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Assessment of the Knowledge Levels of Nurses of Diabetic Foot Care Management and to Determine Influencing Factors

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Abstract:
Diabetic foot Ulcer is a severe complication of diabetes Miletus, contributing to increased morbidity, mortality, and healthcare costs. Early diagnosis, patient education, and proper foot care are essential for prevention. As frontline care providers, nurses play a critical role in educating diabetic patients and managing foot care, significantly influencing patient outcomes and quality of life. This study evaluated the knowledge of nurses regarding diabetic foot care management and identified factors influencing their understanding and practices. A descriptive cross-sectional study was conducted at a major Peoples Medical College Hospital Nawabshah, involving 100 randomly selected nurses. Data was collected using a structured questionnaire specifically designed to assess knowledge about diabetic foot care. The SPSS version 21.0 was used for data analysis, with chi-square tests applied to examine associations between sociodemographic factors and knowledge levels. This study concluded that a general lack of sufficient knowledge about diabetic foot care among nurses, which could compromise patient outcomes. This highlights the need for enhanced training programs and continuous professional education for nurses on diabetic foot management.

Keywords: Diabetic foot, nurse knowledge, diabetic foot care management, risk factors, patient education, cross-sectional study, Pakistan.

Introduction:

Patient education, along with early diagnosis and treatment, can help prevent diabetic foot Ulcer (DFC), a severe complication of Diabetes Mellitus (DM) associated with increased mortality, morbidity, and healthcare costs.(1,2) The DFC condition is significant affecting the quality of life in diabetic patients and are a common cause of hospitalizations 50.9%.(3,4) In addition to causing the patient to lose their job or money 4%, put off their educational goals 17%, and sour their relationships with others, DFU issues also indirectly impact patients' psychological well-being and their surroundings.(5) Morbidity related to DFC not only lead to job loss, financial strain, delayed educational goals, and strained relationships but also indirectly affect patients'

psychological well-being and their social environment.(5,6) These problems can be avoided by being aware of and keeping an eye on risk factors. The strongest predictors of DFC include peripheral neuropathy, peripheral vascular disease, foot deformity, history of previous foot ulcer and previous major amputation especially of the foot and leg.(7,8) The most common causes of DFC in patients include fungal infections, recurrent chronic abrasions, minor cuts, bullae, various irritations, verrucas, calluses, improper nail trimming, poor foot hygiene, inappropriate footwear, and inadequate metabolic control.(9,10) These alterations make it simpler to injure foot and cause wounds to heal more slowly, either single or both of which raise the risk of infection.(11–13) All diabetic patients should be evaluated for potential for ulcer in foot at least once a year, and those who have one or more risk factors should be examined every three to six months in order to reduce , and manage these risk factors.(14,15) The primary components of DFU therapy are the diagnosis of the foot at risk, routine evaluation of the foot at risk, patient, family, and healthcare professional education, management of non-ulcerative diseases, and management of the diabetic ulcer.(16,17) Patients should also be treated for additional risk factors, including obesity, smoking, alcohol, hypertension, hyperlipidemia, and visual impairment. (17–19). It is estimated that 50%-70% of non-traumatic lower-limb amputations in Pakistan are related to DM , and reduce the Quality of life. (12,18) Diabetic foot examinations should comprehensively assess skin integrity, vascular structure, foot biomechanics, and protective sensory function.(20) The evaluation of the at-risk foot involves the following factors: skin condition (e.g., calluses, discoloration, increased temperature, swelling, roughness, and presence of foot ulcers); bone and joint status (e.g., claw toes, hammer toes, hallux valgus, hallux limitus, equinus, amputations, Charcot deformity, dropped foot, and joint stiffness); and vascular status (e.g., stilettos walking, rest pain, and palpation of the foot pulses). (21,22) t is important to ask diabetic patients about neuropathy during neurological examinations. Inability to protect a particular area or the entire foot is assessed by using the Semmes Weinstein Monofilament set, which is inexpensive, non-painful and very effective.(23,24) The classification of risk categories is designed to guide the frequency of follow-up visits and facilitate the referral of patients to specialized healthcare providers for appropriate management. High-risk categories are associated with an increased likelihood of complications, including ulceration, hospitalization, and amputation.(25,26) Furthermore ; long-term diabetic foot care, which requires expertise across various disciplines, a multidisciplinary team approach is essential. Collaboration among diverse healthcare professionals can enhance patient outcomes by improving quality of life, reducing healthcare costs, and lowering the incidence of foot ulcers and amputations.(27) The diabetic foot care team typically comprises a general practitioner, nurse, podiatrist, orthotist, vascular surgeon, infectious disease specialist, dermatologist, endocrinologist, dietitian, and orthopedic surgeon, each contributing their specialized knowledge and skills to optimize patient. (28–30) The nurse and podiatrist are frequently the main providers of patient information, even though the patient should be educated by the entire team.(31,32) One factor contributing to the development of foot issues is a lack of appropriate education and knowledge about the importance of maintaining healthy feet [28–30]. Existing guidelines suggest that patient education is a requirement to preventing ulceration, and a specific education course for foot and wound care reduces the occurrence of foot ulcers and amputations.(33,34) Nurses play a pivotal role in this process, as patients often rely on them as their primary source of information and as the main point of contact.(35) The Key responsivity, nurses must possess a thorough understanding of diabetic foot care management and be capable of effectively communicating this knowledge to patients. Therefore, the purpose of this study is to assess the extent of nurses' knowledge regarding diabetic foot care and how they apply this knowledge in clinical practice.

