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INCIDENCE OF FLAT FOOT IN PLANTER FASCITIS AMONG GUJARAT STATE: AN OBSERVATIONAL STUDY

Physiotherapy

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ABSTRACT

Background: Flexible flatfoot is defined as the postural appearance of the foot, with depressed medial longitudinal arch and pronated subtalar joint and the calcaneus assuming a valgus position under weight bearing conditions. About 10% to 25% population exhibits a flatfoot to varying degrees. In clinical practice, some subjects become symptomatic with foot pain or lower extremity soreness and limitation in their functional activities such as limitation of long distance walking or running and high-impact sports. **Methodology:** Total 100 Subjects will be assessed on basis of following 2 tests and analysis will be done accordingly. First patients will diagnosed for plantar fasciitis with the help of windlass test and then they will be assessed for the flat foot with the help of Navicular drop test. **Result:** Out of 100 participants 68 participants showed increase in pronation of foot according to navicular drop test mean distance were 12.3mm distance more then 9mm can be considered as reduction in arch so the prevalence of flat foot is 68%. **Conclusions:** There is 68% of prevalence of flat foot in patient with plantar fasciitis.

KEYWORDS

Flat foot, Navicular drop test, Plantar fascitis

INTRODUCTION

Flexible flatfoot is defined as the postural appearance of the foot, with depressed medial longitudinal arch and pronated subtalar joint and the calcaneus assuming a valgus position under weight bearing conditions.[1] About 10% to 25% population exhibits a flatfoot to varying degrees.[2]In clinical practice, some subjects become symptomatic with foot pain or lower extremity soreness and limitation in their functional activities such as limitation of long distance walking or running and high-impact sports.

This is a foot with less developed longitudinal arches. Relevant anatomy: A normal foot has longitudinal and transverse arches. The longitudinal arch consists of medial and lateral components resting on a common pillar posteriorly - the tuberosity of the calcaneum. The talus is the keystone of the arches. It receives the body weight and transmits it to the arches below. Through the arches, the weight is transmitted to the ground via the tuberosity of the calcaneum and the heads of first and fifth metatarsals.[3] The integrity of the arches is maintained by the plantar ligaments, the plantar aponeurosis, the extrinsic and intrinsic muscles and the structure of the bones of the foot[4]

Anatomically, the major medial longitudinal arch is formed by the calcaneus, talus, and navicular; the medial, middle, and lateral cuneiforms in addition to the 1st, 2nd, 3rd metatarsals. In dynamic structures, the plantar fascia is essential to the maintenance of the medial longitudinal arch.[5] Kitaoka and associates demonstrated that the posterior tibial tendon owns significant influence as an arch stabilizer during in vitro studies.[5,6] The intrinsic musculature of the foot was also proven to have a significant role in dynamic arch maintenance.

In adult population,pesplanus foot type exist about 10–25% and has been related to musculoskeletal symptoms like back and knee jointpain.[7] Presence of an averted rear foot, lowered medial longitudinal arch (MLA),abducted and dorsi flexed mid foot are the characteristic feature of the flat foot.[8] The cause of pes planus depends on the direct effect between external and internal forces at the articular surfaces, supporting ligaments, joint capsules, extrinsic and intrinsic muscles .Fatigue, paralysis of the intrinsic muscles of the foot due to anaesthesia can also results in reduced height of the MLA[9].

There are few reports which indicate that, plantar fascia contributes in supporting the MLA along with flexor digitorum brevis and abductor hallucis muscles(ABH)[10,11]. There are reports that the paralysis of ABH lowers medial arch height because it is the active elevator of the MLA[12] . About 80% of the resistance for lowering of MLA is furnished by tension in the plantar fascia in the final stage of the swing [13] .Persons with pesplanus tend to develop plantar fasciitis and plantar fascia becomes thicker and rigid due to excessive load .In pesplanus, the altered nature of the plantar fascia is not well understood in the mid and forefoot area where it divides into digital slips, however there reports suggesting studies at its calcaneal attachment[14,15,16] . In the foot,after skeletal maturity if the medial longitudinal arch undergoes a complete or partial collapse then it is referred as flat foot according to foot and ankle specialists[17] .The prevalence of flat feet is not well established. Most of the studies on prevalence of flat foot were done on children below 10 year age.

Plantar fasciitis is the most common cause of the inferior heel pain and may affect up to 10% of running athletes It is associated with biomechanical factors such as pes cavus, foot pronation, heel valgus, sudden gain in body weight or obesity, increased running distance or intensity, shoes with poor cushioning, change in the walking or running surface, and tightness of the Achilles tendon.[18]

In one study, 83% of patients seen with plantar fasciitis were active, working adults ranging from twenty-five to sixty-four years of age^ Often referred to as painful heel syndrome or chronic plantar heel pain, this disorder is diagnosed on the basis of a history of pain on taking the first few steps in the morning,[19] worsening pain with weight-bearing, and pain and tenderness to palpation over the medial calcaneal tubercle'"\ Two large national datasets of ambulatory care data (excluding visits to podiatrists or federal, military, or Veterans Administration facilities) from the National Center for Health Statistics at the U.S. Centers for Disease Control and Prevention found that plantar fasciitis accounts for an average of one million patient visits per year to medical doctors'. Sixty-two percent of these visits were made to general medicine clinics, while 31% of patients were evaluated by orthopaedic or general surgeons.[20]

Study Design And Setting

Study Design: CROSS SECTIONAL STUDY
Population: Patients with plantar fasciitis
Sample Size: 100

Selection Criteria

Inclusion criteria:

- Age group between 20 to 40 years.
- Both genders– male and female.
- Subject willing to participate in study.
- Vendors with 6 to 8 hours of duty.

