PREVALENCE OF FOOT PAIN AND ASSOCIATED RISK FACTORS AMONG FINAL YEAR CLINICAL STUDENTS AT UNIVERSITY OF BENIN, EDO STATE, NIGERIA

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ABSTRACT

Background: Foot pain is a common musculoskeletal complaint that can interfere with mobility, daily activities, and clinical performance. Clinical students are particularly vulnerable due to prolonged standing, unsuitable footwear, and heavy clinical workloads. Understanding its prevalence and associated risk factors is essential for developing effective preventive strategies and improving students' well-being.

Aim: To determine the prevalence of foot pain and identify the associated risk factors among final-year clinical students at the University of Benin.

Methods: A descriptive cross-sectional study among 208 final-year clinical students of Physiotherapy, Nursing, Radiography, and Medical Laboratory Science. Participants were selected using a proportionate stratified sampling technique. Data were collected using a validated Foot Health Status Questionnaire (FHSQ). Descriptive statistics summarized the data, while inferential tests (Kruskal–Wallis, Mann–Whitney U, Spearman's correlation, and binary logistic regression) were used to assess associations at a significance level of $p < 0.05$.

Results: The prevalence of foot pain was 47.6% among participants, indicating a

moderate to high occurrence. The Kruskal–Wallis test revealed significant differences in foot pain across departments (p=0.019), with nursing students reporting highest scores. Spearman's correlation showed significant relationships between prolonged standing (r = −0.143, p = 0.039), shoe height (r = −0.166, p = 0.017), and shoe fit (r = 0.157, p = 0.024) with foot pain. The Mann–Whitney U test found no significant gender difference (p = 0.555), while the presence of foot defects significantly influenced foot pain (p = 0.045). Logistic regression showed that the overall model was significant (χ^2 = 27.74, p = 0.015), though no single predictor independently explained the outcome.

Conclusion: Nearly half of the clinical students experienced foot pain, largely associated with prolonged standing, poorly fitted footwear, and pre-existing foot defects.

Keywords: Prevalence, foot pain, risk factors, prolonged standing

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INTRODUCTION

The human foot is one of the vital parts of the body as it supports the entire body weight and aids in movement and posture.[1] Yet, it is given the least care and attention.[2] Although musculoskeletal foot problems make up a significant portion of primary care consultations, it appears that only a small percentage of people with foot problems seek medical attention for them.[3] Gates et al[4] defined foot pain as an independent risk factor for a loco-motor disability that causes impaired balance, increased risk of falls, loss of independence, and ultimately affects quality of life. Each region of the foot, including the toes, forefoot, midfoot, and hindfoot, is susceptible to different forms of pain and pathological conditions due to variations in structure and function. It most commonly occurs at the toes or forefoot, followed by the arch or ball, with the heel and hindfoot least frequently affected[3]. There is a significant reported incidence of foot pain that affects everyday life and work quality.[5]

The prevalence of foot pain has been estimated in a few studies. Globally, foot pain prevalence in adults in the general population is estimated to be between 9 and 36%, with a pooled prevalence of 24%. In their lifetime, one in four people may experience foot discomfort, and up to 40% of runners will report foot pain.[6] Data collected from five international cohorts reported a prevalence of 13-36%[3]. According to a systematic review, 14.6% of healthcare workers in Africa reported having ankle/foot pain.[7] Ankle-foot pain significantly impacted surgical nurses in Europe, being the most common work-related musculoskeletal disorder. This resulted in 2.4% of nurses missing work, 1.4% requiring hospitalization, 52.9% experiencing disruptions to their daily work life, and 2.9% changing their workplace. Over half of nurses resorted to medication to manage the pain.[8-10] A study in India showed that the prevalence of musculoskeletal foot pain among medical professionals was 30% of doctors, 30% of physiotherapists, 20% of nurses, and 20% of pharmacists.[11]

Various factors such as increasing age, gender, higher body mass index (BMI),[12] foot pathologies, footwear habits,[13] other

musculoskeletal pain,[14,15] and medical conditions including mental health/depression,[16] inflammatory arthritis (RA), osteoarthritis (OA), and heart disease[15] have been associated with foot pain. A recent study highlighted factors that can increase the risk of foot pain; - Age, Gender, Weight gain, Occupational risk, Sport and exercise, pregnancy, corn and calluses, Heel pain, Bunion, Morton's neuroma, Achilles tendinitis, Bursitis of the heel, Plantar fasciitis, Arch problem, foot injury, Haghind's deformity, hammer toe, ingrown toenails, stress fracture, cosmetic foot surgery.[14]

