The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 8, 2025

PREVALENCE OF MORTON'S NEUROMA IN FEMALES WEARING HIGH HEELS AND FLAT SHOES

Afza Ali[1], Farah Mansoor[2], Samama Ejaz[3], Raheel Munawar[*4]

[1, 2,3]*Physiotherapist, Institute of Leadership and Management (ILM), Lahore, Pakistan*
[*4]*Clinical Physiotherapist, Naseem Akbar Medical Center, Lahore*

[2]noormaira923@gmail.com, [3]samamaejaz975@gmail.com, [*4]Raheelmunawar6113@gmail.com

DOI: https://doi.org/10.5281/zenodo.16735604

Keywords
Foot pain, High Heels, Morton's neuroma, Metatarsals, Prevalence, Shoes

Article History
Received: 25 April, 2025
Accepted: 06 July, 2025
Published: 04 August, 2025

Corresponding Author: *
Raheel Munawar

Abstract

Background: *Neuromas are non-neoplastic nerve tissue proliferations characterized by thickening of the nerve around the nerve tissue, primarily effects the middle-aged women and is commonly found in 3rd and 4th toes. Without treatment, Morton's neuroma (MN) can lead to worsen symptom and reduced mobility.*

Objective: *The aim of the study was to determine the prevalence of Morton's neuroma in females wearing high heels and flat shoes.*

Methodology: *The descriptive cross-sectional study lasted for 6 months conducted on sample size of 80 calculated from Raosoft software. Through, non-purposive convenient sampling 20 to 30 years old females wearing high heels and flat shoes from 3 months with positive Mulder sign were included in the study. Females who had undergone previous foot surgeries or suffered from recent trauma, pain in other arears were exclude. Mulder sign, foot health care status questionnaire and numeric pain rating scale was used as data collection tools.*

Results: *The results indicated that 76.3% females had prevalent Morton's neuroma in which positive Mulder's sign in 34% females wearing heels and 27% in females with flat shoes. 23.8% females experience mild pain, 45% females had moderate pain, and 31.3% had severe pain. There was association of Morton's neuroma with type of shoes pvalue-0.05.*

Conclusion: *The study demonstrated that Morton's neuroma was highly prevalent in females wearing high heels that highly association of Morton's neuroma with type of shoes. P-value was 0.05*

INTRODUCTION

Morton's neuroma, a non-neoplastic proliferation of nerve tissue, is characterized by the thickening of the common plantar digital nerve arises from perineural inflammation caused by nerve damage or repetitive trauma (1). This condition is prevalent in the ball of the foot, particularly between the third and fourth toes, where it often leads to discomfort, pain, and sensory abnormalities (2). Epidemiological studies reveal an incidence of 87.5 per 100,000 persons, affects approximately 4% of the general population, with a predominance in middle-aged females (3).

Factors such as foot structure, footwear, sports activities, and underlying conditions like rheumatoid arthritis and gout significantly increase the risk of developing this condition The pathophysiology of Morton's neuroma involves a combination of mechanical and inflammatory processes. Repeated microtrauma due to compression or stretching of the nerve leads to perineural fibrosis, resulting in

thickening of the nerve and its surrounding tissues (4).Factors such as foot structure, improper footwear, repetitive impact activities, and predisposing conditions like rheumatoid arthritis, gout, or psoriasis significantly increase the risk of developing Morton's neuroma (5). The compression within the deep transverse metatarsal ligament tunnel is believed to play a critical role in its etiology, further exacerbated by high-heeled or narrow-toed footwear (6).

Clinically, patients often report sharp, burning pain in the metatarsal region, frequently described as the sensation of walking on a pebble or fold in a sock. Additional symptoms include tingling, numbness, and localized discomfort, which can worsen with activities involving standing, walking, or wearing restrictive footwear. Functional impairment is common, significantly affecting weight-bearing activities and quality of life (7). Diagnosis is primarily based on clinical evaluation and characteristic symptomatology, supported by imaging modalities such as ultrasonography and MRI. Ultrasonography provides precise visualization of the neuroma's size, shape, and location, while MRI offers detailed assessment of soft tissues. Clinical tests, including the Mulder's click test and Morton squeeze test, further aid in diagnosis by reproducing symptoms through targeted compression (1, 7)