Exclusion criteria:

- Subject with any systemic illness and other musculoskeletal disorders specifically in lower limb like foot injuries, degenerative changes of hip and knee.

- Subject with any recent surgeries of lower limb.

MATERIALS REQUIRED

- Paper, Pen and Pencil
- Inch Tape
- Marker
- Step Stool

METHEDOLOGY

Subjects will be assessed on basis of following 2 tests and analysis will be done accordingly. First patients will diagnosed for plantar fasciitis with the help of windlass test and then they will be assessed for the flat foot with the help of Navicular drop test.

Windlass Test:

Maintaining the sitting position and then coming in standing position. In high sitting position, the ankle will be stabilized and the great toe will dorsi-flexed (no-weight bearing). In standing position, the subject will be asked to stand on toes of both the foot (weight bearing). In both the positions the subject will be asked if there is any unpleasant pain in the sole or heel of the foot. Both the plantar fascia passive stretching test and the windlass test (in non- weight bearing position) were supposed to be performed on the both the limbs (foot) simultaneously. If the subject will complain for any pain then the respective test will be marked positively and there will be no pain then the respective test will be marked negative.

Navicular drop test.

Purpose: To assess the height of navicular bone.
Test position: Standing
First mark the navicular tuberosity next measure the height of the navicular bone with the subtalar joint in neutral and the patient bearing most of the weight on the contralateral limb. Finally have the patient assume equal weight on both feet and re-measure the first and second measurement is the navicular drop. A difference of > 10mm is considered significant excessive foot pronation.

RESULTS

All statistical analysis was done using SPSS 25.0 software for windows. Descriptive analysis was used to obtain mean and standard deviations.

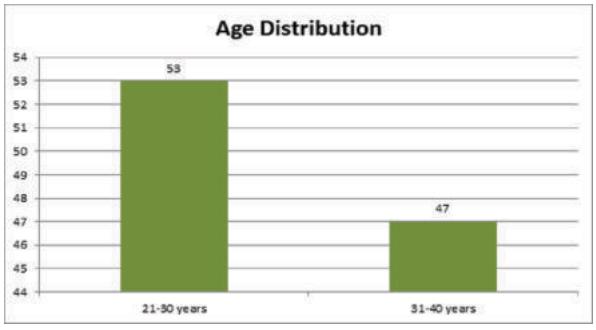
Demographic Data

AGE:

The research was performed on 100 participants between the age of 20-40. There were 53 patients between the ages of 20 to 30, 47 patients between the age 31to 40.

Table 1: Age Distribution

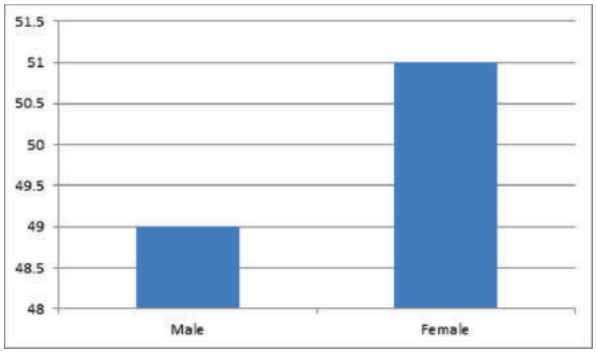
Age Distribution	
21-30 years	31-40 years
53	47



Graph 1: Age Distribution

Gender Distribution:

The research was performed on 100 participants between the age of 20-40. There were 49 Male participants and 51 female participants.



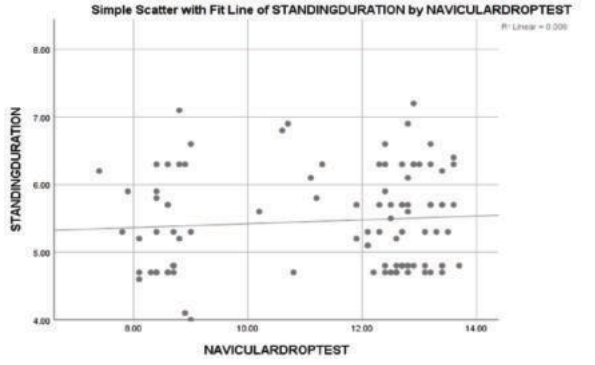
Graph 2: Gender Distribution

Table 2: Mean Value Of Fpi & Standing Duration

	Mean + SD
Age	27.8+4.6
Navicular drop test	12.3+5.2 mm
Standing Duration	5.8+ 0.8 hours

Table 3: Incidence Of Flatfoot Using Navicular Drop Test

Test Name	Positive	Negative
Windlass test	100	0
Navicular drop test	68	32



Graph 3 : Corelation Between Standing Duration And Flat Foot

Out of 100 participants 68 participants showed increase in pronation of foot according to navicular drop test mean distance were 12.3mm distance more then 9mm can be considered as reduction in arch so the prevalence of flat foot is 68% it also shows positive correlation between standing duration and flat foot.

