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ASSESSING THE LEVEL OF KNOWLEDGE REGARDING DIABETIC FOOT CARE AMONG DIABETIC PATIENTS AT TERTIARY CARE HOSPITALS IN PESHAWAR, KPK

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Abstract

Background: Diabetes mellitus is a chronic condition characterized by high blood sugar levels due to inadequate insulin production or utilization. Complications such as diabetic foot ulcers (DFUs) are of significant concern due to their severe consequences, including infections and amputations. The global prevalence of diabetes, particularly Type 2, is rising, with developing countries like Pakistan experiencing a notable increase. Effective management and prevention of DFUs involve regular foot care practices, early detection, and patient education. This study aims to assess the level of knowledge regarding diabetic foot care among diabetic patients in Peshawar to highlight the need for improved educational programs and healthcare practices. Methodology: This quantitative, descriptive cross-sectional study assessed diabetic foot care knowledge among patients at three tertiary care hospitals in Peshawar: Khyber Teaching Hospital, Hayatabad Medical Complex, and Lady Reading Hospital. Conducted over 14 weeks from April to August 2024, the research involved 187 participants, selected through Stratified random sampling via OpenEpi software. Data were collected using an adopted questionnaire administered by trained staff and analyzed with SPSS software, focusing on foot care practices, awareness, and education. Results: The analysis revealed that most participants were male and middle-aged, with many reporting a history of foot problems, including sores, ulcers, and amputations. Common issues included numbness, pain, and foot ulcers. While participants generally inspected their shoes and avoided walking barefoot, fewer consistently dried between their toes or used moisturizing

creams. Education on foot care was limited, but there was a high interest in receiving educational materials. These findings indicate a need for enhanced patient education and preventive practices to address diabetic foot complications. Conclusion: The study underscores a critical need for improved diabetic foot care education and preventive measures among diabetic patients in Peshawar, Pakistan. It highlights the high prevalence of foot problems due to inadequate care, despite some awareness of essential practices. Significant gaps in comprehensive management point to the urgent need for continuous patient education. The strong interest in receiving educational materials presents an opportunity for healthcare providers to empower patients and reduce severe diabetic foot complications, ultimately enhancing the quality of life for diabetic patients.

INTRODUCTION

1.1 Background

Diabetes Mellitus

Diabetes is a long-term condition marked by high blood sugar levels and disrupted fat and protein metabolism. This occurs because the body cannot properly use glucose for energy, either due to insufficient insulin production by the pancreas or the cells' inability to effectively use the insulin available. The main types of diabetes are Type 1, where the pancreas fails to produce insulin; Type 2, where the body's cells become resistant to insulin, and insulin production gradually declines over time; and gestational diabetes, which develops during pregnancy.(1) Signs and symptoms include elevated blood sugar, frequent urination, increased thirst and hunger, fatigue, weight loss, and blurred vision. The preventive measures should always be kept in mind while one suffers from diabetes because if diabetes is left untreated and uncontrolled it leads to a series of

complications that severely affect one's health, functioning, and other activities of day-to-day life. Some of these complications include; Diabetic retinopathy, Diabetic nephropathy, Diabetic vasculopathy, Diabetic neuropathy, and Diabetic foot ulcers.(2) The diagnostic process includes various tests such as urine sugar, blood sugar, and different glucose tolerance tests. Treatment focuses on addressing the underlying cause and administering high doses of regular insulin until the condition is controlled and insulin requirements normalize. The management goals are to restore normal metabolism, prevent complications, and educate the patient for effective self-care.(3)

Prevalence of Diabetes

In 2021, the worldwide prevalence of diabetes among individuals aged 20–79 was estimated at 10.5% (536.6 million people), and it is projected to increase to 12.2% (783.2 million) by 2045. The prevalence in 2021 was found to be higher in urban areas (12.1%) compared to rural areas (8.3%), and in high-income countries (11.1%) compared to low-income countries (5.5%).(4) Over the past thirty years, there has been a significant increase in diabetes cases, particularly type 2 diabetes, predominantly in developing countries where over 80% of diabetes patients reside. The prevalence of type 2 diabetes in South Asia is projected to surge by more than 150% between 2000 and 2035. More than 60% of the global diabetes population is in Asia, with nearly half in China and India combined.(5) The National Diabetes Survey of Pakistan (NDSP 2016-2017) reveals that the diabetes prevalence in Pakistan is 26.3%. This means that around 27.4 million individuals over 20 years old are affected by diabetes. This figure represents a substantial increase from the earlier estimate of about 7 million diabetic patients from a survey conducted between 1994 and 1998, indicating a worrying rise in the number of diabetes cases. (6)

Diabetic Foot Ulcer

Diabetic foot ulcers are common complications in people with diabetes, characterized by open sores or wounds that typically appear on the feet due to factors such as nerve damage and inadequate blood circulation. These ulcers can lead to serious outcomes, including infections, tissue damage, and, in severe cases, amputation if not promptly and effectively treated.(7) Foot ulcers afflict approximately 40–60 million diabetic adults globally, severely impacting their quality of life. Regional disparities in diabetes-related health outcomes are evident, with Belgium reporting a high prevalence of foot ulcers among diabetic patients at 16.6%. Similarly, in Pakistan, where diabetes affects approximately 33 million people and is increasing, the healthcare system struggles with managing diabetic foot ulcers due to deficiencies in healthcare quality, education, and accessibility.(8) Prevention and early detection are crucial for managing diabetic foot ulcers, as they are often preventable and manageable through proper foot care, regular check-ups, and education on self-care practices.(7) By enhancing patient knowledge and providing necessary tools, such initiatives aim to reduce the incidence of foot ulcers and mitigate the need for amputations.(9)

