

“Prevalence of Flat Foot and High Arch Foot among undergraduate Physical Therapy students by using Navicular Drop Test”

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ABSTRACT: Flatfoot and high arch foot are defined as decreased or increased medial longitudinal arch. There are several methods to examine them like, detailed foot and ankle examination, photo-podoscopic examination and the navicular drop test, which is the simplest, easily applicable and reliable test in this regards.

Methodology:

It was Descriptive cross-sectional Study. The sample size was 150 students. For checking navicular drop test, the subject was first positioned in standing i.e. using a small rigid ruler; the height of the navicular bone was measured from the floor to the most prominent part of navicular tuberosity then repeated in sitting.

Result:

Data was analyzed by using Statistical Package for Social Sciences (SPSS) version 20 by using descriptive statistics to calculate frequency and percentage. The incidence of flat foot and high -arch foot was determined in 49 subjects (32.6%) and 25 subjects (16.6%) respectively.

Conclusion:

We concluded that the prevalence of pes-planus and pes-cavus in a selected population of undergraduate physical therapy students was 36.6% and 16.6% respectively.

1. INTRODUCTION

Flatfoot is defined as depressed or lack of medial longitudinal arch, along with a valgus heel or not, rather than as a diagnosis of the hidden root cause. This account for diseased or non-diseased, rigid or flexible, and painful or pain free status. Flexible flatfoot in most cases is a physiological variant rather than a pathological condition. It encounters almost all new born and is frequently found in kids and youth. In reality the medial longitudinal arch formulates during the first 10 years of life. Many precipitating factors play important role in flexible flatfoot, together with hereditary, widespread ligamentous slackness, increased BMI in addition to type of shoe- wearing in early infancy. Whereas the exact root cause is not known [1]. Flexible flatfoot is roughly indiscriminate at birth. Its occurrence reduces as the age advances showing the growth of the longitudinal arch that develops impulsively within the first years of life [2].

Majority of the children who are experiencing unproblematic flexible flatfoot do not necessitate any therapy. Though, inflexible or aching flat foot, are most probably need orthopedic or surgical involvement. The application of introducing orthopedic and surgery is still controversial in the cases of unproblematic flexible flatfeet. Recent systematic reviews of the current literature verified that there is low level of data for the efficacy of conservative management of flexible flatfoot in children, [3].

Flatfoot is in fact a diagnosis of general look with inconsistent root causes. Each victim has to be evaluated systematically to find out the basic cause of the flatfeet. Management plans should be customized to the reason and kept for the symptomatic patients or persons where hereditary, gait disorders or other co morbidities advocate the probability of bigger dysfunction over time. [4]. In podiatry and orthopedic clinics, a more frequent complaint is seen as Flat foot (pesplanus) in its different types. Majority of this category of patients are asymptomatic and are not suffering from any limitations or hurdles in performing their ADLs. These types of victims need only efficient counseling, consultation regarding posture and advice to have ideal footwear. Particularly under the age of seven, it is very common finding which hardly produce any symptoms and limitations but guardians and parents are more concerned about the health and future status of their child having flat feet. [5]

For that reason, it is crucially significant for the clinician attending such clients to be very understandable about the various types of flatfoot deformity by birth or caused by any secondary risk factor. It is very imperative to recognize the biomechanics of different related foot bones contributing in the formation of whole ankle joint so one can order to recognize and take care of the root cause correctly [5],[6].

A good number of patients with flatfeet along with its different forms are considered normal and physiologic or stretchy. Pathological conditions comprise of the flexible form that considered as beyond normal, in addition to, the flatfoot condition caused by a structural deformity frequently responsible for the rigidity and disability [7], [8].

