Navicular Position in Plantar Fasciitis: A Cross Sectional Study

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Abstract

Background: The foot is a complex structure with multiple functions like weight bearing, propulsion and shock absorption. Plantar fasciitis is an important public health disorder and most of the population may have such a presentation at some point in their lifetime. Abnormal weight-bearing, standing for prolonged periods can cause excessive loading on the plantar fascia causing heel pain. Navicular positions may have an impact on the fascia hence this study intended on assessing the navicular position in subjects with plantar fasciitis.

Methods: Written informed consent was taken from all subjects. 49 subjects were recruited for the study of which 46 were females and 3 were males. The navicular height was measured using a goniometer.Descriptive statistics were used for calculation of percentage values.

Conclusion: Our study concluded that subjects with plantar fasciitis did not have a navicular drop. Majority of the participants had a high arch. Future studies should include larger sample size and also consider recruiting all genders equally for optimal results.

Key Words: *Plantar fasciitis, navicular height, flat foot.*

Introduction

Plantar fasciitis (PF), typically a localized inflammatory condition of the plantar aponeurosis is a common cause of inferior heel pain.[1] One out of 10 people in the United States experiences a persistent pain due to PF.[2] Studies have highlighted the importance of plantar fascia in forming a part of the passive mechanism that can modify the arch stiffness in relation to the load applied. It is also responsible for the windlass mechanism which aids in forward propulsion during gait. There are numerous local and systemic factors that can produce plantar heel pain but the diagnosis is based on clinical sy9limptoms. Pain over the medial tubercle is the most accepted clinical symptom.[3]

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There is a close relationship of flat foot and navicular drop. Biomechanical factors such as pescavus, foot pronation, calcaneal valgus and flat foot can lead to PF. In case of flexible flat foot the subtalar joint remains pronated which can lead to chronic subluxation. Consequently, the forefoot is abducted and talus and navicular are depressed.[4]This mechanism might stretch the plantar fascia which in turn might contribute in developing PF.Excessive and repeated loading of the plantar fascia is believed to be the most common cause of PF. Hence treatment strategies to reduce the excessive strain on the plantar fascia must be used to facilitate recovery of the PF.[5] Treatment techniques like stretching, counter strain techniques, icing, use of orthosis etc. have been used to treat the symptoms of PF. Also, approximately 85%-90% patients with symptoms can successfully be treated without surgery.[6]

Flat foot can be assessed by measuring the navicular drop. Navicular drop can be assessed by measuring the navicular position. The head of first metatarsal, navicular

tuberosity and a point at the Achilles tendon are marked. The position of the navicular bone can be measured with the centre of the goniometer on the navicular tuberosity and the arms of the goniometer on the head of the first metatarsal and the marking on the Achilles tendon, respectively.[7]This study hence aims at identifying the navicular position in plantar fasciitis.

Methodology

SAMPLE POPULATION- Patients diagnosed with PF.

STUDY DESIGN- Cross- sectional study

SAMPLING TECHNIQUE- Purposive sampling

SAMPLE SIZE AND SAMPLING PROCEDURE

$n = Z2\alpha\ p(1-p)$

$e2$

The above formula has been used to calculate the sample size.

$p = 10.5/1000$

$Z\alpha = 1.96$ at 95% C.I

Error (e) at 3%

Sample size (n) = 45

Inclusion Criteria

Patients with PF

All genders

Age group between 18-60yrs

Exclusion Criteria

Foot injury or bony pathology

Ligament injury at or around the ankle

Degenerative or rheumatoid arthritis at the ankle

Musculoskeletal deformities of foot and ankle

Measurement Tools

Goniometer

Outcome Measure

Navicular drop test

Procedure

Ethical clearance was obtained. Based on the inclusion and exclusion criteria, subjects were recruited for the study using purposive sampling. Written informed consent was taken from all the subjects. After obtaining consent, a brief introduction about the study was given to the subject. The navicular position of the affected limb was assessed using the navicular position test. The head of first metatarsal, navicular tuberosity and a point at the Achilles tendon were marked. The position of the navicular bone wasmeasured with the centre of the goniometer on the navicular tuberosity and the arms of the goniometer on the head of the first metatarsal and the marking on the Achilles tendon, respectively.

Statistical Analysis

Descriptive statistics were used for calculation of percentage values.

Results

Statistical analysis was done using descriptive statistics. SPSS version was used.

Table 1: Population with navicular drop

	Low arch	High arch
PLANTAR FASCITIS	3(6.1)	46(93.9)
% within NAVICULAR POSTION RANGE	100.0%	100.0%

Discussion

The current study aimed finding out the percentage subjects withnavicular drop in those diagnosed withPF. One of the assumptions of this study was that subjects with PF may have a flat foot. The plantar fascia functions to provide support and maintain the height and shape of the medial arch and hence is considered to be an important structure in the foot.[8] A flat foot cannot optimally perform the task of weight bearing. Due to excessive pronation of the foot, the toes are forced into

dorsiflexion which in-turn places tremendous stress on the plantar fascia. This is also known as windlass mechanism. Also, in cases of flexible flat foot, the foot fails to lock and remains pronated during gait. This leads to abnormal weight bearing which in turn leads to subluxation of talocalcaneal joint over a long period of time. This subjects the plantar fascia to inflammation or microtears when running or walking.

In this study, 49 subjects were assessed for navicular drop, out of which 37 were females and 12 were males. Out of the 49 subjects, only 3 were found to have a navicular drop while the rest had a high arch. This study concludes that subjects with a high arch had a higher chance of developing PF when compared to subjects with a flat foot. Conversely, a study conducted by Huang Y[9]et al concluded that subjects with a flexible flat foot had a higher incidence of developing PF when compared to the normal arch group. This difference in the results may be attributed to smaller sample sizes included. Future studies may need to include larger sample sizes to come to consensus. Also, in the current study, the number of males and females recruited were not even. Only 12 males were recruited, while the rest were all females. Future studies should recruit equal samples to give optimal results as sex differences can have an association with foot posture and foot pain[10].

Conclusion

In conclusion, subjects with PF did not have a navicular drop. Hence there is a need for future studies to be conducted to establish an association whilst using larger sample sizes to confirm it. Also equal males and female subjects need to be recruited to check for gender differences.

Conflict of Interest: Nil.

Ethical Clearance: Ethical clearance was obtained from Father Muller Institutional Ethics Committee.

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