ASSOCIATION OF HAMSTRING TIGHTNESS AND PLANTER FASCIITIS IN YOUNG FEMALE RUNNERS

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ABSTRACT

Background:

Hamstring tightness is the most common issue and muscle tightness occurs due to reduction in the muscle's ability to deform. On the other hand, plantar fasciitis is the standard issue of inferior heal pain, it is considered to responsible for 11 to 15 percent of all foot clinical features that requires professional care in adults. Several runners develop hamstring muscle pain because of tightness that resulting from tension due to plantar fasciitis.

Objective:

To find out the association between hamstring tightness and plantar fasciitis in young female runners.

Materialsand Methods:

A descriptive cross-sectional study was conducted. Data was collected from Bushra Fitness center for Females.Sample size was 51.Non-probability convenient sampling technique was applied. Female runners diagnosed with plantar fasciitis age group between 15-30years were included in this study. Participants with any injury, tear or leg deformity and pathology were

excluded. Hamstring tightness was accessed by performing Active Knee Extension Test measuring popliteal angle with the help of goniometer.

Results:

51 female runners, diagnosed with plantar fasciitis were selected, hamstring tightness was accessed by performing AKET measuring popliteal angle of affected leg, mean (SD) 57.29 (3.83) while theaffected foot with diagnosed plantar fasciitis showedmean (SD) 1.25 (0.44)

Conclusion:

This study concluded that there is asignificant association between hamstring tightness and fasciitis.

Key words: Hamstring tightness, plantar fasciitis, female, athlete.

1. INTRODUCTION:

Hamstring tightness is the most common issue and muscle tightness occurs due to reduction in the muscle's ability to deform, resulting &reduced in the joint's range of motion in which it works. The title has also been used to indicate a minor to average decrease in muscle length; normally the movement in elongating muscle's side is limited. Muscle tightness mostly happen from insufficient or unprofessional rehabilitation after sustained muscle injury or reduced movement in individual. In addition to making numerous anatomical aspects more resistant to damage, it makes the muscle-tendon complex more prone to overuse syndrome. In particular on a muscle like the hamstrings that travels over two joints, it may also result in certain pathological issues at the joint on which the movement occurs.(1)Decreased hamstring extensibility is usually considered due to stiffness or reduced length of the hamstring muscle group.(2)By all accountsplantar fasciitis is the standard issue of inferior heal pain, it is evaluated to responsible for 11 to 15 percent of all foot clinical features that demands professional care in adults. The area of malformation is naturally near the plantar fascia's site of origin at the level of medial tuberosity of calcaneus. The plantar fasciitis cause/source is not understood completely and is might be due to several components. Due to the limited information available from case-control studies, factors have been recognized, including obesity, employment requiring extended standing, pes planus, reduced ankle dorsiflexion, and inferior calcaneal exostoses, also known as bone spurs. Plantar fasciitis is frequently regarded as the result of repeated micro damage due to its high prevalence among runners. Running excessively (or abruptly increasing the distance ran), donning defective jogging shoes, running on uneven surfaces, getting a cavus (high-arched) foot, or having an Achilles tendon shortening are all suggested risk factors, but there is little or no evidence for many of them.(3) Plantar fasciitis is counted as a most common soft-tissue disorders of the foot, only little is known about the reason.(4)Hamstring tightness occurs due to its ability to deform;hamstring stiffness is described as the inability to straighten the knee beyond 160 degrees with the hip in the 90 degree flexion position. Hamstring injuries are the most frequent type of injury among athletes and are brought on by hamstring tightness. Athletes who sustain these ailments must spend a lot of time recovering, which affects their performance.(5) An

injury to the plantar fascia's attachment at the inferior aspect of the calcaneus caused by repetitive micro trauma overload is called plantar fasciitis. Although many etiological factors have been linked to the onset of plantar fasciitis, the significance of hamstring tightness has not been studied.[6]Several patients develop hamstring muscle pain because of tightness that resulting from tension due to plantar fasciitis source and transfer it to hamstring muscle along with the Superficial Back Line (SBL).[7]Incidence of plantar fasciitis is 8.7 times in hamstring tightness patients as compared with the patients without hamstring tightness.[7] Plantar fasciitis is an uncertain condition, the most common cause of heel pain in adults. More than 1 million persons per year are affected by it, and two-thirds of patients with diagnosed plantar fasciitis receive treatment or care from their family physician.[8]In Pakistan there are no enough published studies on the association of Hamstring tightness and plantar fasciitis in young female runners. The current study will aid professional runners in preventing diseases and promoting health and improving quality of life. It will aware and provide knowledge to athletes about hamstring tightness and plantar fasciitis and they will be cautious about muscle weakness or tightness or any heel pain. It is also helpful in reducing muscular tightness among professional athletes. The objective of study is to find out the association between hamstring tightness and plantar fasciitis in young female runners.