Diabetic Foot Care

Practicing diabetic foot care measures, such as daily foot examinations and using appropriate footwear, is crucial for early detection and prevention of complications. (10) Proper foot care practices are essential for safeguarding the feet of individuals living with diabetes mellitus (DM). These practices include daily foot examinations for signs of redness, ulcers, cuts, and bruises, thorough washing and drying of the feet, moisturizing, inspecting the insides of shoes before wearing them, and protecting the feet from extreme temperatures.(11) Additionally, these practices help reduce common foot issues,

such as corns and calluses, and promote the healing of foot ulcers. (10) The "IWGDF Practical Guidelines on the Prevention and Management of Diabetic Foot Disease (2019 update)" detail a comprehensive protocol for diabetic foot care, focusing on prevention, classification, and treatment. Key steps include annual exams for at-risk feet, thorough inspections, patient education, and appropriate footwear. Ulcers are classified and treated based on type, cause, and infection signs, with strategies for offloading pressure, restoring perfusion, and managing comorbidities. Regular ulcer care and education are essential for effective management.(12) In Pakistan, a foot care protocol for diabetic patients must focus on improving education and practical guidance, as only 31.82% show good knowledge and 16.82% practice good foot care. The protocol should include regular counseling, emphasize foot hygiene, and ensure timely medical intervention. It must address varying educational backgrounds and improve patient-provider communication to reduce foot-related complications. (13)

Importance of Knowledge in Diabetic Foot Care

Patients with inadequate knowledge and practices regarding diabetic foot care have a higher incidence of foot complications, including ulcers. Educating patients on proper foot care can reduce the incidence of foot ulcers and amputations.(10) Improving knowledge about self-management of foot care can help identify DFU in its early stages and prevent its progression. Effective foot care education programs can address factors contributing to diabetic foot disease.(11) The American Diabetes Association recommends annual assessments of diabetic patients' knowledge, skills, and behaviors.(14) Investing in education and raising patient awareness about DFU and proper foot care practices may help decrease the incidence of foot disease. Several studies have highlighted poor foot care knowledge among individuals with diabetes,

with significant proportions exhibiting inadequate foot care practices. In Germany, individuals with type 2 diabetes who participated in multiple education programs exhibited significantly better self-care practices compared to those with limited or no training.(15) Prevention is the most effective strategy for managing DFUs and their complications. This involves identifying high-risk patients and educating them through multidisciplinary teams comprising DFU and foot care experts. Insufficient knowledge and best practices concerning diabetic foot care (DFC) significantly impact its quality and contribute to increased diabetic foot complications. Proper foot care education is crucial for diabetic patients to minimize complications, including those that may lead to amputation. (16)

1.2 Problem Statement

Diabetic foot complications pose a severe threat to the health and well-being of diabetic patients, especially in developing countries like Pakistan. Although diabetes is highly prevalent in Pakistan, and diabetic patients face a significant risk of foot complications, a critical gap exists in their knowledge and practices regarding diabetic foot care. This lack of awareness and inadequate self-care behaviors significantly contribute to a high incidence of foot ulcers, infections, and ultimately, amputations. These amputations can be life-altering, causing immense physical and emotional distress to patients, while also placing a substantial burden on healthcare systems. A study by Asim et al. underscores this issue, revealing that a majority of diabetic patients in Lahore had poor knowledge about diabetic foot care and exhibited inadequate self-care practices. This gap in knowledge and practice is particularly concerning given the high prevalence of diabetes in the country. The research highlighted that educational level significantly impacted patients' understanding of foot care, with those having a higher education

demonstrating better knowledge and practices. This suggests that increasing educational interventions could be crucial in improving foot care among diabetics. (17)

This study aims to assess the level of knowledge about diabetic foot care among diabetic patients at tertiary care hospitals in Peshawar, KPK, and identify key areas where educational interventions are needed to improve patient outcomes.

1.3 Objective of the Study

To assess the knowledge gaps regarding diabetic foot care among diabetic patients attending tertiary care hospitals in Peshawar, Khyber Pakhtunkhwa (KPK), Pakistan.

1.4 Research Questions

Primary Question: What is the level of knowledge regarding diabetic foot care among diabetic patients at tertiary care hospitals in Peshawar, KPK?

1.5 Hypotheses

1. **Null hypothesis**: The knowledge level of diabetic patients is sufficient regarding diabetic foot care.
2. **Alternate hypothesis**: The knowledge level of diabetic patients is insufficient regarding diabetic foot care.

1.6 Significance of the Study

This study contributes to nursing science and diabetic care literature in several significant ways:

Fill Knowledge Gap: By assessing the level of knowledge regarding diabetic foot care among diabetic patients in Peshawar, KPK, the study addresses a critical gap in the current literature. Existing research often focuses on general diabetes management but lacks detailed insights into specific knowledge gaps related to foot care among Pakistani diabetic patients.

Enhance Patient Education: The findings will provide insights into the specific areas where diabetic patients lack adequate knowledge about foot care. This information is crucial for developing targeted educational interventions that can empower patients to take proactive steps in preventing diabetic foot complications.

Improve Clinical Practice: Tertiary care hospitals play a pivotal role in managing complex diabetic cases, including foot complications. By identifying factors influencing knowledge levels and suggesting effective educational strategies, this study can help healthcare providers enhance patient education programs and improve clinical outcomes.

Policy Implications: The study's recommendations for educational interventions could inform healthcare policies aimed at reducing the incidence of diabetic foot complications in Pakistan. This has the potential to lower healthcare costs associated with managing diabetic foot ulcers and improve overall quality of life for diabetic patients.

Contribution to Global Health: Given the global burden of diabetes and its complications, insights from this study can contribute to international efforts in diabetic care and prevention strategies, particularly in regions facing similar healthcare challenges.

1.7 Operational Definitions

Diabetic Foot Care: Diabetic foot care refers to the preventive measures and management strategies aimed at reducing the risk of foot complications among diabetic patients. This includes daily foot inspections, proper hygiene, wearing appropriate footwear, managing blood sugar levels, and seeking prompt medical attention for any foot abnormalities or injuries.

Knowledge Level: Knowledge level in the context of this study refers to diabetic patients' understanding and awareness of diabetic foot care practices. It encompasses their knowledge of preventive measures, early signs of foot complications, and appropriate actions to take in case of foot problems.

Tertiary Care Hospitals: Tertiary care hospitals are healthcare facilities that provide specialized medical and surgical treatment for complex and severe conditions. In the context of this study, tertiary care hospitals refer to hospitals in Peshawar, Khyber Pakhtunkhwa (KPK), which manage diabetic patients, including those with diabetic foot complications requiring advanced medical intervention.

