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ASSOCIATION OF PES PLANUS WITH GENU VALGUM IN THE ADULT POPULATION OF KARACHI

Komal Jamil[1], Muhammad Abdullah Siddiqui[2], Mubashir Hanif[3], Mubarra Jabeen[4], Misbah Shaikh[5]

[1]*Physical Therapy, Bahria University Health Sciences, Karachi.*

[2, 3, 4, 5]*Rehabilitation Medicine, PNS Shifa Hospital, Karachi.*

[*]***Corresponding Author:*** (komalansari4@gmail.com)
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Abstract

Background: Pes planus (flat foot) along with genu valgum (knock knees) represent frequent musculoskeletal deformities that may greatly affect lower limb mechanics as well as general quality of life. These conditions are researched on occasions in some pediatric populations. Few details are known about their relation with young adults. To make decent management systems, you have to understand how the link is made.

Objective: To determine the association of pes planus with genu valgum in adult population of Karachi.

Methodology: This current study is a cross-sectional one with 207 participants aged 18-26 at Bahria University Health Sciences Campus, Jinnah Sindh Medical University and Ziauddin University. The wet footprint test was used to widely categorize the foot arch type and the Q angle at the knee joint was likewise measured using a goniometer. Statistical analysis was then fully done in order to fully compare pes planus with genu valgum by using chi square test.

Results: The research showed for a clear link between flat feet and into knock knees. Notably, full correlation of 81.8% was observed in patients through right foot pes planus who had unilateral as well as bilateral genu valgum; for cases through bilateral pes planus 63.6% ($p = 0.029$ and $p = 0.047$ respectively).

Conclusion: These results suggest a link between flat feet and knock knees in young adults, implying that pes planus can worsen knee alignment problems. These results underscore the importance of early identification. They also underscore the importance of intervention for people susceptible to developing these conditions. Targeted strategies, like orthotic control along with physical therapy, might improve results as well as increase general lower limb health.

Keywords: *Pes planus, genu valgum, young adults, lower limb mechanics, musculoskeletal deformities, correlation study.*

INTRODUCTION

Pes planus (flat foot) is frequently associated in many cases with knee malalignment, such as genu valgum (knock knees). Although several such states often abate all throughout babyhood, a continuation to teenage years from that might cause major lasting problems [1]. Knee along with foot deformities, including bones, joints, in addition to ligaments or muscles, may arise from certain genetics, trauma, some disease, or overuse, greatly affecting quality of life [2,3]. Genu valgum, a deviation within the coronal plane, is often asymptomatic, but it may elicit flat feet, pain within the medial foot or knee, or an intermalleolar distance that exceeds 8 cm, which is abnormal. Grave instances might feature an obvious everted walk, lateral patella malt racking, or knee friction while walking [4,5].

Posture, kept up constantly in activity or rest, shifts suitably to cut down energy use and handle muscular stress [6]. It relies upon skeletal muscle contractions along with neuromuscular adjustments in response to gravity [7]. Posture is affected via bone issues, into breathing problems, or via ligament flexibility, possibly from causing instability, into more muscle stress, and of movement restrictions [8,9]. If they are left untreated, postural defects may result in meaningful discomfort and major harm, with lower limb posture influencing injury risk and function [10,11]. For instance, foot pain and deformities are closely linked. This is shown in a Danish population study.

This research looks into how pes planus and genu valgum are connected in young people, since there's not much evidence to back up their link. When someone has flat feet, it messes with how their legs work, putting extra pressure on the vastus medialis because of overpronation, weak calf muscles, and tightness in the outer ankle muscles. This adjustment puts more pressure on the inside, which leads to the inward rotation of both the tibia and femur, along with bringing the hip closer together [12]. When arches are flattened, they create extra stress on the knee, causing the tibia and femur to twist inward. When genu valgum and flat feet happen together, they can make lower limb mechanics even worse, putting extra stress on joints and increasing the chances of discomfort and conditions like osteoarthritis. Research has focused on this relationship in kids, but we still don't really get it in adults. Having flat feet might make knee rotation issues worse, which really points out the importance of focused treatments. This research is focused on investigating how adult genu valgum and flat foot are epidemiologically connected by analyzing clinical and biomechanical data [18]. The results from this study could pave the way for both broad and personalized treatment approaches, such as the use of braces and physiotherapy, which could enhance lower limb health by implementing strategies to reduce risks among populations at high risk.

