and determinants of overweight and obesity among medical students^[17]. Overweight is a indicative of obesity and this is commonly seen in medical students cause of lack of exercise, sedentary lifestyle, increased stress and unusual eating and sleeping habits making them prone for multi-system

diseases like cardiovascular diseases, musculoskeletal issues like hamstring tightness.

Hamstring tightness is commonly seen in prolonged sitting like in sedentary lifestyle which causes decrease in muscle mass, affects functional capacity and causes associated pain. Similar things were concluded by Mehreen, Alishba, Fariha^[2] and others in a cross sectional study about prevalence of hamstring tightness in administrative staff due to prolonged sitting. Reetika Y, Ruchi B^[18] concluded in their study how it also affects the curvature of lumbar region. Performance of hamstring muscle is also hampered due to its effect on shock engrossing capacity of limb.

In the present study 2 out of 3 hamstring tightness tests had a correlation with low back pain which suggests that even if one of the structure is affected the other will also have an impact. Correlation of marked stiffness and trunk flexion in people with and without lumbago was noted in a study done by Tafazzoli F, Lamontagne M^[19] in Mechanical behavior of hamstring muscles in low-back pain patients and control subjects. Thakur D, Rose S^[20] agreed that Posterior pelvic tilt is caused due to decreased lumbar lordosis and hamstring tightness.

People with high BMI have increased lumbar lordosis to maintain upright posture due to saturated belly fat which affects center of weight forcing it to move posteriorly through facet joints. Healthy lifestyle will help in promoting flexible hamstrings and improving pelvic rotation and trunk mobility. This suggests that hamstring tightness and lumbago might be correlated in people with high BMI. In a research by Esola, M. A. about analysis of Lumbar spine and hip motion during forward bending in subjects with and without a history of low back pain^[21] they discussed about effect of hip motion on lumbar

spine. LBP can be reduced if there is increase in hamstring flexibility which will increase pelvis motion in turn taking the tension off the low back.

Conclusion

Prevalence of hamstring tightness with mild LBP is 40.7%, with moderate LBP is 24.6%, and that with severe LBP is 7%. The study which was done among 80 Physiotherapy students, demonstrated that there is significant correlation in low back pain with hamstring tightness as two out of three test showed significant value. This was evaluated using the Pearson's correlation. There was a strong correlation of low back pain with Finger to floor test and V-sit and reach test. This is due to constant stress on the structures of low back which eventually leads to hamstring tightness. There was no correlation of low back pain with Active knee extension test. However, when hamstring tightness was examined for different type of pain, it was shown that the likelihood of experiencing hamstring tightness increased along with the level of pain.

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