Flexible flatfeet hardly ever produce pain or limitation in early ages and childhood. The parents are more concerned about their kids' foot in this age, because they have the perception that their child's foot is abnormal. [9], [10]

The clinical evaluation of a flatfoot patient must include a general physical examination of the musculoskeletal system, as well as the detailed foot and ankle examination. The common examination is meant to evaluate torsional and angular variations of the lower limbs and the gait analysis. The clinician must focus on patients to be examined for confirmation of global ligamentous slackness. It is frequently worthwhile to ask about family history regarding flatfeet and to check the feet of other siblings who are available in the examination room. Flexible flatfeet may produce frequent and uneven foot wear in older children and adults, consequently the client's shoes must be examined. Assessment of the foot and ankle initiated with the identification that "the foot is not merely a joint." This basic and apparently visible fact is the basis for the suitable assessment and execution of foot deformities. There are at least two segmental deformities, often in opposite directions from each other, in all congenital and developmental deformities of the child's foot. [8],[9], [10].

A study by Bordin D et al used photo-podoscopic examination to evaluate the incidence of flat foot which was 16.4%, and it was found higher in males. [2] In Iran, Homayouni K et al used navicular drop test and the generalized joint laxity was measured by Beighton score. Flexible Flatfoot prevalence was detected 34.9 %. [3] In 2013, In Iran, Kachoosangy RA et al concluded that the overall prevalence of flat foot was 74% out of which 75.2% were girls and 72.6% which was not significant. [4] According to Dunn J. E. et al 19.0 % had flat feet (pesplanus), and 5.2 % had high

arches (pes cavus). [11] Rasmus et al conducted a study upon the determinants of navicular drop test value. It was concluded that mean navicular drop test value was 5.2%. [12]

2. Objectives of the Study

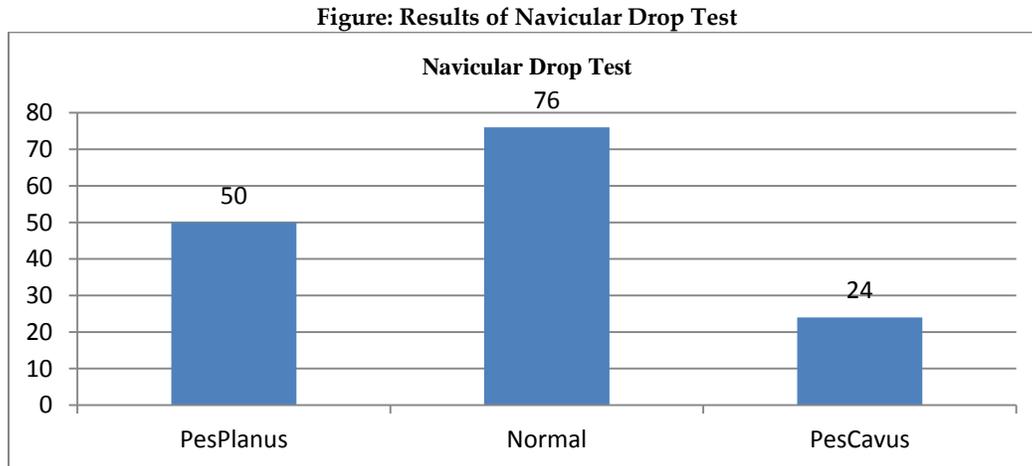
To assess the prevalence of flat foot and high-arch foot among the undergraduate Physical Therapy students by using navicular drop test.

2.1 MATERIAL AND METHODS

It was Descriptive cross-sectional Study. The study was conducted at ISRA institute of rehabilitation sciences ,Karachi campus. The duration of the study was 6 months after approval of proposal. The sample size was 150 students. Convenient non-probability sampling technique was used. Male and female Undergraduate Physical Therapy students were included. Students other than Physical Therapy disciplines and already diagnosed cases of foot deformities were excluded. Navicular drop test was used for collection of data. The normal value is 10 mm. For checking navicular drop test, the subject was first positioned in standing i.e. using a small rigid ruler; the height of the navicular bone was measured from the floor to the most prominent part of navicular tuberosity when in the neutral talar position. Again the height of the navicular bone was measured in relaxed sitting position i.e. non weight bearing .The difference in measurement is the navicular drop >10mm will be regarded as pes planus. Data was analyzed by using Statistical Package for Social Sciences (SPSS) version 20 by using descriptive statistics to calculate frequency and percentage. Ethical review board of Isra University has given the permission to conduct this study. Consent was delivered and collected from all the participants. The information collected from the participants was remained confidential.