METHODOLOGY

Research Approach In 2024, between September and December, we conducted an observational study that had a cross-sectional design. In this study, the focus was on analyzing foot arch types and knee alignment to figure out how flat feet and genu valgum are related in individuals aged 18 to 26. This study took place at three key educational institutions in Karachi, Pakistan, specifically at Bahria University Health Sciences Campus, Jinnah Sindh Medical University, and Ziauddin University. The study involved 207 participants, and we determined this number using OpenEpi software. To ensure a diverse representation from different departments and institutes, we used a stratified probability sampling method in this study. Participants were randomly selected from different academic programs to ensure an even mix of ages and genders.

Equipment Used:

To assess foot arch types, the Wet Footprint Test requires a shallow water container, a piece of absorbent paper or a dark sheet, a measuring tape, and some markers for arch classification. For assessing knee alignment, we used a goniometer, while a measuring tape helped confirm the distances between different anatomical points.

RESULT:

The study analyzed data from a total of 207 participants, which included 104 men and 103 women, with an average age of 21.4 years old. The main focus of our study was to explore how genu valgum and pes planus are related among young individuals.

Statistical analysis revealed a clear positive link between these two conditions. Out of the total sample, 124 individuals, which is about 59.9%, were found to have pes planus to varying extents. Out of the participants, 5.3%—that's 11 individuals—were diagnosed with genu valgum, which could be on one side or both sides of their bodies.

The analysis revealed that there was a notable link between genu valgum and bilateral pes planus in 63.6% of the instances (p = 0.047) as shown in table 1.

Table 1: bilateral pes planus * positive genu valgum Crosstabulation

			anyGV		
			+ve	-ve	Total
bilateralFF	+ve	Count	7	67	74
		% within anyGV	63.6%	34.2%	35.7%
	-ve	Count	4	129	133
		% within anyGV	36.4%	65.8%	64.3%
Total		Count	11	196	207
		% within anyGV	100.0%	100.0%	100.0%

In addition, there was a notable link between genu valgum and right foot pes planus in 81.8% of the instances observed (p = 0.029) as shown in table 2.

Table 2: right pes planus * positive genu valgum Crosstabulation

			anyGV		
			+ve	-ve	Total
right flat foot	+ve	Count	9	94	103
		% within anyGV	81.8%	48.0%	49.8%
	-ve	Count	2	102	104
		% within anyGV	18.2%	52.0%	50.2%
Total		Count	11	196	207
		% within anyGV	100.0%	100.0%	100.0%

Crosstabulation was used to confirm that people with flat feet were more likely to have knee misalignment. This implies that an elevated Q angle at the knee joint results from modifications in lower limb mechanics caused by the flattening of the foot arch.

The results are consistent with earlier research showing that pes planus alters lower limb posture and weight distribution, which in turn increases knee joint stress. Furthermore, the data showed no discernible variations in the prevalence of genu valgum or pes planus by gender.

The severity of these disorders, however, may be influenced by outside variables like lifestyle, degree of physical activity, and body mass index. Pes planus was shown to be more common in participants with greater BMI values, confirming the theory that body weight impacts foot arch stability and knee alignment as shown in figure no.1 & 2.