Treatment strategies for Morton's neuroma range from conservative approaches to surgical interventions. Initial management focuses on modifying footwear, using orthotics to reduce nerve compression, and employing therapeutic modalities such as ultrasound, transcutaneous electrical nerve stimulation (TENS), and cryotherapy to alleviate pain and inflammation (8). Physical therapy interventions, including joint mobilization, stretching exercises for the plantar fascia and calf muscles, intrinsic foot muscle strengthening, and gait training, play a crucial role in improving foot mechanics and reducing symptoms (2). When conservative measures fail, surgical options such as decompression, neurectomy, cryogenic neuroablation, and radiofrequency ablation are considered. Among these, decompression is preferred for its ability to relieve focal nerve compression with significant improvements in pain scores and foot function (9). A systematic review of non-operative interventions highlights the efficacy of corticosteroid injections, orthotics, and manual therapy in symptom relief. While advanced procedures like radiofrequency ablation and Botox injections show promise, their effectiveness requires further research (10).

Research on Morton's neuroma has primarily focused on its causes, risk factors, and mechanisms such as nerve compression and inflammation, with diagnostic methods like ultrasound and MRI being explored. However, there is a notable gap in studies regarding its prevalence, particularly among females. This study addresses this gap by examining the prevalence of Morton's neuroma in women who frequently wear high heels or flat shoes, as prolonged standing, walking, and poor footwear choices can contribute to the condition. Morton's neuroma causes persistent pain, limits mobility, and impacts mental health, leading to social withdrawal and a decline in well-being. The study emphasizes the importance of proper footwear and aims to raise awareness among Pakistani women and physiotherapists about effective foot health evaluation and management. The findings seek to enhance understanding and promote preventive measures to improve overall foot care and quality of life.

Methodology:

The study followed a descriptive cross-sectional design, aimed at investigating the prevalence of Morton's neuroma in females who wear high heels or flat shoes. The research was conducted at the Institute of Leadership and Management (ILM) over a duration of six months. The sample size consisted of 80 females, calculated using Raosoft Software (3) with a confidence level of 95% and a margin of error of 5%. Non-purposive convenient sampling was employed to select participants for the study.

Inclusion criteria for the study required participants to be females aged 20-30 years, who had been wearing high heels or flat shoes for more than three months, and who presented with a positive Mendulv sign (3, 8). Participants were excluded if they were below 20 years of age, had previously undergone foot surgery, experienced pain in other areas, had sustained recent foot trauma, or had certain medical conditions such as rheumatoid arthritis or gout (11).

Data collection was carried out after obtaining ethical approval from the ethical committee of the ILM College Harbanspura Lahore. Participants were given

a consent form for permission, and each participant was provided with the questionnaires. The purpose of the study and the objectives of the questionnaires were explained to ensure participant understanding and facilitation. The data collected from the 80 female participants, divided into two groups of 40 (one group wearing high heels and the other wearing flat shoes), formed the basis of the study's analysis. The study adhered to a descriptive cross-sectional approach throughout the data collection process.

Data collection involved several tools. The Mulder sign, a clinical test for Morton's neuroma, was employed to assess the condition. The sign was considered positive if participants reported sharp or clicking pain upon palpation and compression of the metatarsal heads (12). Additionally, two questionnaires were used to gather more information. The Numeric Pain Rating Scale (NRS) was used to assess the severity of pain, with participants rating their pain on a scale from 0 (no pain) to 10 (worst pain) (13). The Foot Health Status Questionnaire was also administered to evaluate how the condition affected daily activities, mobility, and overall quality of life. The Foot Health Status Questionnaire has shown good reliability, with test-retest correlation coefficients generally above ICC 0.80 (14) indicating stable results over time.

Data was analyzed through SPSS version 26 in which frequency, %age , mean, standard deviation were mentioned in tabulated form.

Results:

The study involved 80 female participants with an average age of 23.53 ± 2.12 years, ranging from 20 to 30. Among the participants, 50% wore flat shoes and 50% wore heels. Educational background showed that 60% of participants continued their education beyond school, while 40% did not. Regarding physical activity, 36.3% engaged in regular exercise, while 63.7% did not. Shoe-wearing duration showed 33.8% wore shoes for 1-5 hours, 46.3% for 6-10 hours, and 20% for 11-15 hours. During work, 57.5% wore shoes for 1-5 hours, while 42.5% wore them for 6-10 hours. The study also found that 76.3% of participants exhibited a positive Mulder's sign, indicating Morton's neuroma, and 23.8% had a negative sign.

