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ORIGINAL ARTICLE

PREVALENCE OF LOW BACK ACHE AND PLANTAR HEEL PAIN AMONG COLLEGE STUDENTS: A CROSS- SECTIONAL STUDY

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ABSTRACT

Background of the study: Low back pain (LBP) is one of the common global health problems and the major cause of disability affecting performance at work and general wellbeing. Hamstring stiffness could be a possible contributory factor of low back pain. There is increased risk of plantar heel pain when the hamstring is tight. The purpose of the study is to find out whether the young adults have any prevalence of low back pain and plantar heel pain due to hamstring tightness. **Methods:** 105 subjects of age group 18–25 year those satisfying the inclusion criteria were recruited for study. After screening the subjects, a written consent form was obtained from each of the subject. The students are sorted on the basis of hamstring tightness using Active knee extension test and the data was collected using valid questionnaire. Low back pain was assessed using Oswestry low back pain disability questionnaire and Foot Ankle Ability Measure (FAAM) to measure physical function of foot and ankle. Numeric pain rating scale is used to measure the severity of plantar heel pain. **Result:** The result of the study shows that, individual with hamstring tightness and plantar heel pain had a greater prevalence of low back pain and there is no significant association between hamstring tightness and plantar heel pain. **Conclusion:** The study concluded that hamstring tightness is observed in most of the college students. The present investigation revealed that half of the subjects experience low back pain due to hamstring tightness. Individual with low back pain have an increased incidence of plantar heel pain. The study resulted that there is no relation between hamstring tightness and plantar heel pain in student population.

Key Words: Cross-sectional study; Hamstring tightness; Low Back Ache; Plantar Heel Pain

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INTRODUCTION

Low back pain (LBP) is one of the most common global health enigmas and the major cause of infirmity affecting performance at work and general wellbeing¹. Low back pain is defined as pain, muscle tension or stiffness localized below the costal margin and above the inferior gluteal fold with or without leg pain. It is often classified as acute (less than 6 week), sub-acute (6-12 week) and chronic (more than 12 week)².

The Global Burden of Disease studies estimated that low back pain ranks higher position among disabling diseases¹. Most people who experience an episode of low back pain will improve overtime. However, a good proportion experience repeated episodes and some report continuous symptoms for several years³.

The estimated incidence of low back pain in adolescent population is 39.81% and among college students is 29.3%^{4,5}. The Overall prevalence of low back pain among Undergraduate students was determined to be high from 40.14% to 57.9%⁶.

There are several mechanical and biological factors leading to LBP. Hamstring stiffness could be a possible contributory factor to LBP. Hamstring tightness may increase the risk of injury in low back due to mechanical stress. A study resulted that more the tightness of the hamstring higher the severity of low back pain⁷. Another study by Ghulam Fatima concluded that prolonged sitting could contribute to hamstring tightness in student population. Prolonged sitting hours are unavoidable in most of the working environments and educational setup, which can affect the flexibility of soft tissues especially biarticular muscles like hamstrings⁸.

Students in their habitual life spend most of their time in a seated position so they keep their knee flexed, hence the hamstring are not actively used which may result in adaptive

shortening of the muscle. Adaptive shortening of hamstrings has a negative impact on function and biomechanics of hip and knee and also on the lumbopelvic rhythm and may lead to low back pain⁹.

Recent studies indicate that tightness of hamstring is associated with plantar heel pain. Another study attributed that tight hamstrings may cause an increase in knee flexion, which leads to prolonged forefoot loading and boosts the windlass mechanism and shortening of plantar fascia and causes plantar heel pain¹⁰. Plantar heel pain is also known as plantar fasciitis¹¹. Plantar heel pain is a common musculoskeletal condition known to affect both physically active and sedentary individual¹².

It affects about 10 % of worldwide population¹³. In Indian population the incidence of patient with heel pain is reported to be 59%¹². In a literature, the prevalence of heel pain among nursing students is high¹⁴. Incidence of plantar heel pain in patient with hamstring tightness is 8.7 times higher if it is compared with the patient without hamstring tightness¹³.

The motive of the study was to investigate whether the tight hamstrings can cause low back pain and plantar heel pain among college students. The students were sorted on the basis of Active knee extension test and subjected to Oswestry low back pain disability questionnaire to assess low back pain. Foot Ankle Ability Measure was used to assess physical function of foot and ankle and Numeric pain rating scale was used to measure plantar heel pain.