2. MATERIALS & METHODS:

Non-probability convenient sampling was used in this descriptive cross-sectional analysis. Data was collected from Medlane Medical Complex and Rehabilitation Centre and Bushra Fitness center for Females. The study duration was of six months from June 2020 till December 2020. **Sample size of 51 was calculated by using WHO sample size calculator. Sample size is calculated by using WHO sample size calculator under the following formula with 1.19% prevalence,(9) 95% confidence interval 1-α & 0.10 precision (d). Sample size was 51.**

Formula:

$$n = \frac{z^2_{1-\alpha/2} P(1-P)}{d^2}$$

Female athletes with age between 15-30 years diagnosed with plantar fasciitis were selected, diagnosed was confirmed by the ultrasound, after the informed consent taken from participants verbally and written.(7) Athletes having osteoarthritis/ rheumatoid arthritis causing pain in hip, knee & ankle or restricting movements, heel Pain disorders like sub calcaneal bursitis, Achilles tendon bursitis or fracture of calcaneus, history of trauma of lower extremity or elective surgery and Neurological pain that confused pain in lower extremity as radiating pain from spinal problems were excluded.(7)In this particular study, An instrument, universal goniometer was utilized to determine popliteal angle of the knee. The reliability of universal goniometer is excellent intrarater. Ultrasonography was used to assure the diagnosis of plantar fasciitis and to see the thickness of plantar fascia. To access the hamstring length, participant was in comfortable supine position when the hip was maintained at maximal flexion, the Active Knee Extension Test was performed by actively straightening the testing leg until reaching the point of pain, hamstring length was measured by placing the standard goniometer over the lateral femoral condyle, with resting arm aligned along the thigh in greater trochanter direction and the moving arm over the leg in lateral malleolus direction. After three trials on every participant average value was recorded and finally hamstring length assessed.

3. DATA ANALYSIS

Data were examined using SPSS version 23 of the statistical package for social sciences. Data and variables were entered into software to produce descriptive statics (tables, graphs, and percentages).

4. RESULTS:

Results showed that plantar fasciitis is directly associated with tightness and reduced range of motion in hamstring muscle Figure no 1 showed the thickness of plantar fasciitis of 51 diagnosed participants volunteered for this study, mean (SD) 5.55 (0.635).Table no 1 showed the Pearson Chi-Square, Likelihood Ratio and linear by linear Associationof hamstring tightness and plantar fasciitis in selected participants of the study.

Demographic variables:

Descriptive Statistics	Minimum	Maximum	Mean	Std. Deviation
Age in years	14.00	30.00	21.0588	4.30540
Height in meters	1.65	1.86	1.7374	.05549
weight in kg	52.00	75.00	63.5882	6.14224

Chi-Square Tests

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	749.842[a]	672	.019
Likelihood Ratio	250.941	672	1.000
Linear-by-Linear Association	38.197	1	.000
N of Valid Cases	51		
a. 725 cells (100.0%) have expected count less than 5. The minimum expected count is .02.			