Clinical students are individuals admitted into the programs of medical laboratory science, physiotherapy, radiography, and nursing. Their program, which is essential to learn clinical skills, requires them to engage in extensive practical training, which predisposes them to prolonged standing, walking long distances within hospital premises, carrying heavy loads, and wearing inappropriate footwear, as well as other risk factors associated with foot pain.[17] Studies have been done to show the prevalence of pain and its associated risk factors among other musculoskeletal regions, particularly the low back[18-21] and neck[22-24] among clinical students. To the best of this researcher's knowledge, there are limited studies that evaluated the prevalence of foot pain and its associated risk factors among clinical students in the University of Benin. Hence, the present study aims to determine the prevalence of foot pain among clinical students and its association with various risk factors.

MATERIAL AND METHODS

This study used a cross-sectional study design to consecutively recruit 208 clinical undergraduates of the School of Basic Medical Sciences, University of Benin, Edo State.

Inclusion criteria were final year clinical students of the school of Basic Medical Sciences, who were willing to participate in this study.

The sample size for this study was determined using Solvin's formula:

$n = N / (1 + N (e)^2)$

Where n is the sample size, N is the total population, and e is the margin of error (0.05).

The total population of final-year clinical students from the four departments of Physiotherapy, Medical Laboratory Science, Nursing, and Radiography was 432. The population distribution was as follows: Physiotherapy (82), Medical Laboratory Science (110), Nursing (148), and Radiography (92). Using the formula, the estimated sample size arrived at was 208..

A proportionate stratified sampling technique was used to ensure that each department was fairly represented in the study. The number of students selected from each department was determined according to their proportion in the total population. This was done by multiplying each department's population by the overall sample size of 208 and dividing by the total population of 432, using the formula:

Sample size for each department = (Department population / Total population) × Overall sample size.

Based on this calculation, 39 students were selected from Physiotherapy, 53 from Medical Laboratory Science, 71 from Nursing, and 44 from Radiography. This method ensured that each department contributed participants in proportion to its size within the total population, making

the sample representative of the study population.

Before the commencement of the study, ethical approval was obtained from the Ethics Research Committee of the College of Medical Sciences, University of Benin, Benin City (REC approval number: CMS/REC/2024/763). Informed consent was obtained from the participants after adequate information on the aims, methods, possible conflict of interest, institutional affiliations of the researcher, the anticipated benefits, the potential risks of the study and the right to refuse to participate was provided to the participants. Data were obtained through a self-administered questionnaire. The questionnaire comprised three sections:

The first section contained the sociodemographic data of the respondents, including age, gender, department, weight, height, and BMI.

The second section contained questions on foot health using the Foot Health Status Questionnaire (FHSQ). The FHSQ was developed in 1998 by Paul Bennett, Carla Patterson, Scott Wearing, and Tony Baglioni. It was initially developed and validated in Australia as a patient outcome measure for foot health. It is a comprehensive, self-administered questionnaire that assesses foot-specific and generic health-related quality of life (HrQoL). For this study, only the foot-specific aspect of the FHSQ was considered. It consists of 13 questions that evaluate four domains: Pain, Function, Footwear, and General Foot Health. Each domain is scored by converting item responses on Likert-type scales to a standardized domain score ranging from 0 to 100, where higher scores indicate better foot health / less pain and lower scores indicate poorer foot health / greater pain. In this study, the foot pain domain was the primary outcome: prevalence of foot pain was determined by participants' affirmative responses to the foot pain items, and severity was described using the continuous FHSQ foot pain domain score (lower scores = greater pain). Other FHSQ domains were used descriptively to contextualize footwear and functional factors. The FHSQ has a high test-retest reliability, ranging from 0.74 to 0.92.[25]

The third section contained questions on the relationship between footwear and foot pain.

Several data quality control measures were implemented. The questionnaire was pretested on 15 students (not included in the main analysis) to assess clarity and feasibility; minor wording adjustments were made accordingly. Data collectors received standardized training on instrument administration and confidentiality protocols. All questionnaires were administered in person under supervision to reduce misunderstanding and to allow immediate resolution of queries. Completed forms were reviewed on site for completeness and consistency; missing or ambiguous responses were queried with respondents where possible. Data were double-entered into a spreadsheet and cross-checked for entry errors prior to export for statistical analysis. Electronic data were stored on a password-protected device, and paper forms were kept in locked storage to ensure confidentiality. These procedures were implemented to enhance reliability, minimize measurement and entry errors, and promote the integrity of the study data.

