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Frequency of Navicular Drop Among Grade II Hallux Valgus Patients

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Author`s Contribution

[1-3]Conception and design, Collection and assembly of data, [2-4]Analysis and interpretation of the data, [3-4]Critical revision of the article for important intellectual content, Statistical expertise[1-4]Final approval and guarantor of the article.

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A B S T R A C T

Objective: The purpose of this research was to determine the frequency of navicular drop among the patient of hallux valgus (HV) in grade II

Methodology: A descriptive cross sectional study was conducted in Ghurki trust and teaching hospital among patients of grade II hallux valgus. The total duration of study was 6 months from June, 2020 to December 2020. The data was collected from 89 participants who fulfilled the inclusion criteria. They were selected through non probability purposive sampling technique. Navicular drop test was used to collect data and results were analyzed using its NDT values. Data was entered and analyzed by using SPSS version 21. Descriptive statistics including the frequency of navicular drop and demographic characteristic of the participant was collected.

Results: The mean age of participant was 44.90 ± 8.22 years and the mean BMI of participants was 27.15 ± 2.96 kg/m2. Navicular drop was normal in 10 patient11.2 %), whereas 15 patients (16.8 %) had low navicular drop and 63 patients (70.7 %) had high navicular drop.

Conclusion: It was observed that the frequency of navicular drop among patients of grade II hallux valgus was high. It suggests the urgent need of carrying out evidence based physical health promotion for patients with foot deformity to control this growing problem.

Key words: Grade II hallux valgus, Navicular drop, Navicular drop Test and environmental domain.

Introduction

Hallux valgus is one of the most prevalent foot abnormalities. The terms hallux and valgus indicate "big toe" and "outward rotation." It's defined as a bulge on the medial inner side of the foot caused by an excessive rotation of the big toe away from the central line and bent towards other toes. A 'bunion' is the term for this bulge.[1] In this condition, the big toe deviates laterally, while the first metatarsal deviates medially. This deformity commonly affects the first metatarsophalangeal joint.[2]

Although the actual etiology of this condition is unknown, numerous variables associated with the development of Hallux valgus may be characterized as wearing pointed shoes, too stretched bones, metatarsal head form, hypermobility of the first ray of the foot, and excessive pronation at the foot.[3] Other considerations include systemic conditions, gender, age, inherited propensity, BMI, foot discomfort, flat feet, and shoe form. The hallux valgus angle is used to determine whether or not a deformity exists. The angle less than 15 is known as the normal angle. It is defined as the angle produced by the first metatarsal's long axis and the first proximal phalanx's axis.[4] In terms of severity, Hallux valgus angles were classified as mild (15-19), moderate (20-39), and severe (40 or >40) based on angle measuring criteria.[5]

The estimated community prevalence of Hallux valgus ranges between 21 and 65% of the whole adult population.[3] However, studies that evaluated the incidence of Hallux valgus by gender consistently found that females 30% (CI: 22 to 38) had a higher frequency than males 13% (CI: 9 to

17).[6] In women, Hallux valgus became associated with past usage of high-heeled footwear and inversely associated with flat feet.[7]

The foot has three arches: one anterior transverse arch and two longitudinal arches (medial and lateral).[8] Navicular drop is a long-term condition characterized by inadequate medial longitudinal arch support and excessive subtalar joint pronation of the foot. Previous study has linked Hallux valgus to medial longitudinal arch disintegration and severe pronation of the foot.[9]

Brody stated that the typical Navicular drop range was around 10 mm, and ranges more than 10 mm were taken into abnormal account.[10] Adults with flat feet might have a variety of reasons. These include "birth abnormalities, displaced bones, injury or swelling of the posterior tibial tendon." Other factors that might increase your chances include "being overweight, diabetes, and elderly people". [11]

In adolescence, the Navicular drop has been hypothesized as a factor in the development of a protrusion or bunion.[12] The structural deformity in hallux valgus in the younger is essentially an outward rotation (valgus) feature of the second and next toes. Systemic disease causes particular ligament laxity, and unique muscle tone appears to play a significant role in the development of hallux valgus. Typically, ligamentous laxity and low muscular tone lead to flat feet.[13] To author's knowledge none of the study has reported the frequency of navicular drop among hallux valgus patients of grade II in Pakistan. Therefore, the purpose of this study was to estimate the frequency navicular drop among grade II hallux valgus and also to spread awareness of about this particular condition.