Cluster Bar chart

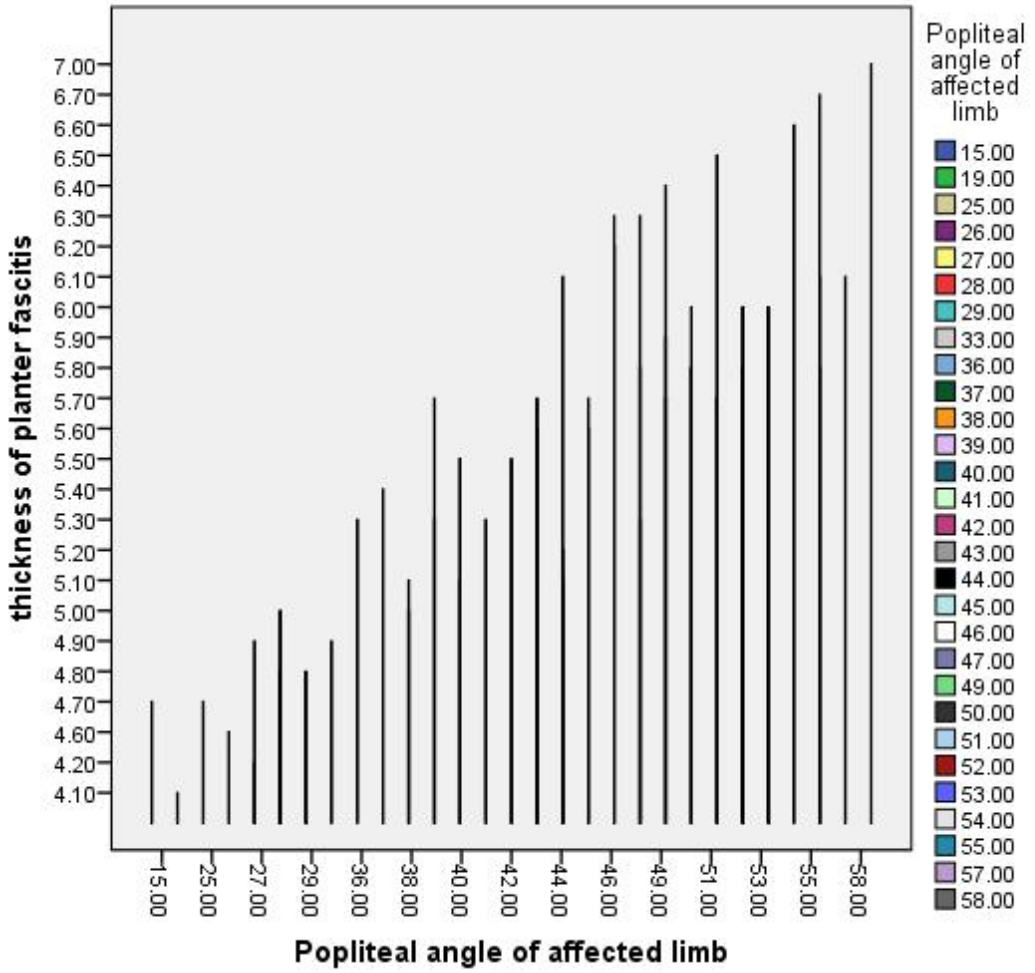

Fig. 1: active knee extension test

5. DISCUSSION:

The aim of this study is to identify the association between hamstring tightness and plantar fasciitis in young female runners. The major findingof current study is on female runners shown greater hamstring tightness and reduced range of motion in athletes with plantar fasciitis unilaterally and bilaterally, while more common unilaterally and right side was more affected, Hamstring tightness accessed by performing active knee extension test using goniometer showed popliteal angle measurements.

According to a prior report by James Harty, increased hamstring tightness cause the prolonged forefoot stress and, via the windlass mechanism, be a role in the development of repetitive injuries to the plantar fascia.[(10)] Now current study says that people with plantar fasciitis shows increase in hamstring tightness that can be due to biomechanical deficit that might be contributing to tensile overload of the plantar fasciitis.

Another study conducted by Jonathan M. Labovitz in March 2011. The aim of this prospective cohort study was to investigate the association between hamstring strain and plantar fasciitis. There was a concept that tightened hamstrings enhanced the likelihood of plantar fasciitis. This study reveals that hamstring tightness has a substantial impact in the existence of plantar fasciitis and should be addressed together with equinus and obesity when treating patients with this diagnosis.(11) Now current study also supports that hamstring tightness and plantar fasciitis are strongly associated with each other as there was presence of hamstring tightness in participants with plantar fasciitis

Another study was conducted by Javaid S. Waqas in 2017to ascertain whether plantar fascia has been related to stiffness in the lower extremities posterior musculature. According to the research, people with planter fasciitis had noticeably tight thigh and calves muscles.(6) The current study favors the previous study that hamstring tightness was noticed in diagnosed plantar fasciitis female runners, right side was more affected.

Bruce R. Wilk, Karen I. Fisher, and William Gutierrez worked on a case study to identify the risk factors for planter inflammation, to outline the treatment strategy, to examine the structure of the patient's sporting shoes, and to document the treatment outcomes. A manufacture flaw in running shoes was discovered that might have contributed to the onset of plantar fascia. Preventing lower - limb overuse illnesses via examining athletic shoe structure.(12)This study conflicts with the previous study as no shoe defect was found. But the participants were having hamstring tightness and stiffness in female runners with plantar fasciitis.

Current study shows that plantar fasciitis has a great impact on hamstring tightness. Plantar fasciitis is directly associated with tightness and reduced range of motion inhamstring muscle, accessed by performing Active knee extension test (AKET). AKET is a reliable tool during accessing hamstring tightness.

6.CONCLUSION

This study found a substantial correlation between tight hamstrings and plantar fasciitis.

Limitations:

There were following limitations that occurred during my study in which limited or decrease number of female runners, Participants were not willing to give measurements or didn't allow to perform test on them due to Corona and many sports and fitness clubs were closed because of Corona. In future more multiple settings should be involved and a large number of participants must be included.

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All the authors have been informed of their inclusion and have approved this.

Disclaimer:

This research has not been presented or published in any conference or book.

Author's contribution:

Conception and design: Mehar-un-Nisa Shafique

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Analysis and Interpretation of Data: Husna Moin Haider

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Conflict of interest:

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