The anthropometric parameters were measured using appropriate instruments. The self-administered questionnaire was distributed and retrieved by the researcher

on the same day. A response rate of 100% was recorded as all participants completed their questionnaires.

Procedure for Assessment and Measurement

A weighing scale was used to measure the participants' weight. They were instructed to remove their shoes and heavy clothing and to stand on the weighing scale. The researcher observed and documented the values recorded.

A tape measure was used to measure the participants' height. Each participant was asked to remove their shoes, stand with their back and heels against a flat wall while ensuring their head, shoulders, and buttocks touched the wall. The researcher then used a flat object to mark the wall at the top of their head. The distance from the floor to the mark on the wall was measured. The Body Mass Index (BMI) of the participants was calculated using the recorded weight and height values.

The data obtained were analyzed using descriptive statistics such as mean, frequency, and standard deviation. The Kruskal–Wallis test was used to compare foot pain scores across departments, while the Mann–Whitney U test assessed the influence of gender and foot defects. Spearman's correlation was employed to examine the relationships between standing duration, shoe height, shoe fit, and foot pain. Binary logistic regression was used to identify predictors of foot pain. The level of significance was set at $p < 0.05$.

RESULTS

The primary aim of this study was to determine the prevalence of foot pain and the associated risk factors among clinical students in the University of Benin. 208 students were recruited for this study from the departments of Medical Laboratory Science, Nursing, Physiotherapy, and Radiography.

Shown in Table 1 are the socio-demographic characteristics of the respondents. 110 (52.9%) of the respondents were female, and 71 (34.1%) were from the department of Nursing. The age of the respondents ranged between 20 to 29 years, with a mean age of 22.36 (± 2.25) years. The mean values for weight and height were 71.45kg (± 14.22) and 1.71m (± 0.10), respectively. Body mass index ranged from 14.68 to 36.06kg/m^2, with a mean value of 24.66kg/m^2 (± 5.22). 103 (49.5%) had a normal weight.

Table 2 presents the prevalence of foot pain among final-year clinical students at the University of Benin. The overall prevalence was 47.6% (95% CI: 40.8–54.4), indicating that nearly half of the respondents experienced some degree of foot pain.

Table 1: Sociodemographic characteristics of the respondents N = 208

	Frequency	Percentage
Gender		
Male	98	47.1
Female	110	52.9
Department		
Physiotherapy	40	19.2
Medical Lab. Science	53	25.5
Nursing	71	34.1
Radiography	44	21.2
Body Mass Index		
Underweight	23	11.1
Normal weight	103	49.5
Overweight	40	19.2
Obese	42	20.2
	Range	**Mean ± SD**
Age (years)	20-29	22.36 ± 2.25
Weight (kg)	45.0 – 120.0	71.45 ± 14.22
Height (m)	1.50 – 2.26	1.71 ± 0.10
Body Mass Index (kg/m^2)	14.68 – 36.06	24.66 ± 5.22

Table 2: Prevalence of foot pain

			95% CI	
	Frequency	**Percentage**	**Lower**	**Upper**
Present	99	47.6	40.8	54.4
Absent	109	52.4		

Table 3 shows the foot health status among the respondents. The scores of the respondents in the pain domain of the foot health status questionnaire ranged from 0 to 81.25, with a mean score of 21.63 (± 20.23). Foot function scores ranged from 0 to 95, with a mean value of 22.40 (± 21.56). Mean values for the footwear and general health domains were 60.86 (± 26.25) and 31.61 (± 26.49), respectively.

Footwear characteristics among the respondents are presented in Table 4. Corporate shoes were the most commonly used shoe type, worn by 161 (77.4%). 99 (47.6%) commonly wore shoes of moderate/right fit, 122 (58.7%) commonly wore flat shoes. 95 (45.7%) experience discomfort after wearing shoes, 96 (46.2%) usually stand for 1 to 3 hours daily. 126 (60.6%) usually walked for 1 to 3 hours daily. 119 (57.2%) spend 1 to 3

hours daily standing while wearing shoes, 122 (58.7%) spend 1 to 3 hours daily walking while wearing shoes. 12 (5.8%) had foot defects, 8 of which were flat feet. 68 (32.7%) reported experiencing foot pain related to improper posture. 92 (44.2%) reported an occasional frequency of feeling foot pain/discomfort. 8 (3.8%) of the respondents reported experiencing changes in foot health that they attributed to weight gain or loss; these changes included swollen feet after standing for long periods and feelings of foot heaviness.