Pain assessment revealed that 23.8% of participants experienced mild pain, 45% moderate pain, and 31.3% severe pain. Over the past week, 25% reported very mild pain, 28.7% mild pain, 28.7% moderate pain, and 11.3% severe pain. Foot pain was reported by 35% occasionally, 30% frequently, and 25% very often. Foot ache occurred occasionally in 40%, frequently in 21.3%, and very often in 22.5%. Sharp foot pain occurred in 35% occasionally, 27.5% frequently, and 27.5% very often. Functional limitations showed that 32.5% experienced slight difficulties in their work, 30% had moderate issues, and 12.5% reported extreme difficulty. Mobility limitations were observed, with 45% facing slight limitations in walking and 8.8% experiencing extreme limitations. Climbing stairs was moderately limited in 31.3% of participants, while 20% had no difficulty.

Regarding overall health, 37.5% rated their health as very good, 15% as good, 12% as fair, and 11.3% as poor. Shoe-related concerns included 28.7% of participants disagreeing and 22.5% agreeing with finding shoes that did not hurt. Additionally, 51.3% reported difficulty in finding shoes that fit properly, and 25% felt limited by the number of wearable shoes. Physical activity limitations were noted, with 75% reporting limitations in vigorous activities, 50% in moderate activities, and 51.2% in lifting. Daily activities like climbing steep hills, getting up from sitting, and walking more than one kilometer were also impacted, with 43.8% reporting significant limitations in climbing one flight of stairs and 28.7% in walking 100 meters.

Analysis comparing pain levels between flat shoe and heel wearers revealed no significant association with foot pain (p-value = 0.314). However, a significant association was found between shoe type and Morton's neuroma, with 85% of heel wearers showing a positive Mulder's sign compared to 67.5% of flat shoe wearers (p-value = 0.05). The study found no significant association between Morton's neuroma and the duration of shoe wear, standing working hours, or foot pain intensity.

Table 1: Age and Usage demographics:

Variables		Mean ± S.d	Frequency (%)
Age		23.53 ±2.12	-
Education	Yes	-	48 (60%)
	No	-	32 (40%)
Physical Exercises	Yes	-	29 (36.3%)
	No	-	51 (63.7%)
Type of Shoes	Flat shoes	-	40 (50 %)
	Heels	-	40 (50 %)
Duration of wearing shoes	1-5 hours	-	27 (33.8%)
	6-10 hours	-	37 (46.3%)
	11-15 hours	-	16 (20%)
Standing working hours	1-5 hours	-	46 (57.5%)
	6-10 hours	-	34 (42.5%)
Mudker's sign	Positive	-	61 (76.3%)
	Negative	-	19 (23.8%)
NPRS	1-3 Mild pain	-	19 (23.8%)
	4-6 Moderate pain	-	36 (45%)
	7-10 Severe pain	-	25 (31.3%)

Table 2: Foot Health Status Questionnaire:

Variable			Frequency (%)
Pain	Pain Intensity during past week	None	5 (6.3%)
		Very mild	20 (25%)
		Mild	23 (28.7%)
		Moderate	23 (28.7%)
		Sever	9 (11.3%)
	How often Foot pain	Never	1 (1.3%)
		Occasionally	28 (35%)
		Fairly many times	24 (30%)
		Very often	20 (25%)
		Always	7(4%)
	How often Foot ache	Never	10 (12.5%)
		Occasionally	32 (40 %)
		Fairly many times	17 (21.3%)
		Very often	18 (22.5%)
		Always	3 (3.8%)
	How often get sharp Foot pain	Never	4 (5%)
		Occasionally	28 (35%)
		Fairly many times	22 (27.5%)
		Very often	22 (27.5%)
		Always	4 (5%)
Activities Interference	Difficulties in Work or activities	not at all	8 (10%)
		Slightly	26 (32.5%)
		Moderately	24 (30%)
		quite a bit	12 (15%)