DISCUSSION

Flatfoot is a biomechanical disorder frequently seen in clinical practice. one study reveals that the prevalence of flat foot was 26.62%.

Described finding is practically identical to a study conducted in Japan on a sample of 242 women and 98 men, in which a prevalence of 26.5% was observed, along with how said finding is related with obesity and the effects of pain and functionality . Similar findings regarding the prevalence of flat foot can be found in other publications. In other population studies (Springfield, Massachusetts) the prevalence of flat foot was 19.0% (20.1% in females and 17.2% in males) . Another study conducted in the Boston area found a prevalence of 20% in women 17% in men. There are even studies, conducted in a diabetic population on a sample of 230 patients, which refer to a prevalence as high as 37%

The present study was performed on 100 participants between the age of 20-40. There were 53 patients between the ages of 20 to 30, 47 patients between the age 31to 40. It was having mean Navicular drop test score of 12.3±5.2 mm and mean standing hours were 5.8±0.8 hours and they show positive correlation of standing hours with flat foot. Prevalence of flat foot among plantar fasciitis is 68%.

Previous studies of plantar fasciitis have found that up to 10% of the population is affected during their lifetime^ and over one million Americans per year' have this condition. The incidence rate of plantar fasciitis in our population was 10.5 per 1000 person-years, with a rate of 9.2 for men and 18.0 for women per 1000 person-years. Although we are aware of no known studies in the literature with incidence rates, prevalence rates of plantar fasciitis ranging between 4% and 22% have been reported among a population of runners.

Another study conducted in India reveals how the use of footwear at early ages, along with obesity and ligamentous laxity, increases the prevalence of flat foot

Another study conducted in Nigeria on 560 children aged between six and 12 years shows that although in the univariate analysis an association was found with type of footwear and age, after taking both into consideration, only age remained as a variable associated the presence of flat foot . Urban residence as a risk factor for the prevalence of flat foot has also been described in a study conducted on children in the Congo, where, after studying 1,851 footprints from 906 girls and 945 boys aged between three and 12 years, it was observed that prevalence diminishes with age, is higher in urban areas and in the masculine sex, and that the use of footwear has little influence on said prevalence . This study shows how the BMI, comorbidity and foot size are associated with the prevalence of flat foot. There are variability in the literature review. A number of studies describe how this foot disorder increases with age , other studies describe how flat foot diminishes with age, after adjusting for other covariates , and others indicate that neither age, gender nor BMI are related with flat foot.

Also in another study, the prevalence of flat foot was assessed where in it was found that real prevalence of symptomatic flatfoot is not very high in adolescents due to its nature of spontaneous correction as age increasesAlso in another study, the prevalence of flat foot was assessed where in it was found that real prevalence of symptomatic flatfoot is not very high in adolescents due to its nature of spontaneous correction as age increases [18,19]. According to age, the subjects between age 20-29 years were suffering 31.8% of flat foot, 30-39 years were having 42% flat foot, 40-49 years were having 16.7% flat foot, above 50 years were having 37.5% flat foot. similarly subjects between age 20-29 years were suffering 47.7% of high arched foot, 30-39 years were having 50% high arched foot, 40-49 years were having 61.1% high arched foot, above 50 years were having 50 % high arched foot.

According to gender it was found that high arched foot had higher incidences in males (55.2%) whereas flat feet were found to have higher incidences in females (38.7%).

A number of studies also describe different radiological findings in the morphology of the foot according to different ethnic groups. Others indicate how the different radiological morphology (angle of the talus with the first metatarsal) is related with the symptomatic presence or absence of flat foot. Even though obesity has repeatedly been associated with the presence of flat foot , not all studies point towards this association . In some articles, not only is the association of flat foot with characteristics (e.g., age, sex, BMI and concomitant illness) indicated, but also as a modifier of health . Thus, there are studies of 97,279 military recruits which associate flat foot with localised knee pain . As we have previously mentioned, in the article which finds a prevalence of flat foot identical that in our study it can also be seen how said alteration is also associated with the presence of pain and fatigue in women.

CONCLUSION

This study, conducted among adults of Gujarat state, revealed that youth those are having plantar fasciitis prone to developing flat foot, which aligns with published Western literature. This study shows that there is 68 % of prevalence of flat foot in adults who had plantar fasciitis. this study also suggest standing duration was positively correlated with pronation of foot in persons with plantar fasciitis.

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