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# Frequency of Trigger Points in Lower Extremity Muscles Among Runners with Plantar Fasciitis

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*[1] Substantial contributions to the conception or design of the work for the acquisition, analysis or interpretation of data for the work, [2] Drafting the work or reviewing it critically for important intellectual content, [3] Final approval of the version to be published, [2] Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.*

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## ABSTRACT

**Background** Plantar fasciitis is a condition used to describe heel pain brought on by excessive stress on the plantar aspect of the foot. Trigger points are extremely sensitive spots found in tense muscular bands. These induce motor dysfunction such as stiffness, decrease range of motion, and related fatigue ability within the affected muscle.

**Objective:** To determine the frequency of trigger points in lower extremity muscles among runners with plantar fasciitis.

**Methodology:** A descriptive cross-sectional study was carried out in six sports clubs of Lahore, Pakistan. The study extended from June 2021 to December 2021 for a total of six months. Data was gathered from n=196 people who met the inclusion criteria. Non-probability convenient sampling techniques were used. Ischemic compression test was used to examine trigger points. Eight muscles in total, on the affected and unaffected sides, had been examined. Data analysis was done with SPSS version 22. Descriptive statistics which include the frequency of trigger points and demographic of the participant was collected.

**Results:** Mean age of individuals was 22.56±3.42 and BMI of participants was 21.50 ± 2.16 kg/m². The medial gastrocnemius had a higher prevalence of trigger points, according to the results i.e. (54.08%) while the trigger points were least found in the biceps femoris (8.67%).

**Conclusion:** It was found that runners with plantar fasciitis have a greater frequency of trigger points in their medical gastrocnemius and tibialis posterior muscles. It recommends that evidence-based physical health promotion for athletes is required to address this developing problem.

**Keywords:** Athletes, chronic, heel pain, musculoskeletal abnormalities, plantar fasciitis, Trigger points

## Introduction

Plantar fasciitis is a term that refers to pain in the heel caused by an excessive strain on the plantar area of the foot.[1] It's a disorder characterized by heel pain and inflammation. Fasciitis is characterized by fascial thickening and inflammation.[2] Rather than being an inflammation, it is mostly a degenerative process of micro tears (fasciosis), linked to tendinosis, collagen degeneration, and fascial thickening. Therefore, "plantar fasciopathy" rather than "plantar fasciitis" may more accurately reflect the underlying illness inside the fascia.[3] Plantar heel pain syndrome, retrocalcaneal discomfort, plantar fasciosis, and calcaneodynia are all terms for this condition. One characteristic of plantar fasciopathy is pain on the medial side of the heel brought on by inactivity. Pain intensifies as a result of sustained weight bearing.[4] The plantar fascia is related to the muscles of the posterior myofascial chain.[5]

Trigger points are extremely sensitive spot found in tense muscular bands. Pain is frequently produced locally or in a referral pattern in conjunction with musculoskeletal problems [(6)]. Acute trauma or recurrent micro trauma can cause muscle fiber

tension and trigger point formation. Trigger points originate or evolve as a result of repeated pressures placed on muscle fibers. There are two types of trigger points: active and latent.[7] They cause the affected muscle to become stiffer, have a limited range of motion, and become more fatigued. An active trigger point causes pain at rest. It features a referred pain pattern similar to the patient's complaint and is tender to palpation. [2] This referred pain is felt somewhere else, not at the area of the trigger-point origin. Radiating or spreading pain is a common description of the condition. [8] Referred pain is a crucial component of a trigger point. It sets a trigger point apart from a tender point, which hurts only when the area is palpated.[9] A latent trigger point doesn't immediately induce pain, but it might impede motion or exacerbate muscular weakness. When pressure is placed directly over a latent trigger point in a patient who has muscle weakness or restrictions, the patient may only become aware of pain coming from that spot.[10]

According to studies, plantar fasciitis is one of the top 3 overuse injuries and one of the top 5 injuries suffered by runners. Most experts agree that persons in their middle years and older tend to suffer from plantar fasciitis. Moreover, it happened to runners and weight-bearers.[11] In the meantime, a 3:1 ratio distribution indicates that females are more afflicted than males. Plantar fasciitis with pain was diagnosed in 0.85(0.53 percent) of individuals. Ages 18 to 44 have the lowest rates while 45 to 64 have the highest rates (1.33 percent).[12]