Material & Methods:

This descriptive cross-sectional study was conducted from December 2023 to March 2024 at Peoples Medical College Hospital (PMCH), Nawabshah, Shaheed Benazirabad, Pakistan, following the approval of the Ethical Review Committee of Peoples University of Medical and

Health Sciences for Women (PUMHSW). The PMCH is a tertiary care hospital with a capacity of 1500 beds, recognized as one of the largest hospitals in Pakistan. It serves as a training hospital for various medical specialties and combines its academic and clinical services. The study population comprised 100 hospital-employed nurses. A random sampling technique was employed to select the study sample. Based on a total population of 130, a 95% confidence level, and a 5% margin of error, the calculated sample size was determined to be 96. However, to enhance the reliability of the study and accommodate potential non-responses, the final sample size was adjusted to include 100 nurses. A 100% response rate was achieved, with all selected nurses (having more than two years of clinical experience at Medicine Department and minimum Bachler degree in nursing education) agreeing to participate in the study, which was conducted from April to May 2023. Nurses who were unavailable due to maternity leave, annual leave, or other reasons were excluded from the study. Nurses were asked to complete a self-administered questionnaire, which took approximately 15 to 20 minutes to complete. The researcher collected the completed questionnaires directly from the participants. One of the key data collection instruments was the "Nurses' Knowledge Level Form on Diabetic Foot Management," a specially designed tool to assess nurses' knowledge on diabetic foot care management.

The data was analyzed through SPSS for Windows version 21.0. Nurses' knowledge level scores regarding diabetic foot management were treated as the dependent variable, while sociodemographic characteristics and diabetic foot management practices were considered independent variables. Descriptive statistics, including means and percentages, were used to determine demographic variables. A pilot study, involving 25% of the total study population, was conducted prior to the main study. The relationship between variables was assessed using Pearson correlation analysis. The internal consistency of the scale was evaluated with a Cronbach's alpha score of **0.69**. Additionally, a Chi-square test was applied, with a significance level p **= 0.05.** Prior to data collection, nurses were informed about the study's objectives and methodology and were asked to enroll in the study followed by the signature in the Consent Form.

Results:

Table No.01 presents the demographic characteristics of the study participants, including gender, qualification, experience, and designation. Among the participants, 55% were male, while 45% were female. Regarding educational qualifications, the highest proportion of participants (40%) held a post-RN BScN, followed by 31% with a Diploma in General Nursing and 4% with an MSN. In terms of work experience, 44% of participants had 5-10 years of experience, while 36% had 1-5 years of experience. Concerning job designation, 42% were staff nurses, 32% were head nurses, 14% were nursing supervisors, and 12% held the position of ward In-charge.

Table No.01

Gender	**Frequency**	**Percentage**
Male	55	55%
Female	45	45%
Total	**100**	**100%**
Qualification of Participants	**Frequency**	**Percentage**
Diploma in General Nursing	31	31%
Post RN	40	40%
MSN	4	4%
Total	**100**	**100%**
Experience of Participants	**Frequency**	**Percentage**
1 – 5 Years	36	36%
5 – 10 Years	44	44%

10 – 15 Years	12	12%
16 – 20 Years	8	8%
Total	**100**	**100%**
Designation of Participants	**Frequency**	**Percentage**
Staff Nurse	42	42%
Head Nurse	32	32%
Nursing Supervisor	14	14%
Ward In charge	12	12%
Total	**100**	**100%**

Table No.02, shows the knowledge level of the participants regarding the diabetic foot care management. When asked about "Ant diabetic medications should be taken regularly to prevent complications" the participants had lower knowledge and had got lower score on knowledge scale. Participants also secured lower score on account of knowledge when inquired about "The temperature of water should be checked before washing feet". Overall study subjects showed little knowledge when inquired about the management of diabetic foot care management. While some of the participants had no awareness regarding the said subject matter.

Table: 2 Assessment of Knowledge About Management of Diabetic Foot

Questions	Correct	Wrong	I don't Know	Total score
Food planning and proper medication intake of antidiabetic drugs should be done in order to avoid further consequences of DM.	39	57	4	82
Feet should be washed daily	62	34	4	128
Warm water must be used to wash feet	61	21	18	140
Temperatures of water to be used for washing feet should be checked.	48	48	4	100
Talcom powder is supposed to be used to minimize dampness in the skin found between the toes.	31	57	12	74
This is because no one wants their feet to be soggy and also feet should be thoroughly washed and dried.	44	51	5	93
The feet should be massaged with lotion or a moisturizing cream in order to avoid development of dry skin.	32	52	16	80
Lotion should not be applied before toes	48	42	10	106
Socks should be changed daily	51	43	6	108
Toenails should be trimmed straight across	36	50	14	86
Feet should be inspected at least once in aday	42	40	18	102
Diabetic patients should wear comfortable shoes	44	42	14	102

The inside of the shoe should be inspected for before washing them	46	43	11	103
Diabetic patients should not walk bare foot	54	28	18	126
Patients with diabetes must seek medical advice if their feet develop redness, blisters, cuts or any wounds.	54	43	3	111

Table 03 shows that there is significant difference between the male and female participants on account of good and bad knowledge and there was a significant difference in the level of knowledge and participants demographic characteristics such as sex, age, designation, qualification and experience of the participants.