		Extremely	10 (12.5%)
	Limited I the kind of work by foot	not at all	14 (17.5%)
		Slightly	22(27.5%)
		Moderately	26 (32.5%)
		quite a bit	13 (16.3%)
		Extremely	5 (6.3%)
Foot Health	Foot health limit walking	not at all	9 (11.3%)
		slightly	36 (45%)
		moderately	18 (22.5%)
		quite a bit	10 (12.5%)
		extremely	7 (8.8%)
	Foot health limit stair climbing	not at all	16 (20 %)
		slightly	22(27.5%)
		moderately	25 (31.3%)
		quite a bit	8 (10%)
		extremely	9 (11.3%)
	Overall health	Excellent	17 (21.3%)
		Very good	30 (37.5%)
		Good	12(15%)
		Fair	12 (15%)
		Poor	9 (11.3%)
Shoes that wearable	Hard to find shoes doesn't hurt	Strongly Agree	2 (2.5%)
		Agree	18 (22.5%)
		Neither Agree nor Disagree	27 (33.8%)
		Disagree	23 (28.7%)
		Strongly Disagree	10 (12.6%)
	Difficulty in finding shoes fit my feet	Strongly Agree	21 (26.3%)
		Agree	20 (25%)
		Neither Agree nor Disagree	13 (16.3%)
		Disagree	22 (27.5%)
		Strongly Disagree	4 (5%)
	Limited number of wearable shoes	Strongly Agree	11 (13.8%)
		Agree	19 (23.8%)
		Neither Agree nor Disagree	19 (23.8%)
		Disagree	20 (25%)
		Strongly Disagree	11 (13.8%)
Limiting BADLs	Vigorous activities	Yes limited a lot	11 (13.8%)
		Yes limited a little	60 (75%)
		Not at all	9 (11.3%)
	Moderate activities	Yes limited a lot	22 (27.5%)
		Yes limited a little	40 (50%)
		Not at all	18 (22.5%)
	Lifting	Yes limited a lot	19 (23.8%)
		Yes limited a little	41 (51.2%)
		Not at all	20 (25%)
	Climbing a steep hill	Yes limited a lot	17(21.3%)

		Yes limited a little	46 (57.5%)
		Not at all	17 (21.3%)
	Climbing a one flight of steep	Yes limited a lot	35 (43.8%)
		Yes limited a little	24 (30%)
		Not at all	21 (26.3%)
	Getting up form sitting position	Yes limited a lot	19 (23.8%)
		Yes limited a little	38 (47.5%)
		Not at all	23 (28.7%)
	Walking more than a Kilometer	Yes limited a lot	18 (33.5%)
		Yes limited a little	29 (36.3%)
		Not at all	33(23.1%)
	Walking 100 meter	Yes, limited a lot	23 (28.7%)
		Yes, limited a little	34 (42.5%)
		Not at all	23 (28.7%)
	Showering / dressing yourself	Yes limited a lot	24 (30%)
		Yes limited a little	40 (50%)
		Not at all	16 (20%)

Table 3: Association of Shoe's type with NPRS and Mudler sign:

Variable		Type of Shoe			Chi square	p-value
		Flat shoes	Heels	Total		
NPRS	1-3 (Mild Pain)	12	7	19	2.316	0.314
	4-6 (Moderate Pain)	18	18	36		
	7-10 (Severe Pain)	10	15	25		
	Total	40	40	80		
Mulder sign	Positive	27	34	61	3.382	0.05
	Negative	13	6	19		
	Total	40	40	80		

Table 4: Association of Mudler sign with NPRS and Duration of shoe wearing and standing:

Variable		Mdler sign			Chi square	p-value
		Positive	Negative	Total		
NPRS	1-3 (Mild Pain)	15	4	19	0.372	0.830
	4-6 (Moderate Pain)	28	8	36		
	7-10 (Severe Pain)	18	7	25		
	Total	61	19	80		
Duration of wearing shoes	1-5 hours	21	6	27	0.475	0.789
	6-10 hours	27	10	37		
	11-15 hours	13	3	16		
	Total	61	19	80		
Standing hours	1-5 hours	35	11	46	0.002	0.592
	5-10 hours	26	8	34		
	Total	61	19	80		

Discussion:

The objective of the study was to find out the prevalence of the Morton's neuroma in females wearing flat shoes and high heels aged between 20 years to 30 years. In this study, we have found out the association of Morton's neuroma with type of shoes, and the p-value was 0.05. Furthermore, we had come across that Morton's neuroma can be diagnosed by the clinical test called Mulder's sign. According to our study, we find out that out of 80 females, 19 females had mild pain, 36 moderate pain, 25 females had severe pain according to numeric pain rating scale.