Need of the Study: The need of the study is to find out whether the sedentary behaviour of the young adults have any influence in the prevalence of low back pain (LBP) and plantar heel pain due to hamstring tightness. This study will help to identify and prevent complications associated with tight hamstrings that can occur in the future.

Aim of the Study:

- To assess hamstring tightness among college students.
- To find out whether the hamstring tightness can cause low back pain among students.
- To find out whether the hamstring tightness can cause plantar heel pain among students.
- To find out whether there is any relation between low back pain and plantar heel pain.

METHODOLOGY

The study design was cross-sectional study. The study was carried out in 2022. Participants were recruited from recognized college of Kerala. Total 105 samples were selected for this study.

Inclusion criteria: Samples belonging to the age group of 18-25 year. Both genders are included in the study. Samples were collected from among college students in Kottayam district. Also, the selecting subject should be students who have 6 hours and > 6 hours of prolonged sitting.

Exclusion criteria: Students with history of recent trauma, hamstring muscle injury previous surgery in lower extremity were excluded from the study. Also, students with lower extremity fracture in past 6 months, students who are not interested to take part in the study were excluded.

Measurement tools and materials: Consent, Performa, Oswestry low back pain disability questionnaire, Foot Ankle Ability Measure, Numerical pain rating scale, goniometer, paper, pen, pencil.

Procedure: The cross-sectional Study was conducted by using Validated Questionnaire. 105 participants were selected from the recognised college in Kottayam district. The

criteria for selecting the participants for the study were students with age group of 18 – 25 years, students who has prolonged sitting hours in a day up to 6 hours or greater than 6 hours and who are willing to participate in the study. If they had any known conditions like recent trauma, hamstring muscle injury, previous Surgery in lower extremity, lower extremity fracture in past 6 months and students who are not interested to take part in the study are excluded from this study. Students with hamstring tightness are selected from the participants by performing Active Knee Extension Test. In selected participants the low back pain and plantar heel pain are assessed through Oswestry how back pain disability questionnaire. Foot Ankle Ability Measure to assess the physical function of foot and ankle and the severity of planter heel pain and assessed by using Numeric pain rating scale.

Active Knee Extension Test: Hamstring flexibility is measured on the basis of knee extension deficit (KED). Knee extension deficit angle was measured by using universal goniometer and Active knee extension test. Active Knee Extension test was done by proper positioning of the subject. The subject lies on supine, head back and arms across chest. The hip and knee were flexed at an angle of 90° and the participant was asked to extent his / her leg at the knee joint. The angle at Knee joint was measured. Knee extension angle greater than 20 degree is considered as hamstring tightness where knee extension angle is the degree of the knee flexion from terminal knee extension.

Oswestry Disability Index (ODI): Oswestry low back pain disability Questionnaire is also known as Oswestry Disability index (ODI) is the most used outcome measure for low back pain. It is a self-administered questionnaire, and it is divided into 10 sections designed to classes limitation of various activities of daily living. Each section scored on a 0-5 Scale where 5 – representing the greatest disability. The index is calculated by dividing the Summed score by the

total possible score which it then multiplied by 100 and expressed as percentage, the denominator reduced by 5 if a patient marks more than one statement in a question. The highest scoring statement is recorded as a true indication of disability. The Questionnaire takes 3.5 – 5 minute to complete and approximately 1 minute score. ODI is reliable and Valid Score suitable for measuring low back pain.

Foot Ankle Ability Measure (FAAM): The Foot Ankle Ability Measure (FAAM) is a self-reported measure that assess physical function of individual with Foot and ankle musculoskeletal disorder. The FAAM is a 29 item Questionnaire consisting of 21 item of Activities of Daily life (ADL) and 8 item of sport subscale. The ADL and Sports Subscales are stored separately. It is scored from 4 to 0 with 4 being “no difficulty” and 0 being “Unable to do” N/A responses are not counted. The score on each of the items are added together to get the item score total. The total number of items with a response is multiplied by 4 to get the highest potential

score. The item score total is divided by the highest potential score. This value is then multiplied by 100 to get a percentage. A higher score represents a higher level of physical function. In ADL Subscale of the subject answers all 21 items, the highest potential score is 84. If one item is not answered the highest score is 80 etc. In sport Subscale if the subject answers all 8 items the highest potential score is 32.