Table: 03 Associations Between Gender of the Participants and Knowledge About Management of Diabetic Foot

Sex	**Knowledge About Management of Diabetic Foot**				***P* value**
	Bad Knowledge		**Good Knowledge**		
	Frequency	**Percentage**	**Frequency**	**Percentage**	
Male	34	61.8%	21	38.2%	**0.392**
Female	24	53.3%	21	46.7%	
Total	**58**	**58%**	**42**	**42%**	
Association Between Qualification of the Participants and Knowledge About Management of Diabetic Foot					
Qualification of the Participants	**Knowledge About Management of Diabetic Foot**				***P* value**
	Bad Knowledge		**Good Knowledge**		
	Frequency	**Percentage**	**Frequency**	**Percentage**	
Diploma in General Nursing	16	51.6%	15	48.4%	**0.280**
Post RN	27	67.5%	13	32.5%	
BS Nursing Generic	14	56%	11	44%	
MSN	1	25%	3	75%	
Total	58	58%	42	42%	

Table 4: Association Between Experience of the Participants and Knowledge About Management of Diabetic Foot

Experience of the Participants	**Knowledge About Management of Diabetic Foot**				***P* = value**
	Bad Knowledge		**Good Knowledge**		
	Frequency	Percentage	Frequency	Percentage	
1 – 5 years	20	55.6%	16	44.4%	**0.233**
5 – 10 years	26	59.1%	18	40.9%	
10 – 15 years	05	41.7%	07	58.3%	
16 – 20 years	07	87.5%	01	12.5%	

Total	58	58%	42	42%	
Association Between Designation of the Participants and Knowledge About Management of Diabetic Foot					
Designation of the Participants	**Knowledge About Management of Diabetic Foot**				***P* = value**
	Bad Knowledge		**Good Knowledge**		**0.345**
	Frequency	**Percentage**	**Frequency**	**Percentage**	
Staff Nurse	22	52.4%	20	47.6%	
Head Nurse	17	53.1%	15	46.9%	
Nursing Supervisor	10	71.4%	04	28.6%	
Ward Incharge	09	75%	03	25%	
Total	**58**	**58%**	**42**	**42%**	

Discussion:

The majority were male in terms of sociodemographic characteristics, which was also discovered in an examination carried out at PMCH Nawabshah.(36). The participants' low educational attainment had an impact on nurses' capacity to manage diabetic foot care, as previously mentioned. The current study revealed that female staff nurses demonstrated a moderate level of expertise in the management of diabetic foot care. However, findings from the several studies indicate that women are generally more motivated to incorporate diabetic foot care into their daily routines. In contrast, male nurses were found to have statistically higher knowledge regarding the use of appropriate footwear. (31,35,37). Hence, self-care for diabetic foot treatment requires knowledge, so it's critical to acknowledge how inadequate knowledge of the topic is linked to the scant information patients receive from medical professionals.(27,29). The current study's knowledge levels fell between low and average. These results are consistent with previous studies that identified notable knowledge gaps.(37,38) These startling findings prompt a reexamination of the instructional approaches nurses employ in order to give patients the care they need. This study discovered a strong correlation between educational attainment and knowledge of foot self-care. Several authors that reviewed the topic found statistically significant correlations between educational attainment and knowledge of foot self-care. The participants' reported low levels of knowledge could be caused by a variety of factors, including inadequate training for interventions involving the care of individuals with diabetes mellitus; a lack of time allocated for medical and nursing consultations; and a lack of clear and precise communication between the various parties involved in the patient's care, which impedes the acquisition and consolidation of knowledge that helps lessen the devastating effects of the disease.

In this context, it is acknowledged that inadequate diabetic foot care education, a lack of professional counseling, and a lack of communication all have a detrimental effect on the degree of knowledge of those undergoing treatment.(38,39) . In order to reduce the alleviated impact of the disease and minimize the risk of foot ulcers, which may ultimately lead to amputations and significantly affect the quality of life of those affected, it is essential to strengthen educational strategies and promote their incorporation into the routine practices of various healthcare services.

Conclusion:

This concluded the essential role of health professionals, especially nurses, in educating individuals with type 2 diabetes to enhance knowledge and support behavioral changes. The health education helps prevent diabetic foot complications, improving self-care and quality of life. In primary care, implementing programs to prevent foot ulcers—by training patients and families—promotes early detection and routine foot care, which are vital in reducing complications.

Conflict of interest:
There is no any conflict of interest seen among authors.

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