Diabetic Foot Complications: Diabetic foot complications include a range of issues such as foot ulcers, infections, neuropathy-related deformities, and peripheral arterial disease. These complications are common among diabetic patients and can lead to severe consequences, including amputations, if not managed promptly and effectively.

Educational Interventions: Educational interventions refer to targeted strategies designed to improve diabetic foot care knowledge and practices among patients. These interventions may include educational workshops, individual counseling sessions, distribution of educational materials, and leveraging digital health technologies to enhance patient education and engagement.

LITERATURE REVIEW

2.1 Introduction

Knowledge and awareness of diabetic foot care are essential for preventing foot complications in diabetic patients. Various studies have assessed the understanding and impact of educational interventions on diabetic foot care in different contexts. This

section reviews the existing literature in similar settings to provide a comprehensive overview of the current state of knowledge among diabetic patients.

Studies on Diabetic Foot Care Knowledge

Bohorquez Robles et al. Conducted a descriptive correlational study on Knowledge and Practices of Diabetes Foot Care and Risk of Developing Foot Ulcers in México May Have Implications for Patients of Mexican Heritage Living in the US. This study involved 200 patients with type 2 diabetes. Findings indicated that a majority of participants had insufficient knowledge and inadequate foot care practices, with a notable negative correlation between knowledge levels and foot care practices. Sociodemographic factors did not influence the risk of developing diabetic foot ulcers significantly. The study concluded that patients with type 2 diabetes in outpatient settings often lack adequate knowledge and practices of foot care, which heightens their susceptibility to diabetic foot ulcers and associated complications. (18)

Mitaliben Gor et al. Conducted a quantitative quasi-experimental on the Implementation of the Diabetic Foot Care Education Quality Improvement Project at George Washington University. The study involved 31 diabetic patients aged 65 years and older at risk of diabetic foot ulcers. Results showed significant improvements in foot care knowledge and skills post-intervention, with a decrease in diabetic foot complications. The findings emphasize the effectiveness of diabetic foot care education in enhancing outcomes for older diabetes patients. (19)

Adarmouch et al. Conducted a study in Morocco to assess the short-term effectiveness of a culturally tailored educational intervention on foot self-care among type 2 diabetes patients. Out of 199 participants, 133 completed the follow-up, showing an increase in the average foot-care score from 3.5 to 5.9 days per week one-month

post-intervention ($p < 0.001$). The study found that literacy was linked to better foot care practices, while prior education on diabetic foot was associated with less improvement, underscoring the importance of literacy in health interventions. (20)

Gole et al. conducted a cross-sectional survey on the awareness of diabetic foot care among type 2 diabetes mellitus patients in Durban, South Africa. The findings revealed that only around 22.2% of patients reported examining their feet, and even then, they did so only after experiencing complications. The study concluded that awareness regarding diabetic foot disease was not adequately addressed and fell short of the optimal standards outlined in diabetic foot management and awareness guidelines.(21)

Letta et al. Conducted an institution-based cross-sectional study on Diabetes knowledge and foot care practices among type 2 diabetes patients attending the chronic ambulatory care unit of a public health hospital in eastern Ethiopia that included 549 patients, of whom 52.5% had adequate diabetes knowledge. Higher education levels and medium or above wealth status were linked to better diabetes knowledge, while patients over 55 years had lower odds. Only 20.2% had good foot care practices, which were significantly associated with knowledge of target fasting plasma glucose and overall diabetes knowledge. The study concluded that while about half of the patients had adequate disease knowledge, only one in five practiced good foot care, highlighting the need for education emphasizing daily foot care. (22)

Abdullah et al. Conducted a descriptive cross-sectional, health facility-based study on the Knowledge and practice of diabetic foot care in Sudan. This study involved 150 diabetic patients at a diabetes center. It found that 64.7% of participants were female, 35.3% were male, and 36% were aged 51-60 years. Only 41.3% achieved good

glycemic control. Knowledge of diabetic foot self-care was categorized as good for 46.7%, poor for 29.3%, and moderate for 24%. Self-practice scores indicated that 42.6% had good practices, 36.7% moderate, and 20.7% poor. Factors like older age, higher education, medium income, unemployment, longer diabetes duration (>10 years), family history of diabetes, controlled diabetes, and diabetes education correlated significantly with awareness and practices ($P < 0.05$). The study concludes that enhancing continuous health education is vital to improving diabetic foot self-care practices and addressing the gap between knowledge and its effective application.(23)

Hadi Sulistyo et al. Conducted a two-group pre- and post-test quasi-experimental study in Indonesia to examine the impact of a foot care camp on diabetic foot care knowledge (DFCK) and behaviors (DFCB) in individuals with diabetes mellitus. A total of 72 participants completed the 5-week program. The mean DFCK score in the experimental group significantly improved compared to the control group after completing the foot care camp ($p < .001$). The study concluded that the foot care camp effectively enhanced both diabetic foot care knowledge (DFCK) and diabetic foot care behaviors (DFCB) among diabetic patients.(24)

Jing et al. Conducted a cross-sectional study on Foot care knowledge and self-care practices among diabetic patients in Penang, Malaysia. Jing et al. The study involved 311 diabetic patients registered with two government health clinics in Penang. The study found that 53.1% of respondents had good knowledge scores, and 63% had good self-care practice scores, with the lowest scores in foot skin care questions. Formal foot care education was a significant predictor of foot care knowledge, which was positively correlated with self-care practices, suggesting that educating diabetic patients about foot care may improve their self-care practices. (25)

Kassab et al. Conducted a cross-sectional study titled "Diabetic foot care knowledge and practice in type 2 diabetes and its relation to microvascular complications in Alexandria (Egypt)." The study involved 100 patients with type 2 diabetes attending a diabetes outpatient clinic. Only 25% and 24% of participants demonstrated good knowledge and practice of diabetic foot care, respectively. The study revealed a significant positive correlation between knowledge and practice within the studied group ($p < 0.001$). Additionally, the presence of microvascular complications was associated with higher knowledge levels but did not lead to significantly improved foot care practices. (26)