RESULTS

28 etc. FAAM is a reliable and valid scale measured of physical function of foot and ankle. Numeric Pain Rating Scale: Numeric pain rating scale is an 11-point scale comprising a number from 0 to 10 where 1 indicate “no pain” and 10 indicate “worst imaginable pain. Participants are instructed to choose a single number from the scale that best indicate their level of pain.

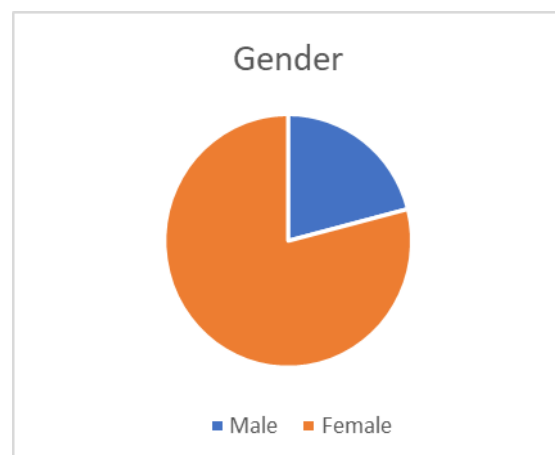
Data Analysis and Interpretation

1. Gender

Gender	Number	Percentage
Male	22	21
Female	83	79
Total	105	100

Table 1- Demographic representation of gender wise distribution.

Pie Diagram



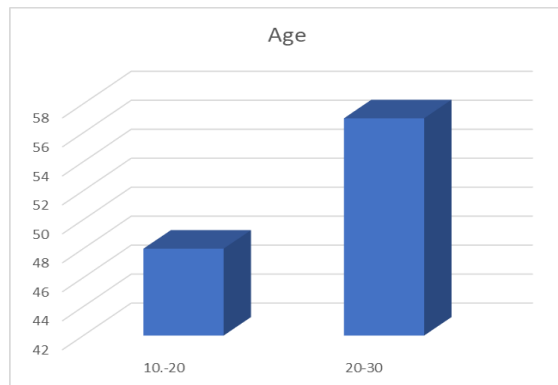
Graph 1- Demographic representation of gender wise distribution

2.Age

Age	Number	Percentage
10-20	48	45.7
20-30	57	54.3
Total	105	100

Table 2: Demographic representation of gender wise distribution

Bar Diagram



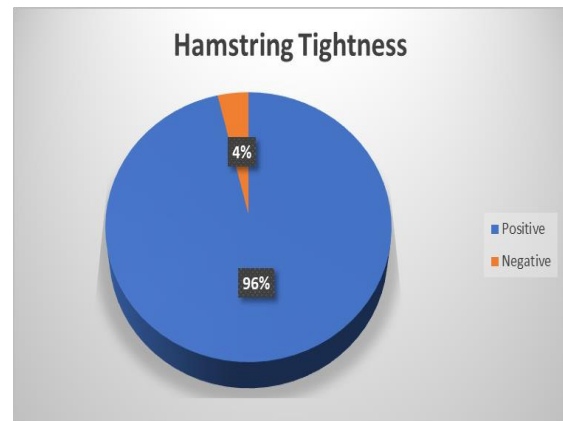
Graph 2: Demographic representation of age wise distribution.

3.To assess hamstring tightness among college students.

Hamstring Tightness	Number	Percentage
Positive	101	96.19
Negative	4	3.81
Total	105	100

Table3: Demographic representation of hamstring tightness distribution.

Pie Diagram

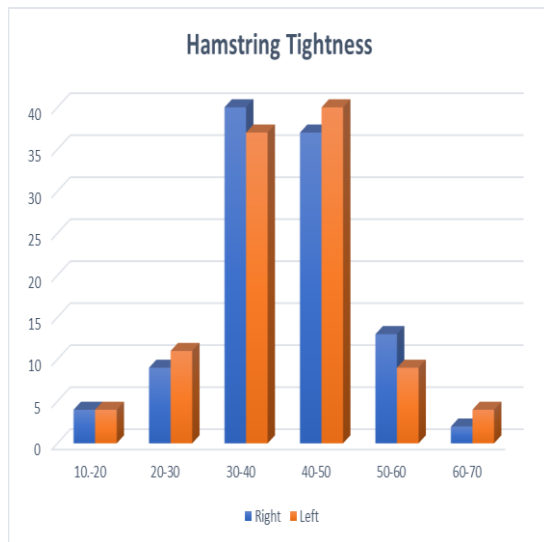


Graph 3: Demographic representation of hamstring tightness distribution.

