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ASSOCIATION OF FOOT PAIN AND HEEL HEIGHT AMONG HEALTH CARE STUDENTS

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ABSTRACT:

BACKGROUND: High heels shoes (HHS) are worn by a lot of women all over the world, Wearing high heels is often a part of women's style. **OBJECTIVES:** To determine the frequency of foot pain, the use of different heel heights among healthcare students, and the association between foot pain and heel height. **METHODOLOGY:** The quantitative cross sectional study was conducted in Sindh from December 2023 to May 2024. 427 health care students participated in the study by means of convenience sampling technique. Data was collected using foot health status questionnaire to measure frequency of foot pain and self-generated questionnaire to determine frequency of wearing heel of different categories among health care students respectively. Data was analyzed through Statistical Package for the Social Sciences (SPSS) Version 21. Demographic data was analyzed by descriptive statics and expressed as mean, standard deviation which was presented in tabulated form. Chi Square test was used to find association between foot pain and heel height. **RESULTS**: The study sample comprised of 427 health care students mean age of students was 21.7±1.8. Among the participants, 47.5% reported no pain, 24.8% had very mild pain, 61.8% wore flat heels, and 28.6% wore low heels. **CONCLUSION:** The study found no significant correlation between foot pain and heel height among healthcare students.

KEYWORDS: Foot health, Heel types, Foot discomforts, Different heel categories.

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Introduction

High heels shoes (HHS) are worn by a lot of women all over the world, Wearing high heels is often a part of women's style. According to the research, 72% of women wore HHS, and 39% of them used to wear them daily, another survey done in 2010 on 3000 women who wore HHS shoes found that 10% of them needed medical attention or were even admitted to the hospital as a result of their footwear, and around 50% of them bent their ankles [1]. According to Mika A. et al, when compared to low-heeled shoes (LHS) and barefoot walking, younger women exhibited an increase in pelvic range of motion in the sagittal plane during high-heeled locomotion, but middle-aged women did not show this compensatory reaction[2]. People have used high heels shoes since they want to appear taller than they actually are, American Medical Association of Podiatrics shows that, 39–69% of females like to wear high heels out of them only 40% of females use high heels daily in their routines, whether they go to the office or grocery[3]. The general prevalence rate of foot discomfort in high heel wearers was 84% in study conducted in Pakistan, which is greater than study by CL Hill et al. in Australia, which reported that the rate was 17.4% that was most similar to a study by Jill Dawson et al in UK, which found that the rate was 83 %[4,5]. It is

reported that 37.5% of female high heel users complained of having foot pain, Mehnaaz Sameera et al found that wearing high heels made one appear taller, wiser, and more being sure[3]. There is proof that wearing HHS negatively impacts the musculoskeletal system, affecting the way the ankle-foot complex functions, the way that a muscular tendon transmits force, and how the foot distributes weight [6]. The difference between flat and heeled footwear is that in flat shoes, forefoot and heel are in the same alignment which ensures that weight is transmitted evenly however, when wearing heeled foot wears the forefoot is positioned lower than the heel part which results in more weight being placed on forefoot and an increase in foot's angulations and amount of weight transferred to the forefoot increases[7].The structural anatomy of the human foot is complicated and serves as the body's foundation it consists on forefoot, mid foot, and hind foot, it has more than 30 joints, 28 bones, more than 100 muscles, tendons, and ligaments which making it a strong mechanical framework and it carry out the two fundamental tasks of propulsion and weight bearing[8]. The foot helps to maintain stability in two primary manners: (i) by giving the body mechanical support through the arch's osteoligamentous architecture and the coordinated action of the muscles in the lower limbs and (ii) by sending sensory data about body position through plantar tactile mechanoreceptors[9]. The foot is a component of the biokinetic chain that runs from the pelvis to the lower limb and the spine. The upper body features may be affected by the foot arch and its loading during standing and walking, the longitudinal and transverse arches offer the best foot loading and appropriate alignment in a typical, healthy foot, distribution of force [10]. It is the only portion of the body that links to the ground and supports the entire weight of the body while standing or walking [4]. Foot pain is a broad term that doesn't mean a specific pain category, mechanism of injury, or tissue pathology [11]. Daily use of high heels has an adverse effect on the foot's structure and morphology, with the forefoot and first metatarsal being the most adversely impacted [4]. High-heeled shoes significantly disrupt process of postural regulation. Because they raise the body center of mass and reduce base of support. The slightly changed center of pressure curve indicates that high-heeled shoes impair postural control[12]. In previous study wearing heels greater than 4 cm leads to decreased performance as compared to those wearing flat shoes of 2 cm[1]. Studies shows that wearing high heels for an extended period of time can cause chronic foot pain and deformities [13]. and raise the risk of an ankle sprain [12].Using HHS is believed to enhance a person's risk analytical of suffering a lateral ankle injury, the plantar foot flexed and inverted, the sub talar joint axis shifted that will cause foot pain and can also aggravate musculoskeletal conditions that affect the foot and ankle, including plantar fasciitis, hallux valgus, and ankle sprain [14]. Women who usually wear (HHS) are more likely to suffer from plantar fasciitis [6,15]. Research on heel height shows that the ankle's instability plays a significant role in sprains, falls, and a problem sustaining body equilibrium due to the ankle's instability and the forward movement of the center of gravity[13]. Lee, Dong, et al have suggested that choosing the right shoes can serve as a clinically therapeutic strategy in addition to protecting the foot and reducing foot related illnesses[16]. Researchers have made significant attempts to increase the comfort of high-heeled shoes up to this point by recommending a reasonable heel height, an acceptable insert insole, enough heel support area, and even walking speed during HH gait [17]. Many studies have been conducted to find association between foot pain and heel height in younger working women and older women but studies on healthcare students is not exist in literature[4,18]. There is literature attributing higher heel height to an increased incidence of ankle inversion injuries which, unless other ankle stabilizing techniques are utilized concurrently, may contraindicate the use of heel raises in individuals having a history of lateral ankle sprains[19].