Abu-elenin et al. Conducted a descriptive cross-sectional study on Knowledge, Practice, and Barriers of Foot Self-Care among Diabetic Patients at Tanta University Hospitals, Egypt, 264 diabetic patients attending outpatient clinics were included. The participants consisted of 42.0% males and 58.0% females, with 51% demonstrating good knowledge about diabetes. However, 62.2% had inadequate self-foot care practices. The study found a significant correlation between education level and both diabetic foot care knowledge and practice. Key barriers identified included poor communication with healthcare providers (54.7%) and insufficient knowledge (50.2%). Despite having good knowledge, the study concluded that patients generally exhibited inadequate foot care practices(27)

Al-Qaddah et al. Conducted a cross-sectional study on the Knowledge and Practice of Foot Care among Diabetics at King Hussein Medical Center, Jordan. The study involved 982 participants, with a balanced gender distribution and a mean age of approximately 52 years. It found varying levels of knowledge and practice in diabetic foot care among the participants: a significant portion had satisfactory knowledge but inadequate practice. This suggests a need for improved education and compliance

strategies in healthcare settings to better align knowledge with effective foot care practices among diabetic patients. (28)

Mosaad Ali et al. Conducted a quasi-experimental study on the Effectiveness of a Health Education Program Regarding Foot Self-care on the Risk of Developing Foot Ulcers among Patients with Diabetes at Benha University Hospital in Egypt. The study involved 132 patients selected through purposive sampling. Results indicated that after the intervention, the group receiving it showed significantly improved scores in knowledge, self-care confidence, and behavior compared to the control group. Additionally, there was a notable reduction in foot ulcer risk among the intervention group following the program. In conclusion, the study affirms the effectiveness of a self-care educational program in enhancing patients' knowledge and self-care practices while reducing the risk of foot ulcers. (29)

Shrestha et al. Conducted a cross-sectional study on Foot Care Knowledge and Practice among Diabetic Patients Attending the General Outpatient Clinic at Tribhuvan University Teaching Hospital in Nepal. This study involved 196 patients diagnosed with diabetes. The study revealed a significant correlation between lack of education and inadequate knowledge and practice of foot care among diabetic patients. Those with no education or only primary education were 6.414 times more likely to have poor knowledge and 4.518 times more likely to exhibit inadequate foot care practices compared to educated individuals. These findings highlight the critical need for targeted educational initiatives aimed at diabetic patients with limited formal education to mitigate foot complications effectively.(30)

Yılmaz Karadağ et al. Conducted a cross-sectional study in Turkey on Foot self-care in diabetes mellitus: Evaluation of patient awareness. This cross-sectional study involved

1030 patients. Results showed that 29.5% of patients had poor foot care, 49.6% had moderate foot care, and 20.8% had good foot care. Higher education, urban residence, higher income, prior foot care training, and type 1 diabetes mellitus were associated with better foot care practices, highlighting the influence of education and disease management on diabetic foot care. (31)

Acelya et al. Conducted a descriptive study on the Knowledge and Attitudes of Patients with Diabetic Foot Ulcers Regarding Foot Care in Turkey. This descriptive study involved 73 patients with type 2 diabetes from a diabetic foot service at a university hospital in Istanbul. Results showed that a significant majority were male, married, over 45 years old, and had limited participation in diabetes education programs. Patients who received diabetes education showed more frequent engagement in foot care practices compared to those who did not. The study concluded that there is a notable lack of diabetic foot care training among patients, suggesting a need for structured education programs facilitated by nurses to improve self-care practices and attitudes in diabetes management. (32)

Biçer & Enç et al conducted a randomized controlled study on the Evaluation of foot care and self-efficacy in patients with diabetes in Turkey. This randomized controlled study involved ninety patients with diabetes mellitus, divided based on whether they received foot care education. Education was designed using Bandura's social learning theory and included assessments using the diabetic foot care self-efficacy scale (DFCSES), foot self-care behavior scale (FSCBS), and diabetic foot knowledge subscale (DFKS) at three-month intervals. Patients who received foot care education showed significant improvements in DFCSES, FSCBS, and DFKS scores over time,

highlighting the effectiveness of education in enhancing foot care knowledge and self-efficacy among diabetes patients. (33)

Pourkazemi et al. Conducted an analytical, cross-sectional study on diabetic foot care knowledge and practice in Guilan Province, northern Iran. The study involved 375 patients with type 2 diabetes mellitus. The average knowledge score was 8.63 ± 2.5 out of 15, showing that most participants had poor knowledge (84.8%). The average practice score was 7.6 ± 2.5 out of 15, indicating that nearly half of the participants had poor performance (49.6%). A significant direct correlation was found between knowledge and practice. Predictors of practice score included knowledge level, place of residence, marital status, and history of hospital admission due to diabetic foot. (14)

Abdulghani et al. Conducted a quasi-experimental cross-sectional study on the Prevalence of diabetic comorbidities and knowledge and practices of foot care among diabetic patients at a government health care center in Riyadh, Saudi Arabia. The study included 360 patients with Type 2 Diabetes Mellitus. Results showed that 32.5% had poorly controlled hba1c levels (⩾8.6%) and 62.8% had diabetes for over 10 years. Common comorbidities included hypertension (61.4%), dyslipidemia (58.6%), retinopathy (23.3%), heart disease (14.4%), and severe foot complications (3.9%). Poorly controlled hba1c levels were associated with higher rates of retinopathy, foot complications, dyslipidemia, and hypertension. Physicians examined only 34.2% of patient feet, and 36.7% received advice on foot care. Despite 70% having knowledge of diabetic foot care, actual foot care practices were inadequate, indicating a need for improved awareness, education, and adherence to diabetic foot care guidelines among both healthcare providers and patients to reduce complications effectively. (34)

Goweda et al. Conducted a cross-sectional study on the Assessment of Knowledge and Practices of Diabetic Patients Regarding Diabetic Foot Care, in Makkah, Saudi Arabia. In Makkah hospitals, a study involving 350 diabetic patients found that the mean age was 53 years, with an average diabetes duration of 11.24 years. Among the participants, 35.1% had a history of foot ulcers, 25.7% had an ulcer at the time of the interview, and 11.7% had a history of amputation, with 77.1% examining their feet and 49.1% receiving foot care education. The study concluded that patient knowledge and practices regarding diabetic foot care are significantly associated with the reduction of diabetic foot ulcers. (35)