2.2 RESULTS

49 participants were 17-19 years of age, while 80 participants were in age group of 20-22 years and 21 participants were in 22-25 years of age. Out of 150 participants, 29 subjects were males & 121 were females. Navicular drop test of participants



2.3 DISCUSSION

Flexible flatfoot (pesplanus), high-arch foot (pescausus), hind foot valgus and hallux valgus are the mainly frequently occurring foot deformities observed in the practice. [13] A good number of patients with flatfeet along with its different forms are considered normal and physiologic or stretchy. Pathological conditions comprise of the flexible form that considered as beyond normal, in addition to, the flatfoot condition caused by a structural deformity frequently responsible for the rigidity and disability [7], [8].

Our objective was to identify the prevalence of flat foot and high arch foot in a population of undergraduate Physical therapy students. By the vigilant examination of the foot of 150 participants, the incidence of flat foot and high -arch foot was determined in 49 subjects (32.6%) and 25 subjects (16.6%) respectively while rest of the 76 out of 150 participants found to have normal NDT value, i.e. 10mm. According to age the subject 18 years were suffering 6.5% of flat foot, 19 years were having 6.75% flat foot, 22 years were having 7.75% bilateral flat foot, 24 years were having 4.25% bilateral flat foot. Result exhibits no major difference according to gender but there was positive correlation of BMI with NDT value. In a study on prevalence of flatfoot noticed in the literature [5],[7],[9] is frequently for children under 10 years of age and differs among age groups. As the age advances, prevalence of the flatfoot decreases due to its natural automatic repairing mechanism. It was observed that [14] 43% of children was suffering from moderate and 14% experiencing severe pesplanus under 2-3 years of age. The prevalence fallen up to 31% for moderate and 9% for severe pes-planus under 4 years, of age group 24% for moderate and 4% severe under 5

years of age group, and 19% for moderate and 2% for severe under 6 years of age group. In another study [15] it was also observed that the prevalence of pes-planus was 16.4% under 10 years of age group. Our research group comprised of boys and girls of 18 and 25 years of age group. The prevalence of the pes-planus and pes-cavus in this population was 32.6% and 16.6% respectively. Our and automatic 10 years of age. Saša Milenković et al 2004, in their research noticed that in adult population, pes-planus and pes-cavus might be considered as the regular shape of a fit and stable foot, as a result of some abnormality in foot or paresis of the muscles in the foot. No related issues were noticed among reported cases. [16] We observed that the medial arch improves with progression of age, very swiftly under 6 years of age, gradually up to 10 years, there is no change observed after first decade of life. [17] ,[18] Daneshmandi H et al in 2002, observed the children having BMI greater than 25 suffered from pes-planus and pes-cavus than normal-weight individuals. [19]

Our results also support these arguments. The reason for this similarity might be the maximal number of students with BMI greater than 25 included in our study. By our study the Navicular drop test mean value was 11.01mm for all participated suffered with flat foot and 7.86 for normal individual. Rasmus G et al, 2006, from their study concluded that calculation of the ND might be the most suitable method for the clinical assessment of foot deformity. [20, 7] consequently easiest and authentic methods to measure ND are extremely guaranteed.

2.4 CONCLUSION

We concluded that the prevalence of pes-planus and pes-cavus in a selected population of undergraduate physical therapy students was 36.6% and 16.6% respectively. According to age 18 years were having 9.5% of flat foot bilaterally, 19 years were having 5.75% flat foot bilaterally, 22 years were having 5.75 % flat foot bilaterally, 24 years were having 5.24% flat foot bilaterally.

It is highly recommended to widen the study horizon to other discipline of undergraduate students. Moreover there are multiple other methods to check the validity and reliability of an individual suffering from foot deformities. Latest advancement in technology is there to measure the deformities more accurately like foot scanners and podometry etc.