The exact cause of plantar heel pain is yet unclear. A mechanical, neurogenic, inflammatory, or myofascial aetiology for heel pain is possible. Heel pain, also referred to as plantar fasciitis, can develop as a result of significant modifications in the way you bear weight. The following signs and symptoms constitute the diagnostic criteria for a trigger point examination and investigation: (a) any palpable taut band or nodule within the skeletal muscle; (b) any hypersensitive spot within the taut band; (c) any noticeable pain upon application of pressure; (d) and painful limitation up to full range of motion.[13]

Risk factors include altered biomechanics of the feet, such as low arches, subtalar eversion, and shortening of the hamstrings and gastrocnemius muscles.[14] Other risk factors include a decrease in first metatarsophalangeal extensions and a reduction in ankle dorsiflexion. Furthermore, repetitive pressures are a risk factor for heel pain.[15]

To author's knowledge there is no sufficient data about the frequency of trigger points in lower limb muscles. A thorough literature of relevant research is found to be insufficient to provide data about the presence of trigger points in runners with plantar fasciitis. Most of the population is unaware of muscle ache caused be the formation of trigger point. So, this study will help the population to gain awareness about the cause of pain. The study's findings would give physiotherapists objective information to consider when performing a myofascial assessment on plantar fasciitis patients.

## Methodology

With approval from the Lahore College of Physical Therapy, LMDC Ethical Review Committee (Ref No: LCPT/DPT/ERB/09), N=196 patients with plantar fasciitis from six sports clubs in Lahore, Pakistan participated in this descriptive observational study, which was conducted from June 2021 to December 2021. The sample size was calculated using the following formula by the World Health Organization (WHO) sample size calculator: 0.86% prevalence, 95% Confidence Interval, and 0.10 precision.[16] Following a general physician's confirmation of the plantar fasciitis diagnosis based on clinical observation, patients were chosen for the study. Plantar fasciitis was diagnosed based on the patient's history and physical examination findings.[17, 18] A convenient non-probabilistic sampling strategy was employed. Patients between the ages of 18 and 35 who had a confirmed diagnosis of plantar fasciitis and had three years of running experience met the inclusion criteria. Patients were excluded based on prior history of any fixed deformity of ankle joint or foot joint, any history of recent fracture or injury of lower limb, any neurological condition and peripheral vascular disease, any red flag to manual palpation technique, retro calcaneal bursitis, tarsal tunnel syndrome, and any systemic diseases that could affect lower extremity or foot posture.[19]

After informing the patient about the study, informed consent was obtained, protecting patient identity. Palpation was carried out by an expert Physical Therapist with considerable training and experience, using the right criteria to find trigger points while remaining blind to the feet that were infected or unaffected. Patients received the ischemic compression technique to determine the frequency of trigger points in plantar fasciitis. [20] Muscles palpated were biceps femoris, medial and lateral head of gastrocnemius, soleus, tibialis posterior, quadratusplantae, flexor halluces longus, of affected. Myofascial trigger points can be mechanically tested using ischemic compression, which involves applying sustained pressure for a long enough period of time to put the trigger points passive. A compression of over 30-90 seconds, or almost 1.5 minutes, is being applied to the trigger area. While a 90-second hold yields the optimum outcomes, a change can be seen after just 30 seconds.[21] SPSS Version 22 was used for data compilation and analysis. To conduct a descriptive analysis, the mean and standard deviation of each variable

were calculated. For categorical data, percentages and frequencies were utilized.

## Results

Participants' average age was 22.56 ± 3.42 years, and their average body mass index was 21.50 ± 2.16 kg/m². Out of total 196 patients, 101 patients (51.3 %) were male and 95 patients (48.2 %) were female. Out of total 196 patients, 142 patients (72.4 %) had left side affected and 54 patients (27.5 %) had right side affected. The mean experience of participants was 2.60 ± 1.26 years. The percentage of patients with plantar fasciitis who have trigger points in their affected and unaffected muscles is displayed in Table I and figure 1.