Shown in Table 5 is the difference in foot pain score among students in different clinical departments. The Kruskal–Wallis test showed a significant difference in foot pain scores among students across clinical departments ($H = 9.94$, $p = 0.019$). $\eta^2_h = 0.034$, indicating a small effect. Post-hoc comparisons with Bonferroni adjustment revealed that Nursing students reported significantly higher foot pain scores than Physiotherapy students ($p = 0.049$), while differences among the other departments were not significant ($p > 0.05$).

Table 3: Foot Health Status among the Respondents

Domains	Range	Mean ± SD
Pain	0 – 81.25	21.63 ± 20.23
Foot Function	0 – 95.0	22.40 ± 21.56
Footwear	0 – 100	60.86 ± 26.25
General Health	0 – 100	31.61 ± 26.49

Table 4: Footwear characteristics among the respondents

	Frequency	Percentage
Commonly used shoe type		
Athletic/sneakers	11	5.3
Boots	3	1.4
Corporate Shoe	161	77.4
Dress Shoes	4	1.9
Sandals/flip-flops	29	13.9
Commonly used fitting		
Loose Fit	28	13.5
Moderate/Right Fit	99	47.6
Fit	74	35.6
Tight Fit	7	3.4
Commonly used shoe height		
Flat (0-1 inch)	122	58.7
Low Heel (1-2 inches)	55	26.4
Mid Heel (2-3 inches)	28	13.5
High Heel (3-4 inches)	3	1.4
Experience discomfort after wearing shoes		
Yes	95	45.7
No	113	54.3
Hours spent standing daily		
Less than 1 hour	26	12.5
1-3 hours	96	46.2
4-6 hours	79	38.0
7-9 hours	7	3.4
Hours spent walking daily		
Less than 1 hour	45	21.6
1-3 hours	126	60.6
4-6 hours	35	16.8
7-9 hours	2	1.0
Time spent standing while wearing shoes		
Less than 1 hour	30	14.4
1-3 hours	119	57.2
4-6 hours	56	26.9
7-9 hours	3	1.4
Time spent walking while wearing shoes		
Less than 1 hour	45	21.6
1-3 hours	122	58.7
4-6 hours	35	16.8
7-9 hours	5	2.4
More than 9 hours	1	0.5
Foot defects		
Yes	12	5.8

No	196	94.2
Specific foot defect		
Flat feet	8	3.8
Hallux valgus	3	1.4
Foot pain/discomfort related to improper posture		
Yes	68	32.7
No	140	67.3
Frequency of foot pain/discomfort		
Never	25	12.0
Rarely	84	40.4
Occasionally	92	44.2
Frequently	7	3.4
Have you experienced any changes in foot health that are attributed to weight gain or loss?		
Yes	8	3.8
No	200	96.2
Specific changes		
Swollen feet after standing for a long	1	0.5
Feet feel heavy	1	0.5

Table 5: Kruskal-Wallis test for differences in foot pain scores among students in different clinical departments

	Median (IQR)	H	df	η^2_h	p
Department					
Physiotherapy	6.25 (23.44)	9.94	208	0.034	0.019
Medical Lab. Science	25 (31.25)				
Nursing	25 (25)				
Radiography	12.5 (29.69)				

Table 5.1 Post-hoc analysis

Sample 1-Sample 2	Test Statistic	Std. Error	p-value[a]
Physiotherapy-Radiography	-10.605	12.963	1.000
Physiotherapy-Nursing	-31.029	11.731	0.049
Physiotherapy-Med. Lab Science	-31.162	12.428	0.073
Radiography-Nursing	20.424	11.385	0.437
Radiography-Med. Lab Science	20.557	12.102	0.536
Nursing-Med. Lab Science	.133	10.771	1.000

[a]Significant value has been adjusted by the Bonferroni correction for multiple tests

Table 6 shows the correlation between selected sociodemographic and footwear characteristics and foot pain score using spearman rho correlation. There was a significant negative relationship between foot pain score and time spent standing (r = -0.143, p = 0.039), shoe height (r = -0.166, p = 0.017). There was a significant positive relationship between shoe fit and foot pain (r = 0.157, p = 0.024).