Al-Gaows et al. Conducted a descriptive cross-sectional study on the knowledge and practices of foot care among diabetic patients at a diabetic care center in Jeddah City, Saudi Arabia. Out of 308 patients, 38% demonstrated good knowledge of diabetic foot care, and 22% followed recommended foot care practices. The study revealed gaps in knowledge, with a majority unaware of proper foot washing temperatures and how frequently to inspect their feet. Additionally, many patients did not receive guidance on footwear choices or wear properly fitted shoes. (36)

Alhuqayl et al. Conducted a cross-sectional study in Riyadh, Saudi Arabia focusing on diabetic patients' awareness of foot care. The study revealed that approximately 46.7% of patients had inadequate awareness of diabetic foot care.(37)

Aldawish et al. Conducted a questionnaire-based cross-sectional study in Saudi Arabia to evaluate the awareness of diabetic foot disease among patients diagnosed with type 2 diabetes mellitus. The study involved 99 participants. Following patient education, only 22.2% of patients reported examining their feet, typically after complications had already developed. The study highlighted that patients with higher

education levels and more exposure to foot care techniques tended to have better outcomes, with fewer diabetic foot-related complications. (38)

Almaghrabi et al. Conducted an observational descriptive cross-sectional study on knowledge, attitude, and practices concerning foot care among adult diabetic patients in Saudi Arabia. A total of 665 participants completed the questionnaire, with 54.8% being female and 30.8% aged between 20-30 years. Approximately 120 participants (18.2%) had very poor knowledge of foot care. Almost 615 participants (93%) had a favorable attitude towards foot care, but only eight participants (1.2%) demonstrated good practices. (39)

Sutariya et al. Conducted a cross-sectional study on the Knowledge and practice of foot care among the patients with diabetic foot at a tertiary care center in Ahmedabad City, India. This hospital-based cross-sectional study involved 103 diabetic foot patients from the surgery outpatient department. Findings revealed that a significant portion had inadequate knowledge of diabetic foot care, with only 23% demonstrating good knowledge. Similarly, a majority of patients exhibited poor foot care practices. The study underscores the critical need for more effective patient education to enhance diabetic foot care understanding and practices.(40)

Selvakumar et al. Conducted a study in Tamil Nadu, India on awareness and practices related to foot self-care among individuals diagnosed with type 2 diabetes mellitus in a rural setting. The study found that 64.55% of participants lacked awareness about diabetic foot care and its associated complications. A significant majority (74.2%) of patients walked barefoot, 67.7% did not regularly inspect their footwear, and approximately 54.8% did not trim their toenails correctly. The study concluded that there is a critical need to improve awareness and knowledge about foot care in the

community, emphasizing that better education can help reduce morbidity and mortality associated with diabetes mellitus and its complications.(41)

Kishore et al. Conducted a study on the awareness of foot care among diabetes patients at a tertiary care hospital, in India. A questionnaire was administered to 400 patients to gauge their knowledge and awareness of diabetic foot complications and care. Only 50 out of 400 patients, representing 12.5%, had received prior health education on diabetic foot disease and foot care. The study concluded that there is a pressing need to enhance awareness about diabetic foot complications and foot care among both diabetes patients and healthcare providers to effectively prevent complications, especially diabetic foot disease.(42)

Sonal Sekhar et al. Conducted a randomized controlled study at Kasturba Hospital in Manipal, India, to evaluate the impact of patient education on the health-related quality of life (hrqol) of diabetic foot ulcer (DFU) patients. The study included 135 patients and found that, after six months of patient education, the intervention group showed significant improvement in hrqol compared to the control group and baseline scores ($p < 0.05$). This indicates that patient education significantly enhances hrqol in DFU patients, highlighting the need for non-physician healthcare providers in resource-limited settings.(43)

Asim et al. Conducted a descriptive cross-sectional study on the knowledge and self-care practices concerning diabetic foot among diabetic patients in public hospitals of Lahore, Pakistan. Out of 153 patients, the majority, 85 (55.5%), had poor knowledge about diabetic foot care, 48 (31.3%) had average knowledge, and 20 (13.2%) had good knowledge. Regarding practices, 79 participants (51.6%) had poor practices, 49 (32%) had satisfactory practices, and 25 (16.4%) demonstrated good practices of diabetic foot

care. Patients with a college-level education had a good level of knowledge about foot care. There is a significant association between the participants' knowledge and self-care practices with their age and education. (17)

Zafar et al. Conducted a cross-sectional study on the knowledge and practices of foot care in type 2 diabetic patients visiting the outpatient department at Jinnah Tertiary Care Hospital in Lahore, Pakistan. The study included 220 patients with a mean age of 52.9±12.5 years. The mean knowledge score was 3.9±2.9, with 31.82% having good knowledge, 40% having satisfactory knowledge, and 28.18% having poor knowledge about diabetic foot care. In terms of practices, the mean practice score was 10.50±4.5, with 16.82% demonstrating good practices, 59.09% average practices, and 24.09% poor practices towards diabetic foot care. (13)

Shamim et al. Conducted a cross-sectional study on Knowledge, Attitude, and Practices (Kap) on Diabetic Foot Care Among Patients with Diabetes in District Bahawalpur, Pakistan. The study involved 150 diabetic patients, primarily Type II diabetes (91.3%), with 23.3% having a family history of diabetes. About 44.35% had some knowledge of diabetes-related complications, and 45.44% had a positive attitude toward controlling these complications. However, only 33.62% practiced good foot care and used suitable footwear. The conclusion emphasizes that educating patients about weight management, proper foot care, early detection and treatment of peripheral neuropathy, and strict glycemic control is crucial for reducing diabetic foot complications significantly.(44)