4. Hamstring Tightness Right

Hamstring Tightness	Number	Percentage
10.-20	4	3.8
20-30	9	8.6
30-40	40	38.1
40-50	37	35.2
50-60	13	12.4
60-70	2	1.9
Total	105	100

Table 4: Demographic representation of hamstring tightness distribution on right side.

Bar Diagram

Graph 4: Demographic representation of hamstring tightness distribution on right and left side.

5. Hamstring Tightness Left

Hamstring Tightness	Number	Percentage
10-20	4	3.82
20-30	11	10.48
30-40	37	35.2
40-50	40	38.11
50-60	9	8.57
60-70	4	3.82
Total	105	100

Table 5: Demographic representation of hamstring tightness distribution on left side.

6. To assess if hamstring tightness can cause low back pain among students.

Hamstring Tightness	LBP			Pearson Chi-Square	P-Value
	No	Yes	Total		
No	4	0	4	4.938	0.026 (Significant)
Yes	44	57	101		
Total	48	57	105		

Table 6: Distribution and Pearson Chi- Square Test of the association between hamstring tightness and low back pain.

7. To find out whether the hamstring tightness can cause plantar heel pain among students

Hamstring Tightness	PHP			Pearson Chi-Square	P-Value
	No	Yes	Total		
No	4	0	4	3.780	0.052 (Not Significant)
Yes	51	50	101		
Total	55	50	105		

Table 7: Distribution and Pearson Chi-Square Test of the association between hamstring tightness and plantar heel pain

There is no significant association between hamstring tightness and plantar heel pain among students. Here the P Value is 0.026, there is significant association between hamstring tightness and low back pain among students.

Here the P Value is 0.052. So, we accept the null hypothesis. That is, there is no significant association between hamstring tightness and plantar heel pain among students.

8. To find out whether any relation between low back pain and plantar heel pain among students.

LBP	PHP			Pearson Chi-Square	P-Value
	No	Yes	Total		
No	10	38	48	35.281	0.000 (Significant)
Yes	45	12	57		
Total	55	50	105		

Table 8: Distribution and Pearson Chi-Square Test of the association between low back pain and plantar heel pain.

Here the P Value is 0.000. So, there is significant association between low back pain and plantar heel pain among students.

DISCUSSION

The study was conducted to evaluate the prevalence of low back pain and plantar heel pain among college students. The study was conducted in and around Kottayam District and the data was collected from 105 students who satisfy the inclusion criteria were selected for the study. The age of participants ranges from 18 to 25 years who were college students.

Subjects with history of recent trauma, hamstring muscle injury, previous surgery in lower extremity, lower extremity fracture in past 6 months and students who are not interested to take part in the study etc. were excluded from the experiment. A brief explanation about the procedure was given to subjects and written consent form was obtained from each of the subjects. The participants were aware of the fact that they can withdraw from the study none of them were withdrawn from the study.

The students were sorted on the basis of hamstring tightness using Active Knee Extension test and the data was collected using valid questionnaire Low back pain was assessed using Oswestry low back pain disability questionnaire which is a self-administered outcome measure. Foot and Ankle ability measure to measure physical function of foot and ankle. Numerical pain rating scale is used to measure the severity of plantar heel pain. Pearson chi square test was used to interpret the collected data. It has been widely used in testing for associations between two categorical responses. P value is a statistical measurement used to validate a hypothesis

against observed data. According to the result of the contemporary study the value of Pearson chi square test of relation between hamstring tightness and low back pain was 4.938 and having a p value is 0.026. So, the result show that there is significant association between hamstring tightness and low back pain among college students.

The value of relation between hamstring tightness and plantar heel pain was 3.780 and p value is 0.052, there by the result show that there is no significant association between tightness and plantar heel pain. Here we accept the null hypothesis. The Pearson chi square test value for low back pain and plantar heel pain is 35.28 and the p value is 0.000. there by, the result show that there is significant relation between low back pain and plantar heel pain.

