Original Article

Prevalence of Pes Planus and Pes Cavus among Students of Physical Therapy: A Descriptive Cross-sectional Study

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ABSTRACT

Background and Objectives: This study investigated the prevalence of two common foot conditions, flat feet (pes planus) and high-arched feet (pes cavus), among Doctor of Physical Therapy (DPT) students. Foot arches play a vital role in distributing weight and absorbing shock during activities. Understanding the prevalence of these conditions in this population can be beneficial for early detection and management.

METHODOLOGY: A cross-sectional study was conducted among DPT students at Green International University. Data collection involved a two-pronged approach: a self-administered questionnaire gathering information on demographics and foot health, and a footprint analysis to classify foot arch type (normal, pes planus, pes cavus).

RESULTS: The investigation revealed results which showed that pes cavus (high arches) was significantly more prevalent (54%) compared to pes planus (flat feet) (26%) and even normal foot arch (20%). Interestingly, females exhibited a higher prevalence of both pes cavus and pes planus compared to males.

CONCLUSION: These findings suggest that pes cavus might be more common than pes planus in DPT students, particularly among younger females. This highlights the importance of regular foot screening and early intervention strategies for DPT students to manage and prevent potential complications associated with these conditions.

KEYWORDS: Pes Planus, Pes Cavus, Foot Arch, Prevalence.

INTRODUCTION

The human foot is an intricate and vital component of the musculoskeletal system, comprising 26 bones, ligaments, intrinsic muscles, and extrinsic tendons. It plays a fundamental role in daily activities, counterbalancing body weight and distributing pressure across the body. As a segmented structure, the foot facilitates crucial functions such as weight transfer, propulsion, shock absorption, and adaptability on uneven surfaces. The arches of the foot, including one transverse arch and two anteroposterior arches (the lateral and medial arches), are essential for maintaining balance and stability. Any disturbance in these arches can lead to tension within the foot, potentially affecting the entire lower limb and leading to various musculoskeletal issues(1).

Among these arches, the medial longitudinal arch (MLA) is particularly significant. This arch, supported by the navicular, talus, calcaneus, and first three metatarsals, along with the ligamentous networks and plantar fascia, serves as a dynamic foundation that is both flexible and strong. The MLA's proper function is critical for efficient foot propulsion and shock absorption during activities such as walking, running, and jumping. Its functionality relies heavily on the coordinated action of muscles, adequate innervation, and a robust blood supply, provided by the anterior tibial, posterior tibial, and peroneal arteries(2). Any congenital abnormalities or acquired damage to this arch can have clinical implications ranging from mild discomfort to severe mobility issues.

Foot conditions such as pes planus (flat foot) and pes cavus (high arched foot) are directly related to abnormalities in the MLA. Pes cavus is characterized by an exaggerated plantar concavity, resulting in a high arch and a foot structure that is less capable of absorbing shock(3). This condition is found in approximately 10% of adults(4) and is frequently associated with neurological disorders(5), though it can also result from non-neurological causes. The rigid nature of pes cavus often leads to poor shock absorption, which can

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cause additional stress on the lower limb joints and spine, potentially leading to secondary conditions such as arthritis(6).

Conversely, pes planus is marked by a collapse of the MLA, leading to a foot that is in full or nearly full contact with the ground(7). This condition is common in both children and adults, with prevalence rates influenced by factors such as obesity, posterior tibial tendon dysfunction, and congenital ligamentous laxity(8). Pes planus can result in a variety of lower extremity injuries due to altered foot biomechanics and postural stability, impacting activities like walking and running(7).

The significance of understanding foot arch structure and function, particularly in relation to common conditions like pes planus and pes cavus, cannot be overstated. These conditions not only affect foot health but also have broader implications for overall musculoskeletal health. In developing countries like Pakistan, foot health is often neglected, despite its critical role in preventing injury and maintaining mobility(9). Therefore, this study aims to assess the prevalence of pes planus and pes cavus among Doctor of Physical Therapy (DPT) students, providing valuable insights into the importance of foot health in this population.

METHODOLOGY

This descriptive cross-sectional study was conducted among undergraduate students in the Doctor of Physical Therapy (DPT) program at Green International University, Lahore. A total of 50 students from various academic years participated. Data were collected using a self-administered questionnaire via Google Forms, along with footprint analysis to evaluate the foot arch index (AI).

Inclusion criteria included students aged 18–35 enrolled in the DPT program. Exclusion criteria ruled out individuals with musculoskeletal or neurological diseases, congenital foot/leg deformities, or prior lower extremity surgeries.