Ul Haq et al. Conducted a cross-sectional study on the Assessment of Knowledge and Practice of Diabetes Mellitus Patients Regarding Foot Care in Tertiary Care Hospitals in Quetta, Pakistan. The study distributed 380 questionnaires and received 364

responses. Most respondents were aged 46-55 years, predominantly male, married, and from urban areas. Despite adequate knowledge about diabetic foot care among 58.8% of participants, 62.4% exhibited poor practices. Significant variations in knowledge and practice scores were observed across different demographics, the study highlighted that diabetic patients generally possess adequate knowledge but demonstrate inadequate practices in foot care. Enhancing patient knowledge is crucial to improving overall practices and reducing diabetic foot complications. (45)

Ghafoor et al. Conducted a descriptive cross-sectional study on Knowledge Attitude and Practice of Diabetic Foot Care among Diabetics at Aziz Bhatti Shaheed Teaching Hospital of Gujrat City, Pakistan. The study involved 421 patients. Results showed that only 42.3% of participants had sufficient knowledge about foot care, with attitude and practice rates being even lower at 25.2% and 9.5%, respectively. There was a positive correlation between knowledge and educational status. The study concluded there is a need for greater awareness about diabetic foot care in Pakistan. Without sufficient action, patients are at risk of developing foot complications. (46)

2.2 Research Gap

In analyzing the existing literature on diabetic foot care knowledge, several research gaps become apparent. Despite numerous studies highlighting various aspects of diabetic foot care, there is a consistent trend of inadequate foot care knowledge and practices among diabetic patients globally. For instance, studies from Turkey (Yılmaz Karadağ et al., 2019) and Saudi Arabia (Al-Gaows et al., 2019) show a significant portion of patients with poor knowledge and practices regarding diabetic foot care. Similarly, in Pakistan, a notable gap in knowledge and self-care practices was observed, as evidenced by studies in Lahore (Zafar et al., 2018) and Bahawalpur (Shamim et al., 2021),

which found that a substantial percentage of patients had either poor or only average knowledge and practices related to diabetic foot care.

In the context of Peshawar, KPK, Pakistan, these findings underscore a critical need to assess local diabetic patients' knowledge and practices regarding foot care, as similar trends may be present. The significant gap between knowledge and practice observed in other regions suggests that targeted educational programs and interventions could be pivotal in improving diabetic foot care outcomes in Peshawar. Addressing this gap could enhance patient education and reduce the risk of diabetic foot complications, aligning with the overarching goal of the research to assess and improve diabetic foot care knowledge among patients in tertiary care hospitals in Peshawar, KPK.

METHODOLOGY

3.1 Study Design

This study employs a quantitative approach using a descriptive cross-sectional design. The quantitative approach involves collecting and analyzing numerical data to quantify the level of knowledge regarding diabetic foot care among diabetic patients. This method allows for statistical analysis, making it possible to identify patterns, relationships, and trends within the collected data.

3.2 Study Settings

The study is conducted at three prominent tertiary care hospitals in Peshawar: Khyber Teaching Hospital, Hayatabad Medical Complex, and Lady Reading Hospital. These hospitals were chosen because they have large patient volumes, which helps ensure that the study will include a diverse and representative sample of diabetic patients.

3.3 Study Duration

The study spans a period of 14 weeks, starting from 23 April 2024 to 04 August 2024. This duration is carefully planned to ensure that there is ample time for all critical phases of the research process.

Firstly, it allows sufficient time for recruiting participants from the selected hospitals, ensuring a diverse and representative sample. Secondly, the extended timeframe ensures that data collection can be conducted thoroughly without rushing, which is crucial for maintaining the accuracy and reliability of the data. Lastly, the study duration provides adequate time for data analysis, ensuring that the findings are robust and the study maintains its quality and rigor throughout the research process.

3.4 Sample Size

The sample size for this study is determined to be 187 participants. This calculation is based on the prevalence of diabetes in the region and the desired confidence level, ensuring that the study can provide reliable and valid results. The calculation is done using OpenEpi software, a widely used tool for epidemiological studies, which helps in determining an appropriate sample size for statistical significance.

3.5 Sampling Technique

A **stratified random sampling** technique was used to select participants from the diabetic patient population at the specified hospitals. The population was divided into subgroups (e.g., age, gender, type of diabetes), and participants were randomly selected from each subgroup. This ensured proportional representation, minimized bias, and improved the generalizability of the study's findings.

3.6 Sample Selection Criteria

Inclusion Criteria

To ensure a relevant and representative sample, the study included:

1. Diabetic patients who were willing to participate.
2. Individuals aged 18 years or older.
3. Patients actively visiting the hospital during the study period.

Exclusion Criteria

To maintain the integrity and focus of the study, the following exclusion criteria were applied:

1. Participants who did not provide informed consent.
2. Pregnant women with gestational diabetes.
3. Individuals who do not speak or understand the local language, hindering communication.
4. Patients with physical disabilities that limit their ability to participate in the study.

3.7 Data Collection Procedure

Data were collected using a structured, adapted questionnaire for the study. The questionnaire addressed key aspects of diabetic foot care, including demographic information, history of foot problems, current issues, daily foot care practices, awareness of safety measures, and knowledge of educational resources. Trained data collectors administered the questionnaire after obtaining informed consent, explaining the study's purpose, and ensuring participants understood the questions. This approach facilitated the collection of comprehensive and accurate data, ensuring the reliability and validity of the study’s findings.

3.8 Data Analysis Procedure

Data collected from the questionnaires were analyzed using SPSS software version 23.00. Descriptive statistics, including frequencies, percentages, means, and standard deviations, summarized participant profiles and responses. The analysis covered demographic data, history of foot problems, current conditions, foot care practices, adherence to safety measures, and knowledge of educational resources. This process provided insights into participants' knowledge and practices, helping to identify gaps and areas for improvement in diabetic foot care education.

3.9 Ethical Consideration

Ethical considerations are rigorously observed throughout the research process. Participants are informed about the study objectives and procedures, and their voluntary participation is ensured through informed consent. Measures are taken to protect participant privacy and confidentiality during data collection, storage, and analysis. The study protocol, including the consent process and questionnaire, undergoes review and approval by an institutional review board (IRB) to ensure adherence to ethical standards.

3.10 Dissemination of Findings

The findings of this study were disseminated through a detailed report. Proper acknowledgment was given to all contributors, including supervising faculty and participating students. Findings were shared with relevant stakeholders, including healthcare providers, policymakers, and diabetic patient communities, to inform and improve diabetic foot care management practices.