Table 6: Correlation between selected sociodemographic and footwear characteristics and foot pain score using Spearman's rho correlation

			95% CI	
	R	**p**	**Lower**	**Upper**
BMI * Foot pain	0.076	0.276	-0.065	0.214
Hours spent standing * Foot pain	-0.143	0.039	-0.278	-0.003
Hours spent walking * Foot pain	-0.082	0.237	-0.220	0.058
Shoe height * Foot pain	-0.166	0.017	-0.299	-0.026
Shoe fit * Foot pain	0.157	0.024	0.017	0.291
Age * Foot pain	0.021	0.760	-0.119	0.161
Time spent standing in shoes	0.044	0.526	-0.096	0.183
Time spent walking in shoes	-0.006	0.93	-0.146	0.134

Shown in Table 7 is the influence of gender and foot defects on foot pain score using the Mann-Whitney U test. The presence of foot defects had a significant influence on the foot pain score (t = -1.985, p = 0.045). However, the gender of the students did not influence their foot pain score.

Table 7: Influence of gender and foot defects on foot pain score using the Mann-Whitney U T-test

	Median (IQR)	**U**	**r**	**p-value**
Gender				
Male	18.75 (31.25)	5642	0.04	0.555
Female	25 (31.25)			
Foot Defect				
Yes	31.25 (31.25)	775.5	0.14	0.045
No	18.75 (31.25)			

Presented in Table 8, the binary logistic regression model significantly predicted foot pain prevalence overall (χ^2 = 27.74, p = 0.015). However, none of the individual predictors were independently significant.

The subgroup analysis presented in Table 9 – 12, showed that the binary logistic regression model significantly predicted the prevalence of foot pain among physiotherapy students (χ^2 = 26.458, p = 0.009) and radiography students (χ^2 = 30.895, p = 0.002). Among radiography students, factors of BMI (OR = 1.61, p = 0.016), walking for less than 1 hour (OR = 7.7 x 10^4, p = 0.028) and walking between 1 to 3 hours (OR = 2.2 x 10^4, p = 0.031) were significant predictors of foot pain prevalence.

Table 8: Omnibus test of model coefficients

Omnibus Tests of Model Coefficients			
	Chi-square	**Df**	**Sig.**
Model	27.744	14	0.015

Table 8.1: Binary logistic regression for predictors of foot pain prevalence

	B	**OR**	**95% C.I. for OR**		**p-value**
			Lower	**Upper**	
Age	0.109	1.115	0.976	1.273	0.108
BMI	0.050	1.052	0.994	1.113	0.079
Gender					
Male (vs Female)	-0.087	0.917	0.499	1.684	0.779
Shoe Fit					0.282
Loose fit (vs Tight fit)	0.693	1.999	0.302	13.245	0.473
Moderate/Right fit (vs Tight fit)	1.161	3.193	0.565	18.036	0.189
Shoe Height					0.086
Flat (vs High heel)	21.277	1.74×10^9	0.000	—	0.999
Low Heel (vs High heel)	21.123	1.49×10^9	0.000	—	0.999
Mid Heel (vs High heel)	19.989	4.80×10^8	0.000	—	0.999
Hours spent standing					0.353
Less than 1 hour (vs 7 – 9 hrs)	0.441	1.555	0.249	9.687	0.636
1-3 hours (vs 7 – 9 hrs)	-0.435	0.648	0.125	3.350	0.604
4-6 hours (vs 7 – 9 hrs)	-0.429	0.651	0.126	3.372	0.609
Hours spent walking					0.184
Less than 1 hour (vs 7 – 9 hrs)	-20.654	0.000	0.000	—	0.999
1-3 hours (vs 7 – 9 hrs)	-21.050	0.000	0.000	—	0.999
4-6 hours (vs 7 – 9 hrs)	-21.787	0.000	0.000	—	0.999
Constant	-4.457	0.012	—	—	1.000

Subgroup Analysis

Department = Physiotherapy

Table 9: Omnibus test of model coefficients for physiotherapy students

Omnibus Tests of Model Coefficients			
	Chi-square	**Df**	**Sig.**
Model	26.458	12	0.009

Table 9.1: Binary logistic regression for predictors of foot pain prevalence among physiotherapy students

