

Frequency of Leg Pain, Edema, and its Associated Factors among Nurses Working on Shift Duty in Private Tertiary Care Hospital, Karachi

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ABSTRACT

Background: Long-standing hours cause nurses to be at high risk of lower extremity pain and edema that can lead to varicose veins and deep venous thrombosis.

Objective: To determine the frequency of leg pain and edema and to determine the factors associated with leg pain and edema among nurses working in shifts on duty.

Methods: It was a cross-sectional study, carried out at Ziauddin Hospital Karachi on 242 male and female nurses. Non-probability purposive sampling method was used to access the participants. Data was collected on a questionnaire designed for the study, Pain numeric rating scale was used to record pain. A chi-square test of independence was applied to the association. The p-value ≤ 0.05 was considered statistically significant.

Results: Out of a total of 242 nurses, the majority 84 (56.4%) were male nurses and 65(43.6%) were female nurses. Lower extremity pain was reported in 55 % and leg edema in 22.53% of participants. A significant association between right leg pain, left leg pain, low extremity pain, and leg edema was found with gender; females were more prone as compared to male nurses ($p < 0.001$). Furthermore, a significant association between pain and leg edema is established in participants who were on double duty. The highest number of participants with leg pain and edema were observed in the sub group with body weight of 68 kg and above. There was a significant association between leg edema and the body weight.

Conclusion: It is concluded that the frequency of leg pain and edema was much higher in nurses with body weight of 68kg and above and working double duty in a shift in a tertiary care private hospital.

KEY WORDS: Lower extremity pain, Edema, Long-standing, Nursing Staff

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INTRODUCTION

Leg pain and edema have been identified as a big health-related issue among nurses working long shifts worldwide.¹ Nursing is a health care profession requiring long-standing hours that can lead to impaired blood flow in the lower extremities and increase gradually muscle manipulation, unexpected bumps in a stretching posture, and inappropriate posture.² A varicose vein is increasingly common among nurses who are required to long-standing during their duty hours. The prevalence of lower limb varicose veins is established at 30% worldwide, and

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prolonged standing duty hours are one of the significant risk factors for varicose veins as well.³⁻⁶ Furthermore, varicose veins may cause depression, inability to take restful sleep, and poor quality of life.⁷

The prevalence of chronic venous insufficiency was reported 35% in the U.S.⁸ and 32.4% in China⁹. It is exhibited in a current research that long-standing duty hours can cause varicose veins, primarily in nurses due to the long-standing nature of the job, patient lifting, and shifting. Thus, preventive measures can improve the quality of life for their future life.¹⁰ After more than 8 hours of duties, 24.17% developed varicose veins, and a far greater prevalence of varicose veins has been documented in female nurses than in male nurses.¹¹ For the treatment of varicose veins, the compression stocking has been effectively utilized for a decade.¹² However, the study employed among teachers in Lahore, Pakistan, revealed a 37.8% prevalence of varicose veins and much more prevalent in female teachers.¹³

Nurses, particularly those who perform direct nursing care, spend ample time standing and walking. Registered nurses in tertiary care hospitals and adult medical-surgical units walked virtually 9000 steps throughout a 12-hour shift.¹⁴ It is established that 96.6% of nursing professionals had musculoskeletal pain in at least one of the body parts within the last twelve months.¹⁵ The study indicates the high prevalence of chronic pain in different parts of the nurses' bodies, including upper and lower extremities and low back pain, specifically, the onset of pain was more than one year.¹⁶ Lower leg pain and lower extremities symptoms are reported more and more than 50% further suffered from varicose vein.¹⁷ A study accomplished in Lahore; Pakistan disclosed a 37.8% prevalence of varicose veins in teachers in which females were found more prevalent.¹⁸

There is a paucity of data related to the frequency of leg pain and edema available among nurses in Pakistan. Therefore, the

present study aimed to identify the frequency of leg pain and edema among nurses working in shift duties and determine the factors associated with leg pain and edema among nurses working shift duties.

