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A Comparative Study to Assess Hamstring Tightness in Individuals with and without *Plantar fasciitis*

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Abstract

Purpose: To compare hamstring tightness in individuals with and without plantar fasciitis

Methodology: 369 individuals (male and female) was evaluated This, cross-sectional study included individuals with, and without plantar fasciitis. Data will be collected from hospitals in DHQ Wazirabad, THQ Gujranwala, Aziz Bhatti Gujrat. Non probability convenient sampling technique was used. Goniometer was used for measuring range of motion for active knee extension. The data was collected under the rules and regulations of ethical committee of University of Lahore.

Findings: This study's findings show that 50.27 percent of subjects had plantar fasciitis whereas 49.73 percent did not. Active knee extension test was used to determine whether participants had tight hamstrings. The results show that among the 49.73% of participants who did not have plantar fasciitis, 37.23% had negative results, while 12.50% had positive results. In contrast, among the 50.27% of participants who did have plantar fasciitis, 11.14% had negative results, while 39.13% had positive results.

Conclusion: The study's goal was to determine if hamstring tension contributes to the development of plantar fasciitis. According to the current study, individuals with and without PF had their hamstring tightness evaluated. An active knee extension test was used to measure the tightness of the hamstrings. Following the completion of the current study, it was shown that patients with plantar fasciitis show higher hamstring tightness than individuals without plantar fasciitis.

Recommendations: For study, it is recommended to gather data from several cities so that the conclusions may be generalized. Future research should examine additional risk factors for plantar fasciitis. The reasons of hamstring tightness should be addressed to reduce the chance of developing plantar fasciitis.

Keywords: *Plantar Fasciitis, Hamstring Tightness, Isolated Gastrocnemius Tightness.*

1.0 INTRODUCTION

The plantar fascia is a band of connective tissue that runs from the calcaneus to the tendons of the forefoot and proximal phalanges to support the arch of the foot and function as a shock absorber for pressure applied to the foot.[1] Plantar heel pain, commonly known as plantar fasciitis, is discomfort or tenderness of the heel that is limited to the sole of the foot. It usually radiates from the middle section of the heel pad or the medial tubercle of the calcaneus. The severity of the condition can range from soreness at the root of the plantar fascia that is visible while rising from a rest to incapacitating pain.[2] Although various intrinsic and extrinsic variables are associated with the development of PF, some have received significant attention in both clinical and research contexts, such as longitudinal plantar arch changes, rearfoot pronation, and amplitude of plantar loads.[3] Plantar fasciitis can occur in people who are overweight, have high arches, flat feet, or tight calf muscles.

People who run regularly or participate in other high-impact sports such as leaping or dancing are more prone to develop plantar fasciitis because these activities can create tiny, recurrent damage to the plantar fascia over time. The discomfort is generally intense at first, then fades or becomes duller after some modest exercise. It is possible that one or both feet will be impacted[4]. Muscle weakness may be an important PF etiological factor, as patients with PF may experience an increase in foot pressure It is well known that hamstring muscles play an important role in modifying lower-limb biomechanics and may potentially lead to increased plantar fascia strain.

Weakness of the GCM and proximal muscles, such as the gluteal and tensor fasciae latae muscles, has been noted in individuals with PF. As a result, most therapists in PF patients have concentrated on regaining the flexibility of the posterior muscles, such as the GCM and hamstring muscles[5]. Tightness of hamstring muscle is a condition that affects people with and without symptoms alike. Flexibility can be affected by a variety of factors[6]. MRIs are being utilized to evaluate and differentiate any abnormalities in the thickness of the plantar fascia. Using the same ideas as MRI, MR elastography can show an image that shows how stiff the different soft tissue structures being examined are [7].