Acknowledgment:

Firstly, I would like to thank ALLAH Almighty and His beloved Prophet (P.B.U.H) and then my parents and family. Special thanks to my teacher and mentor Dr Muhammad Asif and Dr Muhammad Hassan Farrag and my entire co-authors.

REFERENCES

1. Shih YF, Chen CY, Chen WY, Lin HC. Lower extremity kinematics in children with and without flexible flatfoot: a comparative study. *BMC Musculoskeletal Disord.* 2012;vol:13:31.
2. Bordin D, De Giorgi G, Mazzocco G, Rigon F. Flat and cavus foot, indexes of obesity and overweight in a population of primary-school children. *Minerva Pediatr* 2001;vol:53:7-13.
3. Kaynoosh Homayouni et al Prevalence of Flexible Flatfoot Among School-Age Girls by using navicular drop (ND). *Shiraz E-Med J.* 2015 February; 16(2): e18005.
4. Reihaneh Askarykachoosangy et al, A cross-sectional study upon the Prevalence of Flat Foot: Comparison between Male and Female Primary School Students. *Iranian Rehabilitation Journal*, 2013, Vol.18.
5. Ewen, Naviculo-cuneiform fusion in the treatment of flat foot. www.boneandjoint.org.uk/content/jbjsbr/35-B/1/75.full.pdf. accessed on Jan 2015.
6. Clement, D.B., Taunton, J.E., Smart, G.W., McNicol, K.L. A survey of overuse running injuries. *Phys. Sports Med.* 1981; p. 9, 47-58.
7. G. k. rose, The diagnosis of flat foot in the child. www.bjj.boneandjoint.org.uk/content/jbjsbr/67-B/1/71.full.pdf. accessed on Jan 2015.
8. *Clinical Anatomy* by Richard S. Snell. Chapter 12 Joints. 2007; 375:433.10
9. lam sim-fook et al, A Comparison of Foot Forms Among the Non-Shoe and Shoe-Wearing Chinese Population.
10. *Gray's Anatomy*, by Susan Standring ;39th Edition ;chapter 115-Foot and ankle. 2005;1507:45.
11. J. E. Dunn et al, The Prevalence of Foot and Ankle Conditions in a Multiethnic Community. www.aje.oxfordjournals.org/content/159/5/491.short. Accessed on Jan 2015.
12. Rasmus G Nielsen, Michael S Rathleff, Ole H Simonsen and Henning Langberg et al Determination of normal values for navicular drop during walking: a new model correcting for foot length and gender *Journal of Foot and Ankle Research* 2009;vol: 2(12)1757-1146
13. Tejashree Bhoir, Deepak B. Anap and Abhijit Diwate, Prevalence of flat foot among 18 -25 years old physiotherapy students: cross sectional study, 2014
14. Munro BJ et al, The Foot-care awareness. A survey of persons aged 65 years and older www.japmaonline.org/doi/abs/10.7547/87507315-88-5-242. accessed on Jan 2015.

15. Solveig et al, The effects of Footwear on Measurements of Balance and Gait in Women Between the Ages of 65 and 93 Years. www.ptjournal.apta.org/content/80/1/17.short. accessed on Jan 2015.
16. C.I. Ezema et al, A cross-sectional study conducted upon Flat foot and associated factors among primary school children. www.sciencedirect.com/science/article/pii/S1013702513000493, accessed on Jan 2015.
17. Forriol F, Pascual J. Footprint analysis between three and seventeen years of age. *Foot Ankle*. 1990;vol:11:101–104.
18. Wenger DR, Mauldin D, Speck G, Morgan D, Lieber RL. Corrective shoes and inserts as treatment for flexible flatfoot in infants and children. *J Bone Joint Surg Am*. 1989;vol:71:800–810.
19. Picciano AM, Rowland MS, Worrel. Reliability of open & close kinetic chain subtalar joint neutral position & navicular drop test. *J orthop sport phys. Ther*, 1993;18:553-558.
20. Hylton et al, A comparison of the Arch Index (AI) and Foot Posture Index (FPI) between normal and flat foot children. www.ncbi.nlm.nih.gov/pmc/articles/PMC3388464/. Accessed on Jan 2015.

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