

To Compare the Prevalence of Plantar Fasciitis among Females Wearing Flat Foot Wear and Heels in Young Adults

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Abstract

Introduction: The purpose of this research is to check whether there is any co-relation between the footwear and the foot alignment (foot position) for example there is decreased dorsiflexion of foot in females wearing high heels as compared to females wearing flat foot wears and whether it makes people prone to develop plantar fasciitis or not.

Methodology: 100 subjects were taken for the trial. The study included a total of 100 girls from Galgotias University out of which 2 groups were made of 50-50, that is, 50 girls who were regular heel users and 50 girls who wear flat foot wear. Subjects were tested in department's lab room. The subjects were informed to sit upright on plinth with their one leg crossed over the other to make figure of four and the subjects were informed to look straight. Then, manual plantar fascia stretch test was performed by grasping and stabilizing the heel with one hand and dorsiflexing the ankle and toes together with the other hand of the researcher, which in turn stretched the plantar fascia of the foot. Then the subjects were asked if there was any pain experienced or not at the heel or in the sole of the foot while the test was performed. Next step was to perform the windlass test with the subject maintaining the same sitting position and then coming in standing position.

Results and Conclusion: The result showed that out of total sample 20% subjects felt the plantar fascia stretch, 7%, subjects with positive windlass test, 27% of population in sample was prone to develop plantar fasciitis out of which 19% of the subjects were those who wear high heels. The 7% population who had positive windlass test were the females who were wearing heels

Keywords: *Plantar Fasciitis, Plantar Fascia. Windlass Test.*

Introduction

The sole of the foot works similar to palm of hand. The surfaces go in the order as superficial fascia, deep fascia and four layers with neurovascular bundles. There are two arches present in the foot- longitudinal (medial and lateral) and transverse (anterior and posterior). These arches lie between the third and fourth layer of the sole. The plantar fascia is a specialised form of deep fascia which helps in maintaining the longitudinal arch and also protects the deeper structures.

The deep fascia present in the sole of the foot which covers the centre as well as the sides of foot is called as plantar fascia. It is attached from medial tubercle of calcaneum and runs toward the head of metatarsal bones

for its second attachment.^[1] It aims at binding muscles into their respective functional groups and holding down tendons and facilitating their movements.^[2] During static stance and in dynamic function it has a significant role in shock absorption in weight bearing foot.^[3] Also, it maintains the medial longitudinal arch. Plantar fasciitis is a soft tissue injury commonly resulting in inferior heel pain. It is the inflammation of plantar fascia at the medial tubercle of calcaneum due to repetitive stress, decreased dorsiflexion, excessive walking or running as well as with obesity, biomechanical disorders like pes planus (flat foot), pes cavus (high arched foot) and tight tendo-achilles and work-related prolonged weight bearing.^[4]

When a rope or cable is tightened it is known as ‘windlass’. The plantar fascia works similar to a cable which connects the calcaneum to the metatarsophalangeal joints. During propulsion, the plantar fascia is tightened around the head of metatarsals during dorsiflexion phase. Due to tightened fascia the medial longitudinal arch elevates because of the decreased distance between the calcaneum and metatarsal.^[6] During plantar fasciitis, if the toes are dorsiflexed passively or done in weight bearing position, the test is positive if pain elicits. This is also known as passive toe dorsiflexion test.^[7]

With manoeuvres stretching the plantar fascia, tenderness increases hence marking the passive stretching test positive.^[8] It is done by dorsiflexing the ankle which in turn stretches the plantar fascia hence confirming the physical examination of plantar fasciitis.^[4] This pain hence limits the ankle dorsiflexion.

Plantar fasciitis functionally limits the foot.^[9] Plantar fasciitis makes people prone to increased risk of falls by altering the perception of foot hence impairing the balance.^[10]

Footwear is an important part of our daily life. It protects us from external injuries and trauma. It also serves the cosmesis function and provides comfort and support. Footwear has been reported to have the significant impact on the musculoskeletal system specifically, these factors are affected by footwear and in turn lead to inflammation, rupture or irritation of the plantar fascia. The purpose of this research is to check whether there is any co-relation between the footwear and the foot alignment (foot position) for example there is decreased dorsiflexion of foot in females wearing high heels as compared to females wearing flat foot wears and whether it makes people prone to develop plantar fasciitis or not. This research will rule out one more risk factor for plantar fasciitis that is the foot mispositioning due to different footwears.