	B	**OR**	**95% C.I. for OR**		**p-value**
			Lower	**Upper**	
Age	0.208	1.231	0.767	1.975	0.390
BMI	0.151	1.164	0.896	1.512	0.256
Gender					
Male (vs Female)	−1.530	0.216	0.015	3.067	0.258
Shoe Fit					
Loose fit (vs Tight fit)	−19.632	0.000	0.000	—	0.999
Shoe Height					0.399
Flat (vs High heel)	21.725	2.72×10^{9}	0.000	—	1.000
Low heel (vs High heel)	24.188	3.20×10^{10}	0.000	—	1.000
Mid heel (vs High heel)	19.691	3.56×10^{8}	0.000	—	1.000
Hours spent standing					0.666
<1 hour (vs 7 – 9 hrs)	−20.401	0.000	0.000	9.596	0.999
1–3 hours (vs 7 – 9 hrs)	−22.842	0.000	0.000	94.006	0.999
4 – 6 hours (vs 7 – 9 hrs)	−22.014	0.000	0.000		0.999
Hours spent walking					0.705
<1 hour (vs 7 – 9 hrs)	23.080	1.06×10^{10}	0.000	—	0.998
1–3 hours (vs 7 – 9 hrs)	21.952	3.42×10^{9}	0.000	—	0.998
Constant	−30.640	0.000	—	—	0.999

Department = Medical Laboratory Science

Table 10: Omnibus test of model coefficients for medical laboratory science students

Omnibus Tests of Model Coefficients			
	Chi-square	**Df**	**Sig.**
Model	7.836	11	0.728

Table 10.1: Binary logistic regression for predictors of foot pain prevalence among medical laboratory science students

	B	**OR**	**95% C.I. for OR**		**p-value**
			Lower	**Upper**	
Age	0.125	1.133	0.832	1.543	0.427
BMI	0.024	1.025	0.901	1.165	0.711
Gender					
Male (vs Female)	0.284	1.329	0.362	4.880	0.669
Shoe Fit					
Loose fit (vs Tight fit)	0.144	1.155	0.123	10.812	0.9
Shoe Height					0.626
Flat (vs High heel)	0.903	2.468	0.382	15.949	0.343
Low heel (vs High heel)	0.898	2.455	0.274	21.994	0.422
Hours spent standing					0.974
<1 hour (vs 7 – 9 hrs)	1.158	3.184	0.000	—	1.000
1–3 hours (vs 7 – 9 hrs)	21.727	2.73×10^{9}	0.000	—	0.999
4 – 6 hours (vs 7 – 9 hrs)	22.044	3.75×10^{9}	0.000	—	0.999
Hours spent walking					0.420
<1 hour (vs 7 – 9 hrs)	1.684	5.387	0.428	67.866	0.193
1–3 hours (vs 7 – 9 hrs)	0.937	2.552	0.406	16.036	0.318
Constant	−26.940	0.000	—	—	0.999

Department = Nursing

Table 11: Omnibus test of model coefficients for nursing students

Omnibus Tests of Model Coefficients			
	Chi-square	**Df**	**Sig.**
Model	15.6	14	0.335

Table 11.1: Binary logistic regression for predictors of foot pain prevalence among nursing students

Variable	**B**	**OR (Exp(B))**	**95% C.I. for OR**		**p-value**
			Lower	**Upper**	
Age	x	1.094	0.823	1.454	0.537
BMI	0.034	1.034	0.923	1.158	0.336
Gender					
Male (vs Female)	−0.255	0.775	0.252	2.386	0.198
Shoe Fit					0.187
Loose fit (vs Tight fit)	1.020	2.773	0.138	55.577	0.505
Fit (vs Tight fit)	1.990	7.314	0.542	98.713	0.134
Shoe Height					0.976
Flat (vs High heel)	22.490	5.85×10^9	0.000	—	0.999
Low heel (vs High heel)	22.630	6.73×10^9	0.000	—	0.999
Mid heel (vs High heel)	22.125	4.06×10^9	0.000	—	0.999
Time spent standing					0.929
<1 hour (vs 7 – 9 hrs)	−18.348	0.000	—	—	1.000
1–3 hours (vs 7 – 9 hrs)	−18.760	0.000	—	—	1.000
4–6 hours (vs 7 – 9 hrs)	−19.095	0.000	—	—	1.000
Time spent walking					0.764
<1 hour (vs 7 – 9 hrs)	−20.896	0.000	—	—	0.999
1–3 hours (vs 7 – 9 hrs)	−20.765	0.000	—	—	0.999
4–6 hours (vs 7 – 9 hrs)	−19.384	0.000	—	—	0.999
Constant	13.038	4.60×10^5	—	—	1.000