Figure 1: bilateral pes planus * positive genu valgum bar chart

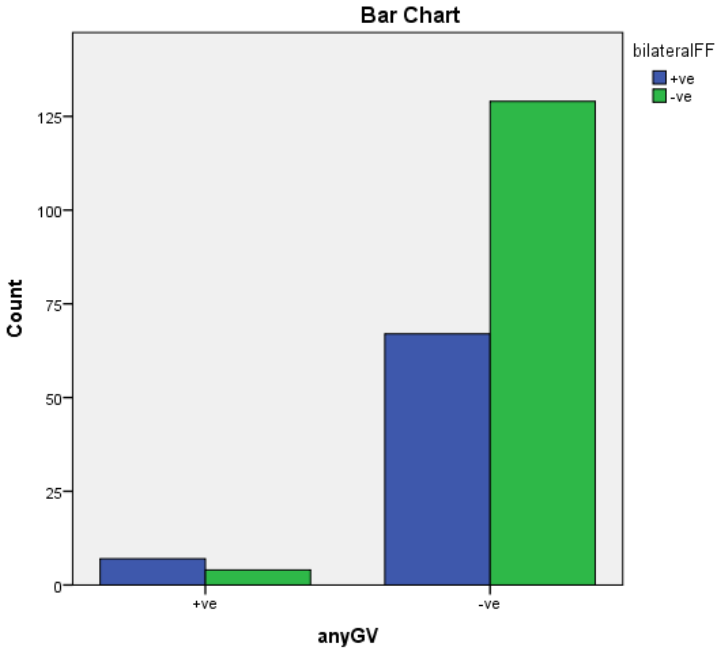
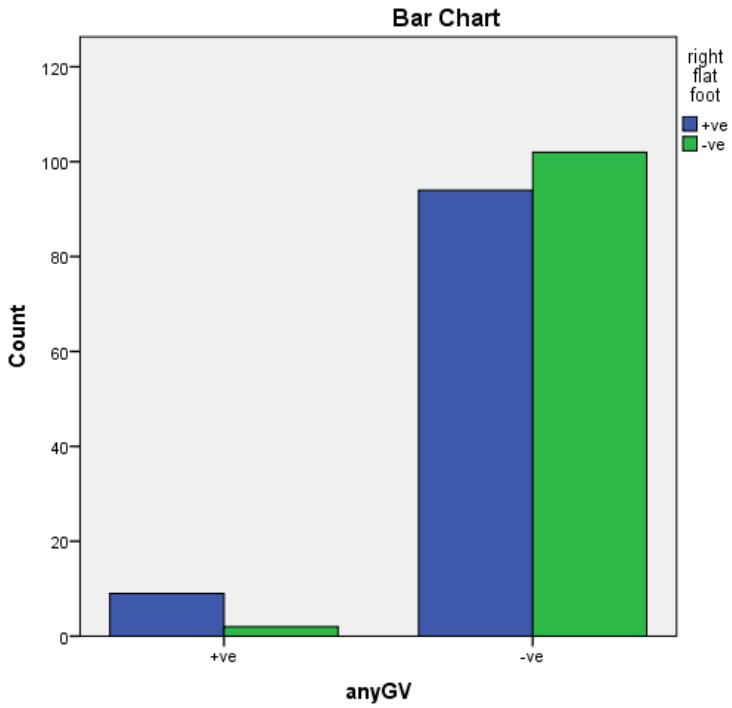


Figure 2: right pes planus * positive genu valgum bar chart



CONCLUSION

The use of crosstabulation helped verify that there's a higher chance for folks with flat feet to experience misaligned knees. Essentially, this suggests that a raised Q angle in the knee might be the result of changes in how the lower limbs function, brought about by the foot arch losing its shape. Earlier studies align with these findings, indicating that flat feet can change how the lower limbs are positioned and how weight is distributed, which ultimately boosts stress on the knee joint. Interestingly, the analysis revealed that there were no significant differences in the rates of genu valgum or flat feet when comparing genders. Yet, the impact of these conditions can vary due to external factors such as one's lifestyle, how active they are, and their body mass index. People with flat feet tend to have higher BMI levels, which supports the idea that extra body weight can affect both foot arch stability and how the knees line up. In summary, this study emphasizes the importance of promptly diagnosing and treating individuals with flat feet to prevent further complications, such as knee pain and misalignment of the knees. The harmful consequences of these conditions can be reduced by implementing preventive strategies like strength training, orthotic support, and posture correction exercises. To determine causality and assess the long-term effects of pes planus on knee alignment and musculoskeletal health, future studies need to incorporate longitudinal studies. The general conclusions of the study identify the strong correlation between flat feet and knee malalignment, leading to the recommendation for early clinical evaluation and therapy to avoid subsequent orthopedic complications.