METHODS

This cross-sectional study was carried out at Ziauddin Hospital Karachi, after taking permission by the Ethical Review Committee (ERC) of Ziauddin University Karachi (Ref: 4150821SRNUR). The study was completed in three months, from 1st October to 31st December 2021. Non-probability purposive sampling method was done. The sample size was calculated by OpenEpi version 3.0. By taking the prevalence of varicose veins 0.3%, a margin of error of 5%, a confidence level of 95%, α is 0.05, and the critical value is 1.96. A total of 242 nurses, both male and female were included by specifying the population of 650.¹⁸

All of the participants were approached at their working areas to participate in the study. Nurses working in shift duties including morning, evening, and night, having a valid license from Pakistan Nursing Council, ages between 20-45 years, and regular jobs were included in the study. Nurses who work in management positions and with less than one year of clinical experience were excluded from the study.

Written informed consent was obtained from all participants. Data was collected on a questionnaire designed for the study, Pain Numeric Rating Scale was used to record pain intensity. Pain Numeric Rating Scale is a validated and adapted, open-access questionnaire, The reliability of the scale is 0.97, whereas; the validity of the scale is 0.9420.¹⁹ The questionnaire was explicitly explained to all participants before data collection. All subjects participated voluntarily and the confidentiality of the data was assured.

Statistical Analysis

The data was entered and analyzed by SPSS version 22. Percentages and frequencies are

computed for pain and edema. A chi-square test of independence was applied for the factors associated with outcomes. The P-value was considered significant at < 0.05.

RESULTS

Out of a total of 242 nurses, the majority 84 (56.4%) were male nurses and 65(43.6%) were female nurses. A large number of the study participants were married (30.4%), 68% were single, 0.4% were divorced, and 0.4% were widow. The study participants were divided into four age categories, and a higher frequency of 92 (36.4%) was observed in the age group of 22-25 years of age. 69(27.3%) participants were aged between 18-21 years, 41 (16.3%) and 51 (20.2%) participants were 26-29 years and 30 or above. The response rate of the participants was 100%, there were no drop outs. Table 1 shows the baseline characteristics of the study population including the number of participants in different weight and height categories.

Lower extremity pain was reported in 55% and leg edema in 22.53% of the study participants It is seen that the high in number of participants belonged to the body weight group of 68kg above and 48 to 57 kilograms, i.e., 28.1%. The frequency of nurses with body weight 47 kg or below was 64 (25.3%), and in the weight category of 58 to 67kg, the frequency was found to be 47 (18.6%) as shown in Table 1.

Table 1: Baseline parameters of the study population	
Parameters	n (%)
Weight (kg)	
below and 47	64 (25.3)
48 to 57	71 (28.1)
58 to 67	47 (18.6)
68 and above	71 (28.1)
Height (cm)	
109 to 147	19 (9.5)
148 to 157	87 (36.4)
158 to 167	60 (25.7)
168 and above	66 (28.3)
Double duty in a Shift	
Yes	97 (38.3)
No	147 (58.1)
Lower extremity pain	
Yes	134 (53.0)
No	119 (47.0)
Right leg pain	
Yes	127 (50.2)
No	126 (49.8)
Left leg pain	
Yes	123 (48.6)
No	130 (51.4)
Leg edema	
Yes	57 (22.53)
No	196 (77.5)
Right ankle girth (cm)	16.28 ± 6.29*
Left ankle girth (cm)	19.94 ± 26.52*
Right calf circumference (cm)	25.09 ± 10.06*
Left calf circumference (cm)	25.13 ± 10.18*