RESULTS AND ANALYSIS

This chapter presents the findings from the data collected through the structured questionnaires administered to diabetic patients at the selected tertiary care hospitals in Peshawar. The objective of this analysis is to assess the level of knowledge and practices related to diabetic foot care among the study participants.

The results aim to provide a comprehensive overview of the current state of diabetic foot care knowledge and practices among the study population. By presenting these findings, this chapter will highlight trends, identify gaps in knowledge, and inform potential areas for improvement in patient education and care practices.

TABLE 1: DEMOGRAPHIC DATA

Category	Subcategory	Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Male	134	71.7	71.7	71.7
	Female	53	28.3	28.3	100.0
	Total	**187**	**100.0**	**100.0**	**100.0**
Age	30-40	19	10.2	10.2	10.2
	40-50	73	39.0	39.0	49.2
	50-60	47	25.1	25.1	74.3
	Above 60	48	25.7	25.7	100.0
	Total	**187**	**100.0**	**100.0**	**100.0**
Educational Status	Literate	102	54.5	54.5	54.5
	Illiterate	85	45.5	45.5	100.0
	Total	**187**	**100.0**	**100.0**	**100.0**

Marital Status	Married	173	92.5	92.5	92.5
	Unmarried	14	7.5	7.5	100.0
	Total	**187**	**100.0**	**100.0**	**100.0**

Demographic Information

The demographic data of the participants in this study, which aims to assess the level of knowledge regarding diabetic foot care among diabetic patients at tertiary care hospitals in Peshawar, KPK, is presented in Table 1. The sample consisted of 187 respondents, of which a significant majority were male (71.7%) while the remaining 28.3% were female. This gender distribution highlights a predominance of male participants in the study.

The age distribution of the respondents reveals a diverse range of ages. The largest age group was 40-50 years old, comprising 39.0% of the total sample. This was followed by the age group 50-60 years, which constituted 25.1% of the participants. Those aged above 60 years made up 25.7% of the respondents, while the youngest age group, 30-40 years, accounted for 10.2%. This distribution indicates that the majority of participants were middle-aged or older, reflecting a typical demographic profile of diabetic patients.

Regarding educational status, more than half of the participants (54.5%) were literate, while the remaining 45.5% were illiterate. This balance shows a relatively even distribution between literate and illiterate respondents, which could have implications for their level of knowledge about diabetic foot care.

The marital status of the participants was also recorded, with an overwhelming majority (92.5%) being married. Only 7.5% of the respondents were unmarried. This high

proportion of married individuals might suggest a potential support system that could influence their health management practices, including diabetic foot care.

Overall, the demographic data provides a comprehensive overview of the participants in the study, highlighting important factors such as gender, age, educational status, and marital status. Understanding these demographics is crucial for interpreting the subsequent analysis of knowledge levels regarding diabetic foot care and tailoring educational interventions to the specific needs of different demographic groups.

TABLE 2: HISTORY OF FOOT PROBLEMS

History of Foot Problems	N	Mean	Std. Deviation	Yes (N)	Yes (%)	No (N)	No (%)
Have you ever had a sore or cut on your foot or leg that took more than two weeks to heal?	187	1.4759	0.50076	98	52.4%	89	47.6%
Have you ever had a foot ulcer?	187	1.4706	0.50047	99	52.9%	88	47.1%
Have you ever had an amputation of a toe, foot, or leg?	187	1.7701	0.42193	43	23.0%	144	77.0%
Valid N (listwise)	187						

History of Foot Problems

The data on the history of foot problems among diabetic patients is summarized in Table 2. This section represents the participants' experiences with foot-related issues, which is crucial for understanding the context of their knowledge and self-care practices regarding diabetic foot care. Over half of the respondents reported having sores or cuts

that took more than two weeks to heal (52.4%) and having had a foot ulcer (52.9%). A smaller portion of respondents reported having had an amputation (23.0%).

Table 3: Current Foot or Leg Problems

Current Foot or Leg Problems	N	Mean	Std. Deviation	Yes (N)	Yes (%)	No (N)	No (%)
Do you have an ulcer, sore, or blister on your feet at this time?	187	1.3209	0.46806	127	67.9%	60	32.1%
Do you have blood or discharge on your socks?	187	1.3636	0.48234	119	63.6%	68	36.4%
Do you have any calluses on your feet?	187	1.6096	0.48914	73	39.0%	114	61.0%
Do you have any numbness, tingling, pins, and needles, or itching sensation in your feet?	187	1.0909	0.28825	170	90.9%	17	9.1%
Do you have any tightness, heaviness, pain, or cramps in your feet or legs?	187	1.1711	0.37763	155	82.9%	32	17.1%
Valid N (listwise)	187						

Current Foot or Leg Problems

The data on current foot or leg problems among diabetic patients is presented in Table 3. This section presents the prevalence of various symptoms and conditions that the participants are currently experiencing, which can provide insight into their ongoing challenges and the necessity for proper diabetic foot care knowledge. A significant

portion of respondents reported having numbness, tingling, or other sensations in their feet (90.9%) and tightness, heaviness, pain, or cramps (82.9%). Additionally, 67.9% have an ulcer, sore, or blister on their feet currently, and 63.6% have blood or discharge on their socks. Meanwhile, fewer respondents reported having calluses on their feet (39.0%)

Table 4: Foot Care Practices

Foot Care	N	Mean	Std. Deviation	Yes (N)	Yes (%)	No (N)	No (%)
Can you reach and see the bottoms of your feet?	187	1.2513	0.43495	140	74.9%	47	25.1%
Do you examine your feet? (If yes, how often?)	187	1.4492	0.49875	103	55.1%	84	44.9%
Do you wash your feet every day?	187	1.3262	0.47008	126	67.4%	61	32.6%
Do you dry well between the toes?	187	1.5561	0.49817	83	44.4%	104	55.6%
Do you use a moisturizing cream on your feet?	187	1.5936	0.49248	76	40.6%	111	59.4%
Do you cut your own toenails? (If no, who does this for you?)	187	1.2193	0.41485	146	78.1%	41	21.9%
Valid N (listwise)	187						

Foot Care Practices

The data on foot care practices among diabetic patients is summarized in Table 4. This section assesses the participants' habits and routines related to foot care, which are

crucial for preventing complications and maintaining foot health in diabetic patients. A majority of respondents can reach and see the bottoms of their feet (74.9%), cut their own toenails (78.1%), and wash their feet every day (67.4%). Over half of the respondents (55.1%) examine their feet, while fewer dry well between their toes (44.4%) and use moisturizing cream (40.6%).