Methodology

This descriptive observational study was conducted among 89 patients of grade II hallux valgus from Ghurki Trust and Teaching Hospital, Lahore, Pakistan in six month duration after the approval from Ethical Review Committee of Lahore College of Physical Therapy, LMDC. (ref no. 1.CPT/2006). The sample size was calculated by using the world health organization (WHO) sample size calculator under the following formula with 0.9% prevalence, 95% Confidence Interval, and 0.10 precision.[14] Patients were selected for the study after the confirming the diagnosis of hallux valgus grade II on the basis of Manchester scale. According to Manchester scale, four photographs of foot were presented to the participants and they were allowed to self-assess the foot by selecting the picture which was mostly resembled with their feet. Non probability convenient sampling technique was used. The inclusion criteria were patients of both genders of 30 - 60 years of age with confirmed diagnosis of either unilateral or bilateral grade II hallux valgus. Patients were excluded based on prior history of any fixed deformity of rare foot, any joint related congenital deformity of lower extremity, any history of previous foot surgery, any systemic diseases that could affect lower extremity or foot posture.[14]

Patient anonymity was ensured and informed consent was taken from the patient after explaining the study. Navicular drop test was performed on patients to check the frequency of navicular drop among grade II hallux valgus**.** Firstly subject was allowed to sit and mark the Navicular tuberosity with the pen on paper, then participant was allowed to stand and again mark the Navicular tuberosity. In this way, marked the Navicular drop difference on the paper with the help of ruler for both feet in sitting and standing position respectively and recorded in millimeters.[15] Data was compiled and analyzed using SPSS Version 17. Frequencies and percentages were used for categorical data.

Results

The mean age of participant was 44.90 ± 8.22 years and the mean BMI of participants was 27.15 ± 2.96 kg/m2. Out of total 89 patients, 63 patients (70. 8 %) were right side dominent and 26 patients (29.2 %) were left side dominant. 22 patients (24.7 %) had bilateral hallux valgus and 67 patients (75.3 %) had unilateral hallux valgus. The mean foot length was 24.9 ± 1.6. Navicular drop was normal in 10 pateints (11.2 %) where as 15 patients (16.8 %) had low navicular drop and 63 patients (70.7 %) had high navicular drop as shown in table I.

Table I: Frequency of navicular drop using Navicular Drop Test among hallux valgus grade II patient

Tool	Category	Percentage	Frequency
NDT	Low (< 6 mm)	16.8	15
	Normal (6mm)	11.2	10
	High (≥ 9 mm)	70.7	63

The realtionship body mass index and navicular drop showed that out of 10 underweight patients, 6 patients fall in low navicular drop category, 2 were normal and 8 were in high navicular drop category. A high BMI is expected to increase the load on the second and third tarsometatarsal joints for this reason an association was done between navicular drop and Body ,mass index. Out of 21 under weight patients, 2 patients had low navicular drop, 12 had normal navicular drop and 7 had high navicular drop. Out of 38 underweight patients, 8 patients fall in low navicular drop category, 10 were normal and 20 were in high navicular drop category. Out of 14 under weight patients, 1 patients had low navicular drop, 1 had normal navicular drop and 12 had high navicular drop. As the p value

was less than 0.05 so there was a significant association between these variables as shown in table II.

Table II: Chi Square Test relationship between body mass index and navicular drop.

ND	BMI				Total	P Value
	Under weight	Normal weight	Over weight	Obese		
Low drop	6	2	8	1	17	0.001
Normal	2	12	10	1	25	
High drop	8	7	20	12	47	
Total	10	21	38	14	89	

Discussion

The purpose of this study was to determine the occurrence of Navicular drop with patients having grade II Hallux valgus. The major findings of the current study showed that the frequency of Navicular drop increased with increasing age and with an increase in severity of hallux valgus.

The current study's findings are compatible with those of a previous study conducted by Bahar Kulunkoglu et al. to determine the influence of foot position on foot-specific health-related quality of life. This study comprised female patients with Hallux valgus grades II and III who were chosen using the Manchester scale and underwent a Navicular drop test on both feet. Finally, as the angle of Hallux valgus increased, there was a significant Navicular decline with a loss in quality of life.[9]

Coskun et al. performed another study that proved the Hallux valgus deformity and its impact on rear foot position, function, and discomfort in women. This study exclusively included females since hallux valgus is thought to be more prevalent in females due to high heels and small shoes, as well as other constitutional abnormalities. Almost all of the participants were right-side dominant, although their left foot problems were more severe.[2] Another research, Timothy E et al., proposed the significance of flat foot in hallux valgus. It's also established that there is no significant association between flat feet and hallux valgus. As a result, the flat foot should be ruled out as a main cause of hallux valgus.[16] However, the major results of the current study declared that; Navicular drop is directly related with hallux valgus of grade II. Because the frequencies of Navicular drop higher as the hallux valgus angle increased.

Current study concluded that majority of the patient who fall in the category of obese on BMI had high navicular drop than normal and underweight patients. Previous study found that age and BMI did not significantly influence the ND.[17]

Free medical camps should be arranged in order to include the unreported patients and spread awareness about hallux valgus. Further studies with different factors must be conducted.

Conclusion

It was observed that the frequency of navicular drop among patients of grade II hallux valgus was high. It suggests the urgent need of carrying out evidence based physical health promotion for patients with foot deformity to control this growing problem.

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