*Mean ± S.D

Table 2: Association of leg pain and edema with gender

Parameter	Male		Female		p-value
	Yes	No	Yes	No	
Right Leg Pain	21 (25.0%)	63 (75.0%)	106 (62.7%)	63 (37.3%)	<0.001
Left Leg Pain	18 (21.4%)	66 (78.6%)	105 (62.1%)	64 (37.9%)	<0.001
Lower Extremity Pain	22 (26.2%)	62 (73.8%)	112 (66.3%)	57 (33.7%)	<0.001
Leg Edema	0 (0%)	84 (100%)	57 (33.7%)	112 (66.3%)	<0.001

Pearson Chi-Square test was applied; p-value < 0.05 is considered statistically significant

Table 3: Association of pain and edema with double duty shift

Double duty in a Shift	Lower Extremity Pain		Right Leg Pain		Left Leg Pain		Leg edema		p-value
	Yes	No	Yes	No	Yes	No	Yes	No	
Yes	77 (79.4%)	20 (20.6%)	79 (81.4%)	18 (18.6%)	82 (84.5%)	15 (15.5%)	94 (96.9%)	3 (3.1%)	0.001
No	41 (27.9%)	106 (72.1%)	46 (31.3%)	101 (68.7%)	47 (32%)	100 (68.0%)	49 (33.3%)	98 (66.7%)	

Pearson Chi-Square test was applied; p-value < 0.05 is considered statistically significant

Table 4: Association of leg pain with body weight

Weight (kg)	Lower Extremity Pain		Right Leg Pain		Left Leg Pain		p-value
	Yes	No	Yes	No	Yes	No	
≤47	17 (26.6%)	47 (73.4%)	20 (31.3%)	44 (68.8%)	20 (31.3%)	44 (68.8%)	<0.001
48- 57	39 (54.9%)	32 (45.1%)	36 (50.7%)	35 (49.3%)	36 (50.7%)	35 (49.3%)	
58- 67	31 (44.3%)	39 (55.7)	31 (66.0)	16 (34.0)	31 (66.0)	16 (34.0)	
≥68	30 (63.8%)	17 (36.2%)	39 (55.7%)	31 (44.3%)	43 (61.4%)	27 (38.3%)	

Pearson Chi-Square test was applied; p-value <0.05 is considered statistically significant

Table 5: Association of leg edema with body weight

Weight (kg)	Leg edema		p-value
	Yes	No	
≤47	19 (29.7%)	45 (70.3%)	<0.001
48- 57	23 (32.4%)	48 (67.6%)	
58- 67	37 (78.7%)	10 (21.3%)	
≥68	65 (92.9%)	5 (7.1%)	

Pearson Chi-Square test was applied. p value <0.05 is considered statistically significant

Similarly, the distribution of participants in different height categories shows that the height of most participants, 87 (36.4%), was in the height range of 148 to 157cm. In the height range of 158 to 167cm and 168cm and above, the frequency of participants was 60 (25.7%) and 66 (28.3%). The minimum number of participants 19(9.5%) was found in the 109 cm to 147 cm range. The number of participants

performing double duty in a day was 38.3% compared to the participants doing single duty on day 58.1%. It is shown that the mean right ankle girth of the study population was 16.28±6.29 cm, left ankle girth was 19.94±26.52 cm, Right calf circumference was 25.09±10.06 cm and Left calf circumference (cm) was 25.13±10.18.

Table 2 shows the association of pain with gender. It is seen that female nurses of the study population were significantly affected by the pain, and a significant association between right leg pain, left leg pain, usual low extremity pain, and usual leg edema was found with gender; females were more prone as compared to male nurses (p <0.001). Table 3 described the association of pain with the double duty shifts in a single day. Again, a significant association

between pain and leg edema is established in participants who were on double duty in a change compared to those who did a single task in a shift ($p < 0.001$).

Table 4 depicted the association of leg pain with the weight of the study participants. It was found that pain in the leg and lower extremities are significantly associated with the participants' weight ($p < 0.001$). It is seen that the frequency of pain is less in participants whose weight is less than 50 kg. As the weight increases, the frequency of the also increase. The highest frequency of pain was found in the weight category of 68kg and above, i.e., 63.8% complained of usual lower extremity pain, 55.7%, and 61.4% had right and left leg pain, respectively.