**Table I: Frequency of trigger points using Ischemic Compression among plantar fasciitis patient.**

| Muscles | Affected | Unaffected |
|---|---|---|
| | Percentage (%) | Percentage (%) |
| Medial Gastrocnemius | 88 | 16 |
| Tibialis Posterior | 76 | 12 |
| Quadratus Plantae | 70 | 7 |
| Soleus | 72 | 24 |
| Abductor Hallucis | 52 | 2 |
| Lateral Gastrocnemius | 46 | 6 |
| Flexor Hallucis Longus | 32 | 3 |
| Semimembranosus | 28 | 5 |
| Flexor Digitorum Longus | 24 | 2 |
| Adductor Magnus | 24 | 9 |
| Bicep Femoris | 17 | 5 |
| Pronueus Longus | 12 | 2 |
| Semitendinosus | 11 | 4 |
| Popliteus | 9 | 5 |
| Flexor Digitorum Brevis | 3 | 2 |

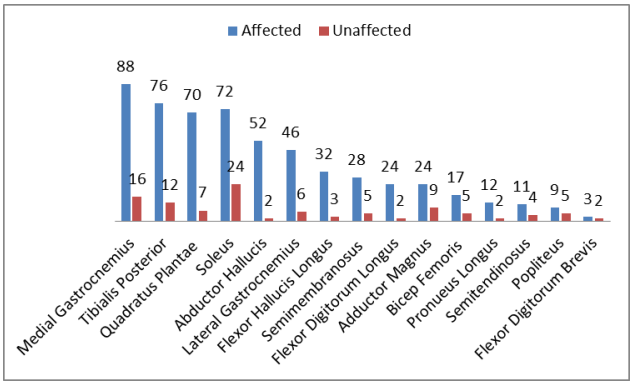


**Figure 1. Bar chart showing the frequency of trigger points in affected and unaffected side.**

## Discussion

The primary goal of this study was to determine the prevalence of trigger points in runners due to the lack of readily available information among runners.. The results of this study showed that trigger points are most prevalent in medial gastrocnemius muscle and tibialis posterior whereas in one study that was conducted in 2020 According to the study's findings, trigger points are more common in the soleus, tibialis posterior, and gastrocnemius muscles. But this study conducted among traditional population. That's why author is checking their prevalence in runners.[22]

This study determined the frequency of myofascial trigger points in the muscles of the lower limbs. According to the study, the gastrocnemius muscle has a higher prevalence of myofascial trigger points (52%). This study coincides with current study and it is found that gastrocnemius is the most prevalent one for trigger point formation. The presence of trigger point in gastrocnemius and tibialis posterior is confirmed by the results of some other studies as well. [3]

It has been observed that the quadratus plantae and gastrocnemius muscle have a higher prevalence of trigger points than other muscle groups. While in other researches gastrocnemius tightness also cause trigger point formation with plantar fasciitis but this is more prevalent in normal ones. [23]

In another study looking at the prevalence of trigger points in lower extremity injuries, they found that trigger points are most prevalent in the gastrocnemius muscles. Subjects with patellar femoral pain syndrome were shown to have a significant prevalence of trigger points in the gluteal muscles with respect to these lower extremity injuries. And this study is conducted in runners and found that the gluteal muscles are the most predominant in the formation of trigger point.[24]

Trigger point formation is linked to plantar fasciitis and occurs in runners as well, is the result of this research report. The result is consistent with the findings of some previous reports.[3]

From the finding of previous research, trigger points are not prevalent in lower limb muscles of asymptomatic subjects, the presence of taunt band and irritable spot is the most relevant and reliable diagnostic criteria. While in current research it is evident that trigger points are frequently present in lower limb muscles among runners.[25]

This study has a few limitations. PF may be influenced in part or full by additional confounding variables. Furthermore, a skilled and knowledgeable physiotherapist employed the manual palpation method to find trigger points. Subsequent clinical trials might examine the impact of trigger point release on PF symptoms. Research that follows subjects over a prolonged duration is crucial to comprehending the course of plantar fasciopathy and the function of trigger points.

## Conclusion

It was found that the frequency of trigger points among runners with plantar fasciitis were high in medial gastrocnemius and tibialis posterior muscles. The study recommends that evidence-based physical health promotion for athletes is required to address this developing problem.

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