DISCUSSION:

The findings of the current study reveal a strong positive correlation between pes planus (flat feet) and genu valgum (knock knees) in young adults aged 18–26 years in Karachi, Pakistan. That is, 81.8% of the subjects with right foot pes planus had unilateral or bilateral genu valgum, and 63.6% of the subjects with bilateral

pes planus had genu valgum. These findings agree with the findings in the literature that changes in foot arch mechanics can influence knee alignment, leading to increased knee joint stress and potentially worsening musculoskeletal deformities [1, 2]. The study emphasizes the importance of knowing the biomechanical interaction of the knee and foot, particularly in young adults, where these conditions may have been present since childhood or may have been caused by lifestyle factors.

This pes planus/genu valgum association discovered clinically can be explained from a biomechanical perspective. The flat medial longitudinal arch and pes planus commonly result in excessive overpronation of the foot. The overpronation results in internal rotation of the tibia and femur, changing the lower limb alignment as well as promoting an increase in the Q angle at the knee joint [3, 4]. The resulting medial displacement of the knee joint causes stress across the medial collateral ligament as well as the patellofemoral joint, the ultimate result often being pain, instability, as well as change in particular degenerative patterns in the long term [5, 6]. Additional flattening of the arch of the foot changes normal weight-bearing stresses across the force-bearing structures of the foot. This can worsen knee malalignment as well as promote progression to genu valgum as well as flat foot [7].

The research also establishes the effect of external factors, including body mass index (BMI), on the severity of such conditions. Those with elevated BMI levels were at higher risk of developing pes planus, an indication that greater body weight may compromise the stability of the foot arch and worsen knee alignment. The result is in line with other research showing that obesity is a major risk factor for both knock knees and flat feet due to the additional stress imposed on the lower limb joints and soft tissues by increased weight [8, 9]. The results are consistent with the adoption of weight control interventions as part of an integrated approach to the treatment of musculoskeletal deformities among young adults.

Gender did not appear to be a factor in the incidence of pes planus or genu valgum in this study, as opposed to some earlier reports with higher incidence in females [10]. However, severity of such deformities could also be determined by gender-related factors, which could include an imbalance in the pelvic anatomy, looseness of ligaments, or the effect of sex hormones and could be a topic to be studied further [11]. Habits, activity level, or foot wear patterns can also influence the development as well as growth of such disorders, though variables pertaining to the above were not examined by the study done here.

The clinical relevance of these observations is important. Treatment and early intervention of pes planus patients can prevent the development or exacerbation of genu valgum and related complications, including knee pain, patellofemoral instability, and osteoarthritis [12, 13]. Focused interventions, such as physical therapy to strengthen intrinsic foot muscles and align the lower limb, and the use of orthotic appliances to stabilize the medial longitudinal arch, may limit the biomechanical impact of flat feet and minimize knee joint stress [14, 15]. In addition, patient education regarding the necessity of a healthy weight and correct footwear can prevent the development of such conditions.

In summary, this study presents strong evidence of a strong correlation between pes planus and genu valgum in young adults, and it highlights the importance of early diagnosis and intervention to prevent secondary complications. By managing these conditions with targeted interventions, such as physical therapy, orthotic management, and weight control, healthcare providers can promote lower limb health and enhance the overall quality of life in at-risk individuals. Further research is needed to determine the underlying mechanisms and long-term consequences of this correlation and to develop evidence-based guidelines for the management of these common musculoskeletal deformities.

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