Table 5 showed the association of usual leg edema with the participants' weight. Leg edema was more prevalent in participants weighing 68 kg or above 65 (92.9%). A significant association between usual leg edema and the participant's weight was documented.

DISCUSSION

It was found in the present study that 134 (53.0%) had usual lower extremity pain, 127 (50.2%) complaint about right leg pain, 123 (48.6%) exhibited left leg pain and only 57 (22.53%) suffered from the usual leg edema. The frequency of usual low extremity pain was found higher among the study population. These findings of pain frequency among nurses are consistent with the study carried out in Iran and Brazil.^{20, 21}

It was previously found that pain-related problems are more prevalent in shift workers than day workers. Musculoskeletal disorders are considered one of the most common health-related problems that can cause disability among healthcare workers working double duty in a shift.²² The current results show that the frequency of left and right pain, usual low extremity pain, and leg edema was more

prevalent in nurses who work double duty in a shift than nurses performing single tasks. The association of pain and edema with the duration of work was found to be significant in the present study. Previous studies validated our results and presented a significant association of pain with extended duty hours.^{23,24} The possible explanation might be that nurses with high physical demand will have high mechanical stress, which could cause strain in the ankle and foot area, leading to the development of ankle-foot pain, leg pain, or edema.²⁵

In the current study, it was also indicated that female nurses were more prone to leg pain and edema as compared to male nurses. The frequency of right and left leg pain, usual low extremity pain, and edema were higher in female participants than in males. Thus, an association of gender with variables of pain was found statistically significant in the current study. This distribution of gender was also found in the previous study by Barbosa et al. It was shown that occupational factors were associated with musculoskeletal pain in both women and men; however, the prevalence of pain in females was higher as compared to the occupational-match males.²⁶ The explanations for this difference may be biological (height, muscle strength, aerobic capacity, hormonal conditions). First, this makes women more susceptible to musculoskeletal disorders. Secondly, women are more likely to report symptoms, and outside of work, women are exposed more than men to risk factors for musculoskeletal injuries during household chores and childcare.

In recognition of associated factors for pain and edema in nurses, it was previously found that overweight or obese nurses are less likely to engage in physical activities and consequently, develop musculoskeletal disorders like ankle or foot pain or leg pain.²⁷ The present study results correlate with this explanation and found that participants whose weight was 68kg and above had a higher frequency of leg pain and usual edema than the lean participants. Similar

findings were observed in the previous studies.²⁸ In the review of the previous study, it was also determined that nurses also perceived that obesity could cause foot problems like pain and edema along with the other complications.²⁹

Limitation of the study First, this cross-sectional was employed with a small sample size, hence the results may not be generalizable. Secondly, the present study was accomplished in a private institute, therefore, the results are not comparable with public sector institutes.

CONCLUSION

It is concluded that the frequency of pain and edema was much higher in nurses working double duty in a shift in a tertiary care private hospital. However, along with the duration of duty hours, other associated factors are also involved in developing pain and edema among nurses. These factors include the weight and gender of the participants. Female overweight nurses and long duty hours were more prone to strain and leg pain than male nurses working and those with fewer working hours. It is highly recommended that nurses should reduce their weight and maintain a normal BMI.

Conflict of Interest:

All authors declared no conflict of interest.

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Data Sharing Statement:

The data is available from the corresponding author upon request.

Contributors:

SRK: Central Idea, Data collection and interpretation, & critical review of a final draft.

B: Data analysis, proofreading and critical review.

R: statistical analysis, drafting

All authors approved the final version and signed the agreement to be accountable for all aspects of work.