The hamstring muscle complex is made up of three separate muscles that play an important role in human movements ranging from standing to explosive motions like running and leaping. Increased hamstring tightness may result in increased forefoot loading. Through windlass mechanism, increased hamstring muscle tightness can lead to prolonged forefoot loading. Additionally, the plantar fascia and hamstrings are connected by a superficial back line. When treating patients with this diagnosis, hamstring tightness, equinus, and obesity should all be addressed because Hamstring tension is a crucial role in plantar fasciitis[8]. To maintain cardiovascular fitness while minimizing cyclic loading, patients can continue to engage in non-weight-bearing activities like rowing, swimming, and cycling. Calf stretches and plantar fascia stretches are inexpensive and simple to learn[9].

2.0 METHODOLOGY

This cross-sectional comparative study included both individuals with and without plantar fasciitis to assess their hamstring tightness. Physical therapy department of THQ(Wazirabad). Physical therapy department of DHQ(Gujranwala) and Physical therapy department of Aziz Bhatti Hospital (Gujrat) was the source of data. Permission was necessary to gather data from hospitals, thus a consent form was signed by the MS of hospitals, allowing data to be taken from the physiotherapy

ward without issue. 369 participants (both male and females) was the subject of data collection. Participants were those having plantar fasciitis and those without plantar fasciitis. The patient with plantar fasciitis were diagnosed by the doctor. Two groups were made one with diagnosed plantar fasciitis and second group were without plantar fasciitis. AKE test was used the assess all the participants.

The Active Knee Extension Test is used to determine hamstring muscle length and active knee extension range in the hip flexion position. The person is positioned supine on the examination table, with the lower leg that is not being examined stabilized on the support surface. The opposing leg is lifted such that the hip is 90 degrees flexed and the knees are stretched to form a perpendicular to the ground position. A lag of 20 degrees from full extension is regarded normal; anything less than 20 degrees is termed hamstring tightness. A goniometer situated at the knee with the fulcrum at the lateral epicondyle, the stationary arm parallel to the thigh pointing to the greater trochanter, and the movable arm parallel to the leg pointing to the lateral malleoli is required to measure this range. Non probability convenient sampling technique was used. The data was collected under the rules and regulations of ethical committee of University of Lahore.

Data Analysis

Data was analyzed using statistical package for social sciences (SPSS). For descriptive analysis, mean and standard deviation was calculated for quantitative variables whereas frequency and percentage was calculated for qualitative variables for inferential statistical test was applied. All results were calculated at 95% confidence interval and p value ≤ 0.05 was considered as a significant value.

3.0 FINDINGS

This study's findings show that 50.27 percent of subjects had plantar fasciitis whereas 49.73 percent did not. Active knee extension test was used to determine whether participants had tight hamstrings. The results show that among the 49.73% of participants who did not have plantar fasciitis, 37.23% had negative results, while 12.50% had positive results. In contrast, among the 50.27% of participants who did have plantar fasciitis, 11.14% had negative results, while 39.13% had positive results.

Table 1: Frequency

Variables		**N (%)**
Participants with and without plantar fasciitis	yes	185(50.3%)
	No	183(49.7%)
	Total	**368(100.0%)**
Age of participants in years	20-35	98(26.6%)
	36-50	183(49.7%)
	51-60	87(23.6%)
	Total	**368(100.0%)**
Gender of participant	Female	239(64.9%)
	Male	129(35.1%)
	Total	**368(100.0%)**
BMI of participants	Underweight	15(4.1%)
	Normal	249(67.7%)
	Overweight	98(26.6%)
	Obese	6(1.6%)
	Total	**368(100.0%)**
Active knee extension test	Positive	190(51.6%)
	Negative	178(48.4%)
	Total	**368(100.0%)**

This table describes the frequencies of all the variables. According to this table, out of 368 participants 185(50.3%) were having planter fasciitis while 183(49.7%) were without planter fasciitis. If we look at the age of participants out of total 368 participants 49.73% fall in 36-50 age group and 98(26.63%) fall in 20-35 age group and 183(49.7%) fall in36-50 while 87(23.6%) fall in 51-60 age group. And gender of participants, 129(35.1%) are males and females are 239(64.95%) of the total sample size. If we talk about the BMI of total participants, out of 368 participants 15(4.1%) are underweight and 249(67.7%) have normal BMI and 98(26.6%) are overweight and 6(1.6%) are obese. Results of active knee extension test shows that out of total 368 participants 178(48.4%) participants are with negative knee extension test and 190(51.6%) are with positive knee extension test.