METHODLOGY

The quantitative cross sectional study design was conducted in Sindh from December 2023 to May 2024 after approval from Institutional Research Committee (IRC), Office of research, Institute of Physiotherapy and Rehabilitation sciences, PUMHS for Women SBA. letter no: PUMHSW/IPRS/ORS: [18]. Multi centered study was conducted from PUMHS Nawabshah, LUMHS Jamshoro, Isra University Hyderabad, Jeejal Maa Institute Hyderabad and JPMC Karachi students. 427 health care students participated in the study by means of

convenience sampling technique. The study included healthcare students aged 18-25, excluding those with recent fractures, flat feet, or lower limb deformities.

Data was collected using foot health status questionnaire to measure frequency of foot pain to determine frequency of wearing heel of different categories among health care students respectively. Heel height set in 3 categories as flat (up to 2.0cm), low heel (2.1-4.0cm) and high heel (4.1-6.0cm or above) [17]. Data was analyzed through Statistical Package for the Social Sciences (SPSS) Version 21. Demographic data was analyzed by descriptive statistics and expressed as mean, standard deviation which was presented in tabulated form. Chi Square test was used to find association between foot pain and heel height.

RESULTS

Of the 427 students, 61.8% wore flat heels, and 28.6% wore low heels. Among them, 47.5% reported no pain, while a non-significant correlation was found between heel height and foot pain (p = 0.438)

TABLE 1: Demographic information of participants.

S. No	Variables	Mean/frequency	S.D/Percent
	Age	21.74	1.8
	Year of study		
1	1st Year	82	19.2
2	2nd Year	71	16.6
3	3rd Year	79	18.5
4	4th Year	58	13.6
5	5th Year	137	32.1
	Discipline		
1	MBBS	52	12.2
2	DPT	222	52.0
3	PHARM_D	54	12.6
4	BSN	81	19.0
5	BSPH	18	4.2
	Institute		
1	Peoples University Of Medical and Health Sciences for Women SBA	297	69.6
2	Liaquat University of Medical and Health Science Jamshoro	31	7.3
3	Isra University Hyderabad	36	8.4
4	Jeejal Maa Institute Of Medical And Health Sciences Hyderabad	7	1.6
5	Jinnah Postgraduate Medical Centre Karachi	10	2.3
6	Others	46	10.8

Table 2: Heel height and Heel frequency

Variable	Frequency	Percentage
Heel height		
Flat heel	264	61.8%
Low heel	122	28.6%
High heel	41	9.6%
Total	427	100%
Heel frequency		
Daily	133	31.1%
Weekly	63	14.8%
Monthly	231	54.1%
Total	427	100%

TABLE 3: Cross tabulation between foot pain and heel height

	Heel height				
Foot pain	Flat (n)	Low (n)	High (n)	Total N(%)	p-value
None (n)	132	56	15	203(47.5%)	0.438
Very Mild (n)	60	36	10	106(24.8%)	
Mild (n)	55	23	14	92(21.5%)	
Moderate (n)	7	2	0	9(2.1%)	
Severe (n)	10	5	2	17(4.0%)	
Total N(%)	264(61.0%)	122(28.6%)	41(9.6%)	427(100%)	

DISCUSSION

The aim of this study was to investigate that Association of foot pain and heel height among health care students, as no such study was conducted in this population.

Foot pain is common health issue. Some studies show that most female wears heel to look more attractive and confident which considered to be one of main factor contributing to foot pain. Therefore in this chapter the finding of this

study was compared with the results of other similar studies.

This study results indicate that majority of participant's worn flat heel 61.8%, with frequency of 47.5% having no pain. This study shows the non-significant correlation of foot pain and heel height with the p value 0.438. This finding is due to the reason that it means participants didn't wear high heel and were not have severe foot pain. Study results shows that in foot specific section where foot pain, foot function, general foot health and footwear, with values of 16.0, 19.3, 20.3 and 24.4 respectively. According to Daniel Lopez – Lopez foot pain, foot function, general foot health and footwear, with values of 0.289, and 0.366, 0.366 and 0.354 respectively [20]

The height of the heel and the type of shoe are the reasons behind variations in the arch of the foot [21.] Out of the 110 ladies, 79 (71.8%) had difficulty in their feet and ankles when wearing heels that were three inches or more. Additionally, this study's findings demonstrated that 110 (63%) female participants wore HHS four days a week, and 65 (37%) of them wore it for at least seven hours each day [22]. Numerous research have examined how wearing high heels affects foot discomfort. While 42% of women reported experiencing pain as a result of using them for more than five years [23]. Keegan et al. examined the shoes worn by those who fractured and those who did not, and discovered that medium-to-high heel height was linked to a higher incidence of foot fracture [24]. Accordance to this study, the prevalence of pain in the lower leg and foot was 24.7% and 29.6%, respectively, as a result of high heels [25]. Based on [9:46 pm, 26/06/2024] Manshi: n surveys, 37% to 69% of women regularly use shoes of balance height [26].

CONCLUSION

There is non-significant association between foot pain and heel height. Some studies have been undertaken to investigate the relationship of foot pain and heel height. This study shows that in study population majority of participant's worn flat heel having no foot pain, and minority of participant's worn high heel having foot pain.

ETHICS APPROVAL: The ERC gave ethical review approval.

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin.

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AUTHORS' CONTRIBUTIONS:

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated in the work to take public responsibility of this manuscript. All authors read and approved the final manuscript.

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