REFERENCES

1. Lee Y, Kim K, Kang S, Kim T, Jung J. Compression Stocking Length Effects on Oedema, Pain, and Satisfaction in Nursing Students: A Pilot Randomized Trial. *Healthcare*. 2020; 8(2):149-168.doi:10.3390/healthcare8020149.
2. Cho YR, Kim HS. The effects of elastic compression stockings on lower leg pain and edema in ward nurses. *J Converg Inf Technol*. 2018; 4(3): 275-285.doi: 10.17703/JCCT.2018.4.3.275.
3. Assiri FF, Sofar SM, Babkair LA. Nurse's Knowledge after Implementation of Self-Instructional Module Regarding the Prevention and Management Strategy of Varicose Vein: A Scoping Review. *Int J Novel Res Health Nurs*. 2021; 8(3): 172-180.
4. Thamu Priyadarshini NT, Veni A, Assess the level of knowledge regarding the management of varicose veins among health care workers. *Int J Res Med Surg Nurs*. 2021; 3(2):28-31.doi:10.33545/surgicalnursing.2021.v3.i2a.69
5. Sugisawa R, Unno N, Saito T, Yamamoto N, Inuzuka K, Tanaka H, et al. Effects of compression stockings on the elevation of leg lymph pumping pressure and improvement of quality of life in healthy female volunteers: A randomized controlled trial. *Lymphat Res Biol*. 2016; 14(2):95-103.doi:10.1089/lrb.2015.0045.
6. Shrestha P, Karmacharya RM, Dahal S, Dhakal P, Bhandari N, Bade S. Patient literacy on varicose veins in cases presenting at the university hospital of Nepal subjected for surgical management of varicose veins. *J Vasc Nurs*. 2021; 39(1): 2-5.doi:10.1016/j.jvn.2021.01.002.
7. Youn YJ, Lee J. Chronic venous insufficiency and varicose veins of the lower extremities. *Korean J Intern Med*. 2019; 34(2): 269–283.doi:10.3904/kjim.2018. 230.
8. Blättler W, Mendoza E, Zollmann C, Bendix J, Amsler F. Homeostatic feelings—a novel