Table 2: Association

Association	Chi-Square	P-Value
Association of BMI with patient with and without PF	28.792[a]	.000
Association of AKE with patient with and without PF	102.315[a]	.000

This tables shows the Chi-Square and p-value. The chi-square value of Association of BMI with patient with and without PF is 28.792[a] and p-value is .000 The chi-square value of Association of AKE with patient with and without PF is 102.315[a] and p-value is .000

Gender of Patients

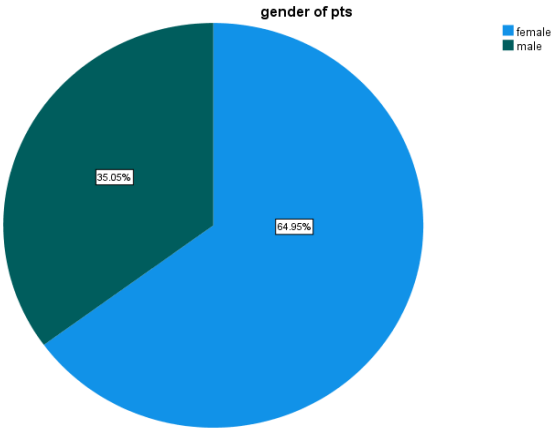

Figure 1: Shows Gender of Participants

This figure shows the gender of participants, males are 35.05% and females are 64.95% of the total sample size.

Age of Participants

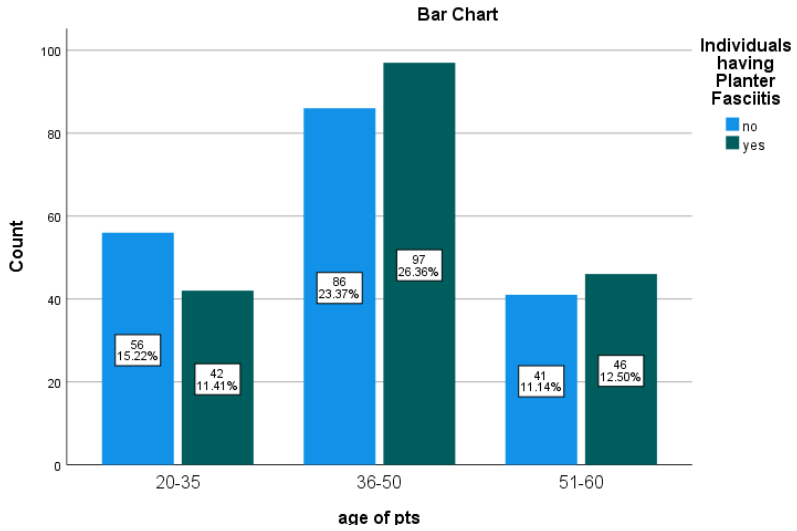

Figure 2: Age of Participants

This figure shows the age of both with and without plantar fasciitis participants with Plantar fasciitis in age group of 20-35 are 11.41 % and in age group of 36-50 are 26.36% and in age group of 51-60 are 12.50% and participants without plantar fasciitis in age group 20-35 are 15.22% and in age group 36-50 are 23.37% and in age group 51-60 are 11.14%