The results of present study indicate that the hamstring tightness is prevalent among the college students. 96.19 % of the sample have reduced hamstring flexibility. These results accord with those of Ghulam Fatima as well as Sushmitha T et al. Ghulam Fatima found that the tightness of hamstrings is observed in majority of students having prolonged sitting hours. Some other factors like genetic predisposition and muscle injuries can also cause hamstring tightness^{8,14}.

Tight hamstrings can limit anterior tilting motion of pelvis and induce compressive loads on lumbar spine and causes low back pain. This is also consistent with the results of the present study that there is significant correlation between hamstring tightness and low back pain. The overall prevalence of low back pain among university students with sitting hours more than 3 hours per day is 63.9%. Low back pain results in limitations in

daily living activities, academics, and quality of life of the university students. The current survey show that 57 subjects had both hamstring tightness and low back pain. It was found comparable to the previous study by Kamala Kannan et al. The study reported that most of the college going students have knee range below 80 degree and investigation reveals that half of the total population experienced low back pain in their life¹⁶.

Similarly, the amount of increased tension in hamstrings might translate into the plantar fascia through the prolonged forefoot loading induced by the increased range of knee flexion angle. Thus, causing plantar heel pain. But the present study resulted that there is no significant correlation between hamstring tightness and plantar heel pain. It might be due to the faster recovery from micro trauma in plantar fascia among young adults, may be a reason for the insignificance. The study by Martin J Thomas et al reported that plantar fasciitis can occur from 18 years to 65 years and over¹⁹. The peak age of incidences in the general population is between 40 and 60 years. After 40 years there is increased risk of atrophy and thinning of the fat pad in the inferior heel, with loss of water collagen and elastic tissue, reducing the shock absorbency and protection of calcaneus causing plantar heel pain. Increasing age, obesity, pes planus, limited ankle dorsiflexion, running excessively and occupation that involve long periods of standing have been identified as major risk factors contributing to the plantar fasciitis.

In the present investigation, the association between low back pain and plantar heel pain is significant. It was found comparable with a previous work by Mc Clinton. Their results indicated that the prevalence of LBP was higher

among patients with plantar heel pain and stated that decreased foot and ankle function gradually leads to low back pain. The sedentary behaviour of the young adult has significant influence of low back pain and plantar heel pain due to hamstring tightness¹⁸.

After analysing the study, it was observed that sedentary lifestyle can be a contributory factor for hamstring tightness. Reduced flexibility of hamstring can result in increased postural problems and limit the hip motion which has been demonstrated in low back pain. Mohammed Bagher Shamsi et al stated that shortening of hamstring have a negative impact on function of hip and knee and the lumbopelvic rhythm which can cause low back pain⁹. Another study by Dr Afreen Jahan and Sumit Kumar found that adequate length of hamstring is desired for lower incidence of mechanical low back pain²⁰. Low back pain is prevalent in individual with plantar heel pain.

The study published by Shane Mc Clinton et al hypothesized that lack of response to plantar heel pain treatment may be related to unmanaged low back pain and low back dysfunction. People with plantar heel pain also has 17% higher levels of low back disability than control. So, in this study it is concluded that preventing hamstring tightness in early age can prevent conditions or disability related to it such as low back pain and its associated plantar heel pain which can improve overall quality of life of an individual.

Increasing the sample size can be attempted, participants were University students with a slight bias towards female students and do not represent the total population of the university to other population. The study settings extending to participants from outside Kerala

may be considered. Bringing equality in the male and female ratio can fetch more accuracy. The study can be done by comparing male and female populations.

Ethical Clearance: Ethical clearance has obtained from CPAS, School of Medical Education, Gandhinagar, Kottayam, Kerala, Reference number: BPTPA/EC/SME/GNR/2022 /08, Dated: 17/08/2022.

Conflict of interest: There was no conflict of interest to conduct this study.

Fund for the study: It was a self-financed study.

CONCLUSION

The study concluded that hamstring tightness is observed in most of the college students. The present investigation revealed that half of the subjects experience low back pain due to hamstring tightness. Individual with low back pain have an increased incidence of plantar heel pain. The study resulted that there is no relation between hamstring tightness and plantar heel pain in student population.

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