Material and Method

The subjects were told about the objective of performing the test. A consent form was taken from them which included volunteer’s declaration, right to withdrawal and confidentiality of their details. After that a brief screening performa was then filled, which contained basic 10 questions related to inclusion and exclusion criteria mentioned in table 1.1. When all questions answered in satisfactory manner the students were selected for the study. The study included a total

of 100 girls from Galgotias University out of which 2 groups were made of 50-50, that is, 50 girls who were regular heel users and 50 girls who wear flat foot wear. Subjects were tested in department’s lab room. The subjects were informed to sit upright on plinth with their one leg crossed over the other to make figure of four and the subjects were informed to look straight. Then, manual plantar fascia stretch test was performed by grasping and stabilizing the heel with one hand and dorsiflexing the ankle and toes together with the other hand of the researcher, which in turn stretched the plantar fascia of the foot. Then the subjects were asked if there was any pain experienced or not at the heel or in the sole of the foot while the test was performed. Next step was to perform the windlass test with the subject maintaining the same sitting position and then coming in standing position. In high sitting position, the ankle was stabilized and the great toe was dorsiflexed (non-weight bearing). In standing position, the subject was asked to stand on toes of both the foot (weight bearing). In both the positions the subject was asked if there was any unpleasant pain in the sole or heel of the foot. Both the plantar fascia passive stretching test and the windlass test^{4,7,8} (in non- weight bearing position) were supposed to be performed on the both the limbs (foot) simultaneously. If the subject complained of any pain the respective test was marked positive and there was no pain the respective test was marked negative.

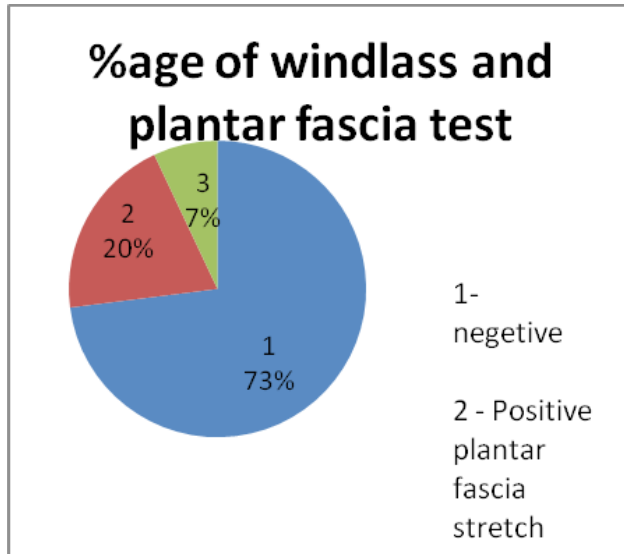
Table 1: Methodology Detail

Design
Convenient sampling with descriptive design
Participants inclusion Criteria
Young adults females
Half population wearing heels and half wearing flat foot wear
Participants exclusion Criteria
Any recent trauma, bone injury, Limb Length Discrepancy, Any musculoskeletal deformity, neurological deficit,
Intervention
Windlass test (weight bearing and non-weight bearing)
Passive dorsiflexion test
Outcome measures
Check the prevalence of plantar fasciitis in females wearing different footwear
Comparisons
Prevalence of plantar fasciitis in females wearing heels compared with females wearing flat foot wear

Findings: The result showed that out of total sample 20% subjects felt the plantar fascia stretch, 7%, subjects

with positive windlass test, 27% of population in sample was prone to develop plantar fasciitis out of which 19% of the subjects were those who wear high heels. The 7% population who had positive windlass test were the females who were wearing heels.

Figure 1: Percentage of Windlass Test and Plantar Fasciitis test



Discussion

Plantar fasciitis is a musculoskeletal disorder which is most of the time left ignored by the females.⁴ There are various risk factors which increases its chances to develop like prolonged weight bearing, improper footwear, biomechanical problems etc. one major risk factor which is left unnoticed is the type of footwear in females. This research focuses on the fact that who are prone to develop plantar fasciitis- females wearing high heels or flat footwear. The two tests performed plantar fascia stretch test and windlass test (weight bearing and non-weight bearing) showed that out of 100 females there were 20% females who felt plantar fascia stretch and 7% responded positive to the windlass test. 12% out of 20% were the females who wear regular heels and the rest 7% population were females who were wearing heels.

Hence, through this research we find out that the chances for high heelers are high to develop plantar fasciitis because of continuous strain on the sole of the foot and prolonged weight bearing. There is no proper management for the pain and not proper rest time is given to the micro traumas to heal. Due to plantar fasciitis, the females will have problem in walking, pain and soreness in the sole, initiating the first step in the

morning, swelling, tenderness. In long term cases there will be changes in the posture, gait and hence altered balance.

The females who reacted negative to the tests are not prone to develop but can develop plantar fasciitis as it is clinically stated that females who wear flat foot wear are more prone to develop plantar fasciitis. So, they should take proper care of footwear and the sole as well.

Through this research we can rule out that females who wear high heels are prone to develop plantar fasciitis, therefore, the footwear should be modified according to the occupation and the standing hours of the subject. If the person has a standing job, there shoes should have good soles and better cushioning.

Though there are no articles that compare the prevalence of plantar fasciitis in different footwear, but my study shows that females who wear regular heels are prone to develop plantar fasciitis because of decreased dorsiflexion of the ankle and prolonged weight bearing on such footwears.¹¹

Conclusions

Heels make females prone to develop plantar fasciitis.

Conflict of Interest :

1. Inconsideration of the weight of the patient.
2. Size of the heels was not categorized.
3. Number of hours the females is wearing heels
4. ADL activity was not acknowledged.

This research was self funded and ethical clearance was done by the ethical committee in Galgotias University.

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