- explanation of vein symptoms derived from an experimental patient study. *Vasa*. 2019; 48(6):492-501.doi:10.1024/0301-1526/a000807.
9. Bozorgnejad M, Khani A, Pakzad M, Nodehi S. Effect of Lifestyle and Symptom Intensity Factors on the Severity of Lower Limbs Veins of Varicose Among Nurses in North Khorasan Hospitals, Iran. *J Patient Saf Qual Improve*. 2021; 9(4): 235-243. doi:10.22038/PSJ.2021.60044.133
 10. Yun MJ, Kim YK, Kang DM, Kim JE, Ha WC, Jung KY, et al. A study on prevalence and risk factors for varicose veins in nurses at a university hospital. *Saf Health Work*. 2018;9(1):79-83.doi:10.1016/j.shaw.2017.08.005
 11. Shakya R, Karmacharya RM, Shrestha R, Shrestha A. Varicose veins and its risk factors among nurses at Dhulikhel hospital: a cross-sectional study. *BMC nursing*. 2020; 19(1): 1-7. doi: 10.1186/s12912-020-0401-8
 12. Kamble PA, Patil NR. Prevalence of Restless Leg Syndrome in Nurses. *Indian J Physiother Occup Ther*. 2019; 13(3): 95-99. doi: 10.5958/0973-5674.2019.00099.6
 13. Ilyas I, Ashfaq H.B. Prevalence of Varicose Veins among Teachers in Lahore, Pakistan. *Pak J Physical Therapy*. 2021;4(3):doi:10.52229/pjpt.v4i3.1671.
 14. Yusoff HM, Zawawi RA, Deros BM. Prevalence of lower limb pain and its associated factors among healthcare workers. *J Mech Eng Sci*. 2017; 11(3): 2930-2940.doi:10.15282/jmes.11.3.2017.13.0264
 15. Santos EC, Andrade RD, Lopes SG, Vargas C. Prevalence of musculoskeletal pain in nursing professionals working in the orthopedic setting. *Rev Dor*. 2017; 18(4): 298-306. doi: 10.5935/1806-0013.20170119
 16. Tanzil S, Jamali T, Inam SN, Abbas A. Frequency and severity of low back pain among healthcare providers and associated factors in a tertiary care, public hospital in Karachi. *Occup Med Health Aff*. 2019; 7(1): 1-5. doi:10.4172/2329-6879.1000285
 17. Li J, Sommerich CM, Chipps E, Lavender SA, Stasny EA. A framework for studying risk factors for lower extremity musculoskeletal discomfort in nurses. *Ergonomics*; 2020; 1; 63(12): 1535-1550. doi:10.1080/00140139.2020.1807615
 18. Ilyas I, Ashfaq HB, ul Ain Q. Prevalence of Varicose Veins among Teachers in Lahore, Pakistan. *Pakistan Journal of Physical Therapy (PJPT)*. 2021; 4(3).doi:10.52229/pjpt.v4i3.1671
 19. Attach M, Raesi S, Namvar M, Golabadi M. Association between shift working and musculoskeletal symptoms among nursing personnel. *Iran J Nurs Midwifery Res*. 2014; 19(3): 309-314.
 20. Daniel W. *Biostatistics: A Foundation for analysis in the health sciences*, 7th Ed. Wiley. New York. 1999: 141-142.
 21. Rauber Gallas S, Fontana RT. Biossegurança e a enfermagem nos cuidados clínicos: contribuições para a saúde do trabalhador. *Rev Bras Enferm*. 2010; 63(5): 786-792.doi:10.1590/S00347167201000050015
 22. Semple R, Murley GS, Woodburn J, Turner DE. Tibialis posterior in health and disease: a review of structure and function with specific reference to electromyographic studies. *J Foot Ankle Res*. 2009; 2(1):1-8. doi: 10.1186/1757-1146-2-24.
 23. Getie K, Kahsay G, Kassaw A, Gomera G, Alamer A, Hailu T. Ankle and Foot Pain and Associated Factors Among Nurses at Ayder Comprehensive Specialized Hospital, Mekelle, Ethiopia: Cross-Sectional Study. *J Pain Res*. 2021;14:83.doi:10.2147/IPR.S283580
 24. Choobineh A, Movahed M, Tabatabaie SH, Kumashiro M. Perceived demands and musculoskeletal disorders in operating room nurses of Shiraz city hospitals. *Ind Health*. 2010; 48(1):74-84.doi:10.2486/indhealth.48.74

25. Choobineh A, Rajaeefard A, Neghab M. Association between perceived demands and musculoskeletal disorders among hospital nurses of Shiraz University of Medical Sciences: a questionnaire survey. *Int J Occup Saf Ergon.* 2006; 12(4): 409-416.doi: 10.1080/10803548.2006.11076699
26. Abedini R, Choobineh A, Hasanzadeh J. Musculoskeletal load assessment in hospital nurses with patient transfer activity. *Int J Occup Hyg.* 2013; 5(2): 39-45
27. Stolt M, Mikkola M, Suhonen R, Leino-Kilpi H. Nurses' perceptions of their foot health: implications for occupational health care. *Workplace Health Saf.* 2018; 66(3): 136-143. doi: 10.1177/2165079917727011
28. Barbosa RE, Assunção AÁ, de Araújo TM. Musculoskeletal pain among healthcare workers: An exploratory study on gender differences. *Am J Ind Med.* 2013; 56(10): 1201-1212.doi:10.1002/ajim.22215
29. Chin DL, Nam S, Lee SJ. Occupational factors associated with obesity and leisure-time physical activity among nurses: A cross-sectional study. *Int J Nurs Stud.* 2016; 57:60-69.doi:10.1016/j.ijnurstu.2016.01.009