Department = Radiography

Table 12: Omnibus test of model coefficients for radiography students

Omnibus Tests of Model Coefficients			
	Chi-square	**Df**	**Sig.**
Model	30.895	12	0.002

Table 12.1: Binary logistic regression for predictors of foot pain prevalence among radiography students

Variable	**B**	**OR (Exp(B))**	**95% C.I. for OR**		**p-value**
			Lower	**Upper**	
Age	−0.031	0.970	0.614	1.531	0.895
BMI	0.476	1.610	1.091	2.376	0.016
Gender					
Male (vs Female)	6.139	463.48	0.913	2.35×10^5	0.053
Shoe Fit					0.210
Loose fit (vs Tight fit)	5.186	178.79	0.478	6.69×10^4	0.086
Moderate/Right fit (vs Tight fit)	5.502	245.13	0.382	1.57×10^5	0.095
Shoe Height					0.072
Flat (vs High heel)	6.236	510.86	0.901	2.90×10^5	0.054
Low heel (vs High heel)	−0.449	0.638	0.015	27.178	0.815
Time spent standing					0.578
<1 hour (vs 7 – 9 hrs)	20.022	4.96×10^8	—	—	1.000
1–3 hours (vs 7 – 9 hrs)	18.568	1.16×10^8	—	—	1.000
4–6 hours (vs 7 – 9 hrs)	17.467	3.85×10^7	—	—	1.000
Time spent walking					0.087
<1 hour (vs 7 – 9 hrs)	11.253	7.71×10^4	3.33	1.79×10^9	0.028
1–3 hours (vs 7 – 9 hrs)	10.008	2.22×10^4	2.56	1.93×10^8	0.031
Constant	−50.141	0.000	—	—	0.999

DISCUSSION

The purpose of this study was to determine the prevalence of foot pain and its associated risk factors among clinical students at the University of Benin. Foot pain can have a significant impact on daily activities and reduce overall quality of life.[1] The findings of this study showed a 47.6% prevalence of foot pain among participants. This aligns with reports from other developing and African countries, where the prevalence of foot or ankle pain among healthcare professionals and trainees ranges between 40% and 52%. For instance, a study among nurses in Ethiopia reported a 43.7% prevalence of ankle and foot pain,[26] while a related study in the Amhara region of Ethiopia found a 51.8% prevalence.[27] These values are comparable to the present study's results and

emphasize the widespread nature of foot pain in health-related fields.

In contrast, a study among nursing students in Asia reported an even higher prevalence (93.5%) of foot discomfort,[28] possibly due to differences in measurement tools and case definitions. In Nigeria, Ayanniyi and Udofia[29] observed a 51.7% prevalence of musculoskeletal pain among undergraduates, indicating that the current finding of 47.6% for foot pain is consistent with the general burden of musculoskeletal symptoms among Nigerian students.

These consistent findings across regions indicate that foot pain is a common occupational and ergonomic concern among healthcare trainees, particularly those who engage in long hours of standing, walking, and practical rotations. Variations in prevalence may be attributed to differences in study design, population characteristics, and assessment instruments. The moderate-to-high prevalence observed in this study underscores the need for institutional interventions aimed at preventing foot-related disorders among clinical undergraduates.

The inferential analysis revealed several important associations. Prolonged standing showed a significant negative correlation with foot pain, suggesting that extended periods on one's feet increase discomfort. This supports findings by Mazahreh,[30] Choudhary and Chitkara,[31] and Aziz et al.,[32] who reported that long-standing durations contribute to musculoskeletal strain, reduced blood circulation, and increased plantar pressure. Similarly, the correlation between shoe height and foot pain indicated that moderate heel heights may reduce discomfort, consistent with the reports of De-Castro et al.[33] and Wibowo et al.,[34] who found that heel elevation redistributes plantar pressure more evenly.

Shoe fit was also significantly associated with foot pain, indicating that ill-fitting footwear increases discomfort. This aligns with Moes[35] and Buldt and Menz[36], who noted that tight or loose footwear can alter gait, increase pressure points, and reduce comfort. Furthermore, the study found no significant difference in foot pain between male and female students, implying similar exposure to occupational and ergonomic risks. However, the presence of foot defects was significantly linked to foot pain, supporting Szczepanowska-Wołowiec et al.,[37] who reported that structural abnormalities like flatfoot or high arches alter biomechanics and heighten discomfort.