BMI of Participants

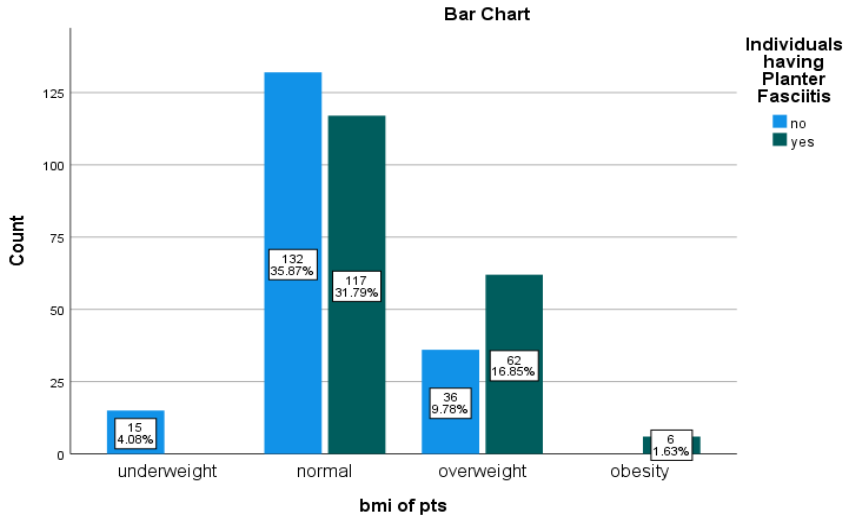

Figure 3: BMI of Participants

The above figure shows the BMI of participants with and without PF. 4.08% of participants without PF are underweight and 1.63% of participants with PF are obese. 35.87% of participants without PF fall in normal weight and 31.79% participants with PF fall in normal weight. 9.78% participants without PF fall in overweight and 16.85% participants with PF fall in overweight.

Active Knee Extension Test Results

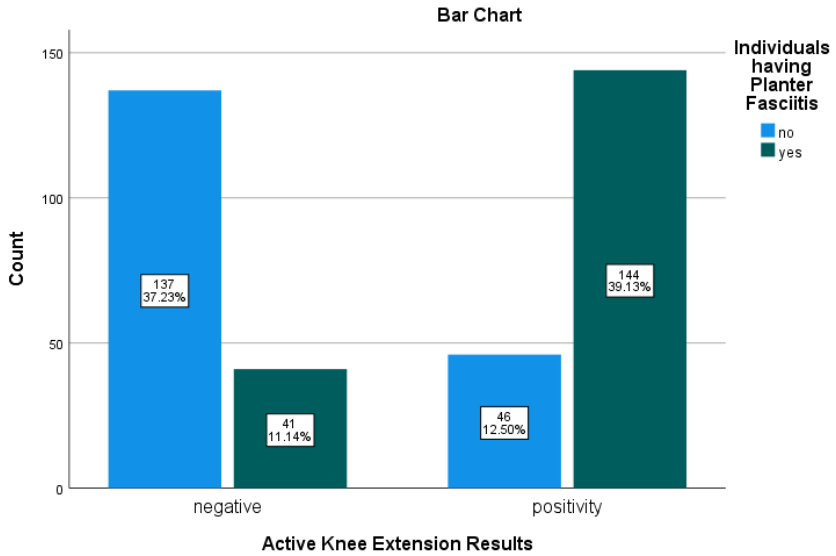

Figure 4: Active Knee Extension Test Results

This figure shows the results of AKE test in both individuals with and without PF. 37.23% participants without PF have negative results of the test while 11.14% participants without PF have positive results. And 12.50% participants with PF have negative result while 39.13% participants with PF have positive results.

Crosstab

			Individuals having Planter Fasciitis		Total
			No	Yes	
Active Knee Extension Results	negative	Count	137	41	178
		% within Individuals having Planter Fasciitis	74.9%	22.2%	48.4%
	positivity	Count	46	144	190
		% within Individuals having Planter Fasciitis	25.1%	77.8%	51.6%
Total		Count	183	185	368
		% within Individuals having Planter Fasciitis	100.0%	100.0%	100.0%

The above figure shows both with and without PF results of active knee extension. Participants without PF who have negative results are 74.9% and positive results are 22.2%. Participants with PF who have negative results are 25.1% and positive results are 77.8%.