A standardized 24-question survey was used to gather information on demographics, medical history, footwear habits, physical activity, and previous physiotherapy treatments. Additionally, participants' footprints were collected using an ink method. The Foot Arch Index (FAI) was calculated using the formula: AI = B / (A+B+C), where A, B, and C represent specific areas of the foot. Based on AI values, footprints were categorized as follows:

- Pes Cavus (High-Arched Foot): AI < 0.21
- Normal: AI = 0.21-0.28
- Pes Planus (Flat Foot): AI > 0.28

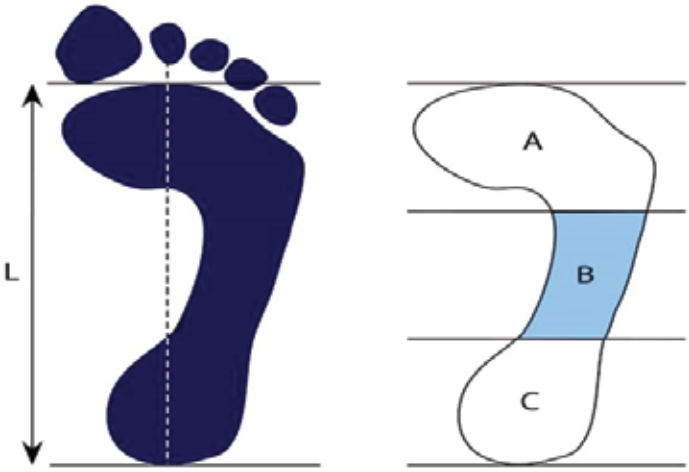

Figure 1. Foot print of foot.

Figure 2. Types of foot.

Participants completed the questionnaire through a Google Form link circulated via email and social media. The data collection phase lasted two weeks, ensuring participant anonymity.

Data were analyzed using SPSS version 26.0, focusing on the prevalence rates of pes planus and pes cavus. Descriptive statistics were used to determine these rates, while crosstabulation analysis examined the relationships between foot conditions and variables such as gender, weight, and footwear type.

Ethical guidelines were followed, with informed consent obtained from all participants. Participation was voluntary, and participants could withdraw at any time without consequences.

RESULTS

The study included 50 participants: 36 females (72.0%) and 14 males (28.0%). The majority of participants (88.0%) were aged 18-24 years, while the remaining 12.0% were aged 25-35 years.

Footprint analysis revealed that 54% of participants had pes cavus (27 out of 50), 20% had normal feet (10 out of 50), and 26% had pes planus (13 out of 50). Among participants aged 18-24 years, pes cavus was the most prevalent condition (50%), followed by pes planus (24%) and normal feet (20%). In the 25-35 age group, pes cavus was significantly more common (83.3%) compared to normal feet and pes planus.

Females were more likely to have both pes cavus and pes planus compared to males. Overall, pes cavus is more prevalent among DPT students, particularly in

younger age groups and among females. The study found no significant correlation between the type of foot deformity and age.

Table 1. Demographics of study participants

Gender * AI * Age Crosstabulation

Age				AI Pes Cavus	AI Normal Foot	AI Pes Planus	Total
18-24	Gender	F	Count	16	8	10	34
			% within AI	72.7%	80.0%	83.3%	77.3%
		M	Count	6	2	2	10
			% within AI	27.3%	20.0%	16.7%	22.7%
		Total	Count	22	10	12	44
			% within AI	100.0%	100.0%	100.0%	100.0%
25-35	Gender	F	Count	2		0	2
			% within AI	40.0%		0.0%	33.3%
		M	Count	3		1	4
			% within AI	60.0%		100.0%	66.7%
		Total	Count	5		1	6
			% within AI	100.0%		100.0%	100.0%
Total	Gender	F	Count	18	8	10	36
			% within AI	66.7%	80.0%	76.9%	72.0%
		M	Count	9	2	3	14
			% within AI	33.3%	20.0%	23.1%	28.0%
		Total	Count	27	10	13	50
			% within AI	100.0%	100.0%	100.0%	100.0%

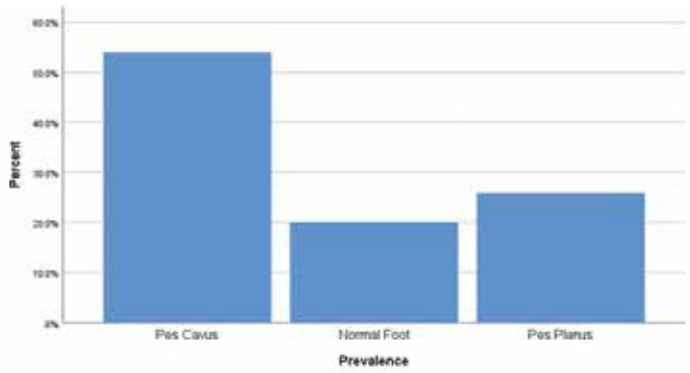

Figure 1

CONCLUSION

This study provides valuable insights into the prevalence of pes planus and pes cavus among DPT students and identifies associated factors. The findings indicate that pes cavus is more prevalent, particularly among females and younger age groups. Regular screening and early intervention are crucial for managing and preventing foot abnormalities in this population. Continued research will further refine best practices for the treatment and prevention of foot abnormalities in young adults.

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Authors Contributions:

Muhammad Nabeel Shah: Substantial contributions to the conception and design of the work.

Syeda Nida Fatima Bukhari: Design of the work and the acquisition. Drafting the work.

Manamta Khan: Final approval of the version to be published.

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