According to Fatima et al in 2022, of the 285 respondents, 96 % experienced pain in their feet with 162 having mild to moderate pain. In total, 84.4 % of the participants last indicated that foot pain is closely linked with walking, climbing, running and standing (p-value = 0.000) (15). Moreover, Alqahtani et al (2019) reported a cross-sectional study was done on 1,439 schoolteachers in Saudi Arabia with an average age of 41 ± 9years through which it was found that 17.3 % of them had mild foot discomfort and 25.5 % had severe foot discomfort (16). Comparatively, current results showed Morton Neuroma was 76.3% prevalent in which 23.8 % had mild pain, 45 % had moderate pain and 31.3 % had severe pain. Both of the previous literatures were very supportive of the present study since it had a statistically significant correlation between the use of both flat-footwear and high heeled footwear and development of Morton neuroma (p = 0.05); which supports the notion that improper footwear is a leading cause.

Bolshakova et al (2023) documented that 63% of the patients described toe neuropathic symptoms, and 77 % had ultrasonographic evidence in their views, similar to Morton neuroma. Furthermore, the correlation of ultrasonography results with the ultrasound results supported using ultrasound to confirm the diagnosis (17). In contrast to current study, the prevalence of a positive Mulder sign in participants was 76.3%, which evidences its validity as a simple and effective clinical evaluation instrument in resource-constrained settings in Morton neuroma. Participants often talked about feeling a stone or pebble under their feet, which is also classical symptoms of the condition. These results support the idea that the sign described by Mulder can be an effective diagnostic instrument in clinical practice where the imaging lacks.

The prevalence of plantar heel pain (plantar fasciitis) according to Thomas et al. (2019) was 9.6%, with 7.9% of it being disabling. Higher prevalence was also found in females, overweight individuals, individuals with mental distress, and individuals with low physical activity. Interestingly, the previous use of high-heeled footwear was found to be lower in this study as a causative factor (18). In contrast, recent research was centered on forefoot pain, and it revealed that 76.3 % of females were the victims of Morton neuroma that has a direct connection with prolonged wearing of high heels and flat shoes. Moreover, 2.5% strongly agreed and 22.5% consented that they found it hard to find comfortable footwear, implying that footwear choice is an important determinant in the prejudice to this condition.

M.McRitchie et al. (2018) also emphasized that older adults (age 61 and older) with a preference to wear slip-on footwear with a width smaller than their feet had greater structural foot deformity prevalence such as Hallux Abductor-Varus deformity. The designers highlighted the importance of individualized footwear counselling, since the patients used to wear inappropriate shoes off-clinic(19). Supported by previous findings, our research found that 22.5 % of the females agreed and 26.3 % strongly agreed that they had difficulties finding the right fitting shoes and 23.8 % reported that they did not have many options of good fitting shoes sticking because of the pain. These results support the validity of personalized footwear prescription, whether it be by age.

Khan et al. (2019) surveyed 333 females enrolled in DPT (mean age of 21.4 years) and discovered that 56.6% of their participants had been experiencing foot pain during the last three months. Out of these, 53.7% felt that the pain was related to footwear even though no significant correlation could be made. Joggers and canvas shoes (52.3%) were the most popular footwear types, and pumps and pointed-toe styles (30.9%) were the second most popular ones(20). Compared to current results the study showed a significant correlation between foot pain and footwear type especially high heels and flat shoes (p = 0.05).

The study has several limitations that may affect the generalizability of its findings. First, the participant

group consisted solely of females with Morton's neuroma, limiting the applicability to other demographics. Future research should explore the prevalence of the condition across various populations, including males and different age groups. The study's short duration may have impacted the comprehensiveness of the data, and extending the study period could provide more insight into the progression and long-term effects of Morton's neuroma. Additionally, the small sample size limits the reliability of the results, so a larger sample would enhance statistical power and validity. The study also did not examine potential differences between the right and left foot, which could offer deeper insights. Lastly, exploring other foot-related diseases could broaden the understanding of foot health and its connection to Morton's neuroma.

Conclusion:

In conclusion, our study found that 76.3% of women wearing both high heels and flat shoes experienced Morton's neuroma, resulting in moderate foot pain and discomfort. Furthermore, a significant association was observed between shoe type and the presence of Morton's neuroma, with a p-value of 0.05.