Discussion

This study was performed to assess hamstring tightness in individuals with and without plantar fasciitis. In those who are healthy, hamstring stiffness is typical and goes through an adaptive shortening process. The purpose of the study was to assess hamstring tightness either in patients with plantar fasciitis or in individuals without plantar fasciitis. Since hamstring tightness is frequent in healthy people, we also included healthy participants in our study to examine the percentage of hamstring tightness in them nonetheless, the goal of the study was to determine how many patients had hamstring discomfort due to plantar fasciitis.

In this comparative study a total of 368 sample size was taken. Out of them 185 patients were taken as diagnosed plantar fasciitis and 183 individuals were presenting with no possible pathology. The patients having plantar fasciitis were taken from Gujranwala Gujrat and Wazirabad city. The study's findings show that 50.27 percent of subjects had plantar fasciitis whereas 49.73 percent did not. AKE test was used to determine whether participants had tight hamstrings. The results show that among the 49.73% of participants who did not have plantar fasciitis, 37.23% had negative results, while 12.50% had positive results. In contrast, among the 50.27% of participants who did have plantar fasciitis, 11.14% had negative results, while 39.13% had positive results. As

a consequence, it may be concluded that hamstring tightness may contribute to plantar fasciitis since most people with plantar fasciitis had tight hamstrings, but most healthy participants did not.

In the past study, the purpose of the study was to compare the prevalence of isolated gastrocnemius tightness in the three groups in order to ascertain the relationship between plantar fasciitis and isolated gastrocnemius tightness. In order to distinguish between the three groups (plantar fasciitis, other Foot/ankle pathology, and no Foot/ankle pathology) this study's statistical power was sufficient. Gender and age disparities between the three groups were not statistical significant, according to statistical analysis. Patients with PF were 52.4 years old on average. This is within the documented peak age range for this illness, which is between 40 and 60 years of age24,25,26, with 74% of the individuals afflicted being female. There were no changes between the left and right feet in terms of the severity of the symptoms or IGT. If we compare both studies it shows that previous study was held to check relation of plantar fasciitis with gastrocnemius muscle meanwhile this study was held to check hamstring tightness.[10]

In the past a study was conducted and the discuss about According to Chang et al, heel pain from PF may cause changes in gait pattern and kinematics of the lower limb As a result, all participants in the PF group who showed an NRS change at the heel of greater than or equal to 3 during the gait test were excluded. Individuals who had a bigger NRS shift would apply less weight on the most painful part of the troublesome heel, resulting in a delayed gait adaptation and lower walking speed. The previous study was to assess change in gait pattern and kinematics of the lower limb due to plantar fasciitis unlike this study it was held to check the tightness due to plantar fasciitis.[11]

It was explained in a prior cross-sectional research., this is the first study to thoroughly investigate the presence of trigger points in the majority of the muscles of the posterior thigh, leg, and foot in PF patients. The traditional method to treating plantar fasciopathy is localized and relies on orthotics and prescription medications. Extracorporeal shock wave therapy has yet to be shown useful in the treatment of plantar fasciopathy.

4.0 CONCLUSION AND RECOMMENDATIONS

Conclusion

The study's goal was to determine if hamstring tension contributes to the development of plantar fasciitis. According to the current study, individuals with and without PF had their hamstring tightness evaluated. To determine the tightness of the hamstrings, an active knee extension test was performed. Following the completion of the current study, it was shown that patients with plantar fasciitis show higher hamstring tightness than individuals without plantar fasciitis.

Recommendations

- For study, it is recommended to gather data from several cities so that the conclusions may be generalized.
- Future research should examine additional risk factors for plantar fasciitis.
- The reasons of hamstring tightness should be addressed in order to reduce the chance of developing plantar fasciitis.

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