When compared with other inferential studies, the findings of this research are consistent with those of Getie et al. (2021) and Canca-Sanchez et al. (2024). Getie et al. reported that low shoe comfort, prolonged standing, and high physical demand were significant predictors of ankle and foot pain among nurses in Ethiopia[38]. Similarly, Canca-Sanchez et al. identified body mass index (BMI), foot posture, and footwear characteristics as major predictors of foot pain in adults.[39] Both studies reinforce the role of footwear comfort, body composition, and occupational exposure in the development of foot pain, supporting the associations found in the present study.

However, while those studies identified distinct independent predictors through logistic regression, the current study's overall regression model was significant, but individual predictors did not retain statistical independence. This difference may be due to sample size limitations, restricted variability in exposure levels

among students, and the overlapping nature of risk factors such as standing duration, shoe fit, and shoe height. Nonetheless, the pattern observed across these studies confirms that foot pain is multifactorial, often arising from the combined effects of biomechanical, ergonomic, and lifestyle-related factors.

While several associations were statistically significant, it is essential to distinguish statistical from clinical significance. Statistical significance shows that findings such as the relationship between prolonged standing and foot pain are unlikely due to chance. However, clinical significance emphasizes the real-world impact, such as reduced concentration, mobility, and performance among affected students. Hence, even moderate pain levels have practical implications for students' well-being and academic functioning.

Potential confounding variables such as body mass index, physical activity, footwear outside clinical practice, and individual pain thresholds were not controlled in this study. These may have influenced both exposure and outcome variables. Future studies should include multivariate or stratified analyses to enhance internal validity and accuracy.

From a practical perspective, this study highlights the need for ergonomic and preventive interventions in clinical education. Institutions should promote the use of properly fitted footwear, encourage periodic rest breaks, and integrate foot health education into training programs. Such measures can reduce discomfort, improve clinical performance, and enhance overall well-being among students.

Limitations of the Study

Although this study provides valuable insights into the prevalence and associated risk factors of foot pain among final-year clinical students, several limitations should be noted. The use of a cross-sectional research design limits the ability to establish a causal relationship between the identified risk factors and the occurrence of foot pain. The associations observed in this study should therefore be interpreted as correlations rather than cause-and-effect relationships. Additionally, the study relied on self-reported data, which may have introduced recall bias or social desirability bias, as participants might have underreported or overreported their symptoms and exposure levels.

Furthermore, the convenience sampling technique employed could have resulted in selection bias. Participants who were more available or experiencing foot pain may have been more likely to take part in the study, potentially leading to an overestimation of the prevalence. Students who were absent or uninterested during data collection were excluded, which may have affected the representativeness of the findings.

Lastly, because the study was conducted among clinical students within a single institution, its generalizability is limited. Differences in clinical exposure, footwear type, physical activity levels, and academic workload in other institutions or regions could lead to varying outcomes. Future studies should consider adopting a longitudinal or multicenter approach, involving larger, randomly selected samples, to enhance generalizability and strengthen causal inferences.

CONCLUSION

The prevalence of foot pain among final year clinical students at the University of Benin was 47.6%. Prolonged standing, poorly fitted footwear and presence of foot defects were identified as major contributing factors.

Recommendations

1. Footwear Interventions: Clinical students should be encouraged to wear properly fitted and ergonomic footwear with moderate heel heights to reduce foot pain and improve mobility.
2. Standing Management: Institutions should implement policies that limit prolonged standing during clinical rotations by incorporating scheduled rest breaks and ergonomic modifications in clinical areas.
3. Foot Health Education: Foot care and ergonomics should be integrated into the curriculum to improve students' awareness of proper footwear, posture, and preventive strategies for maintaining healthy feet.

Implications for further studies

1. Longitudinal Studies: Future research should investigate the long-term effects of foot pain on the academic performance, mental health, and overall well-being of clinical students to establish causal relationships.
2. Intervention Effectiveness: Studies should assess the effectiveness of interventions such as custom orthotics, foot-strengthening exercises, and ergonomic modifications in reducing foot pain and improving functionality.
3. Foot Defects and Biomechanics: Further research should explore the prevalence and biomechanical impact of various foot defects among clinical students to better understand their contribution to foot pain development.

CONFLICT OF INTEREST:

The authors declare no conflict of Interest in this study.

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