REFERENCE:

1. Mak MS, Chowdhury R, Johnson R. Morton's neuroma: review of anatomy, pathomechanism, and imaging. Clinical Radiology. 2021;76(3):235-e15.
2. Tejaswi VSS. A Literature Review on Physical Therapy in Mortons Neuroma. Journal of Natural Sciences Research. 2023;14(77):53739-53743.
3. Potu BK, Saleem BMM, Al-Shenawi N, Almarabheh A. Prevalence of Morton's toe and assessment of the associated risk factors: a cross-sectional study. Eur J Anat. 2023;27(6):717-22.
4. Bhatia M, Thomson L. Morton's neuroma–current concepts review. Journal of clinical orthopaedics and trauma. 2020;11(3):406-9.
5. De Prado M, Cuervas-Mons M. Morton's Neuroma. Percutaneous and Minimally Invasive Foot Surgery: Springer; 2023. p. 271-81.
6. del Mar Ruiz-Herrera M, Criado-Álvarez JJ, Suarez-Ortiz M, Konschake M, Moroni S, Marcos-Tejedor F. Study of the anatomical association between Morton's neuroma and the space inferior to the deep transverse metatarsal ligament using ultrasound. Diagnostics. 2022;12(6):1367.
7. Matthews BG, Thomson CE, Harding MP, McKinley JC, Ware RS. Treatments for Morton's neuroma. Cochrane Database of Systematic Reviews. 2024(2).
8. Colò G, Rava A, Samaila EM, Palazzolo A, Talesa G, Schiraldi M, et al. The effectiveness of shoe modifications and orthotics in the conservative treatment of Civinini-Morton syndrome: state of art. Acta Bio Medica: Atenei Parmensis. 2020;91(4-S):60.
9. Choi JY, Hong WH, Kim MJ, Chae SW, Suh JS. Operative treatment options for Morton's neuroma other than neurectomy– a systematic review. Foot and ankle surgery. 2022;28(4):450-9.
10. Matthews BG, Hurn SE, Harding MP, Henry RA, Ware RS. The effectiveness of non-surgical interventions for common plantar digital compressive neuropathy (Morton's neuroma): A systematic review and meta-analysis. Journal of foot and ankle research. 2019;12(1):12.
11. Oliveira H, Jones A, Jennings F, Vassalli M, Rosenfeld A, Natour J, editors. Effectiveness of customized insoles in patients with Morton's neuroma: a randomized, controlled, double-blind clinical trial2019 2019: BMJ PUBLISHING GROUP BRITISH MED ASSOC HOUSE, TAVISTOCK SQUARE, LONDON WC1H ....
12. Padua L, Coraci D, Gatto DM, Glorioso D, Lodispoto F. Relationship Between Sensory Symptoms, Mulder's Sign, and Dynamic Ultrasonographic Findings in Morton's Neuroma. Foot & Ankle International. 2020;41(12):1474-9.

13. Boonstra AM, Stewart RE, Köke AJ, Oosterwijk RF, Swaan JL, Schreurs KM, et al. Cut-off points for mild, moderate, and severe pain on the numeric rating scale for pain in patients with chronic musculoskeletal pain: variability and influence of sex and catastrophizing. 2016;7:1466.
14. Palomo-López P, López-López D, Becerro-de-Bengoa-Vallejo R, Losa-Iglesias ME, Rodríguez-Sanz D, Fernández-Carnero J, et al. Concurrent validity of the foot health status questionnaire and study short form 36 for measuring the health-related quality of life in patients with foot problems. Medicina. 2019;55(11):750.
15. Fatima S, Riaz U, Sadia A, Khalid M, Jamal A, Ilyas T. Association Between Foot Pain and High Heeled Shoes in Working Women: Association between Foot Pain and High Heeled Shoes. Pakistan BioMedical Journal. 2022:49-53.
16. Alqahtani TA. The prevalence of foot pain and its associated factors among Saudi school teachers in Abha sector, Saudi Arabia. Journal of Family Medicine and Primary Care. 2020;9(9):4641-7.
17. Bolshakova DA, Kardanov AA, Maysigov MN, Akhpashev AA, Ilyin DO, Korolev AV. Instrumental and clinical diagnosis of interdigital Morton neuroma. Journal of Clinical Practice. 2023;14(4):18-25.
18. Thomas MJ, Whittle R, Menz HB, Rathod-Mistry T, Marshall M, Roddy E. Plantar heel pain in middle-aged and older adults: population prevalence, associations with health status and lifestyle factors, and frequency of healthcare use. BMC musculoskeletal disorders. 2019;20(1):337.
19. McRitchie M, Branthwaite H, Chockalingam N. Footwear choices for painful feet–an observational study exploring footwear and foot problems in women. Journal of foot and ankle research. 2018;11(1):23.
20. Khan SJ, Siddiqui FF, Qurat-ul-Ain Ansari FH, Yamin F. Frequency of Foot Pain and its Association with Footwear among Young Female DPT Students. Executive Editor. 2019;13(1):54.