Table 5: Safety and Prevention

Safety and Prevention	N	Mean	Std. Deviation	Yes (N)	Yes (%)	No (N)	No (%)
Do you ever soak your feet?	187	1.5936	0.49248	76	40.6%	111	59.4%
Do you always test the water temperature before putting your foot in?	187	1.5989	0.49143	75	40.1%	112	59.9%
Do you use medicated products for warts, corns, or calluses?	187	1.5508	0.49875	84	44.9%	103	55.1%
Do you put moisturizing creams or lotions between your toes?	187	1.5775	0.49528	79	42.2%	108	57.8%
Do you ever walk around in your bare feet?	187	1.7380	0.44092	49	26.2%	138	73.8%
Do you ever wear shoes without wearing any socks?	187	1.7005	0.45925	56	29.9%	131	70.1%
Do you always inspect your shoes for foreign objects or	187	1.1604	0.36799	157	84.0%	30	16.0%

torn linings?							
Do you use a hot water bottle or heating pad on your feet?	187	1.5936	0.49248	76	40.6%	111	59.4%
Do you sit with your legs crossed?	187	1.3155	0.46597	128	68.4%	59	31.6%
Do you smoke?	187	1.6631	0.47392	63	33.7%	124	66.3%
Valid N (listwise)	187						

Safety and Prevention Practices

Table 5 presents data on safety and prevention practices related to foot care among diabetic patients. This section examines the participants' behaviors and habits that can either contribute to or mitigate the risk of foot complications associated with diabetes. A large majority of respondents inspect their shoes for foreign objects or torn linings (84.0%) and avoid walking barefoot (73.8%). Many do not soak their feet (59.4%) or use a hot water bottle or heating pad (59.4%). Fewer respondents test water temperature (40.1%), use medicated products (44.9%), or put moisturizing creams or lotions between their toes (42.2%). Additionally, a significant portion sit with their legs crossed (68.4%) and do not smoke (66.3%).

Table 6: Foot Care Education

Foot Care Education	N	Mean	Std. Deviation	Yes (N)	Yes (%)	No (N)	No (%)
Have you ever attended a class on how to care for your feet?	187	1.5294	0.50047	88	47.1%	99	52.9%
Have you ever read any	187	1.8075	0.39533	36	19.3%	151	80.7%

handouts on foot care?							
Have you ever read any handouts on proper footwear?	187	1.8556	0.35242	27	14.4%	160	85.6%
Would you like a handout on how to care for your feet?	187	1.0053	0.07313	186	99.5%	1	0.5%
Valid N (listwise)	187						

Foot Care Education

Table 6 presents data on foot care education among diabetic patients, exploring their exposure to educational resources and their preferences for further education. This section examines the participants' engagement with educational materials related to foot care, which is crucial for understanding their knowledge acquisition and readiness to manage diabetic foot complications. Less than half of the respondents (47.1%) have attended a class on foot care, and even fewer have read handouts on foot care (19.3%) or proper footwear (14.4%). However, an overwhelming majority (99.5%) expressed interest in receiving a handout on how to care for their feet, indicating a strong demand for educational materials.

The data reveals significant foot health challenges among diabetic patients. Many respondents have experienced serious foot issues such as sores, ulcers, and amputations. Current problems like numbness, pain, and ongoing sores are common. Foot care practices vary, with many patients able to reach and see their feet and wash them daily, but fewer dry well between the toes or use moisturizing creams. Risky behaviors such as walking barefoot and wearing shoes without socks are noted, although most inspect their shoes regularly. Foot care education is lacking, but there is a strong interest in

receiving educational materials. These findings highlight the need for better education and preventive measures to improve foot health in diabetic patients.

DISCUSSION

5.1 Overview

This chapter provides a detailed discussion of the study's findings on diabetic foot care knowledge and practices among patients at tertiary care hospitals in Peshawar, KPK. The study revealed that while many participants engaged in basic foot care routines, significant gaps remain in their practices and knowledge. A substantial portion of the sample experienced foot problems such as sores, ulcers, and numbness, indicating ongoing challenges in managing diabetic foot health. The demographic data showed a predominantly male, middle-aged, and educated population, which provides context for understanding the variations in foot care practices.

Comparing the study's results with existing literature, it is evident that similar issues are present globally. Previous research in countries like Turkey, Saudi Arabia, and India has highlighted inadequate knowledge and suboptimal practices among diabetic patients, aligning with the findings from Peshawar. This consistency across different regions underscores the universal nature of the problem and the need for effective, culturally tailored educational interventions to address these gaps.

The implications of these findings suggest a pressing need for targeted educational programs and policy enhancements. Improving foot care education, integrating it into routine healthcare practices, and developing comprehensive educational materials are crucial steps. Additionally, policymakers should focus on supporting initiatives that address these educational gaps, aiming to enhance patient outcomes and reduce the incidence of diabetic foot complications.

Demographic Data

The demographic data reveals a notable gender disparity among the study participants, with a majority being male compared to females. This male predominance might reflect broader societal trends or specific health-seeking behaviors in the region. It's important to consider whether gender differences influence knowledge levels regarding diabetic foot care, as previous studies suggest that gender can impact health literacy and management practices.

The age distribution shows that most participants are middle-aged or older, with the largest group falling between the ages of 40-50 years, followed by those in the 50-60 years range and those above 60 years. This age profile aligns with the typical demographics for diabetic patients, who often develop diabetes later in life. The relatively small proportion of younger individuals might suggest a lower prevalence of diabetes in this age range or a lower response rate among younger patients. This variation highlights the need to tailor diabetic foot care education to the specific needs of different age groups.

The educational status distribution shows a near-equal split between literate and illiterate participants. This balance indicates that educational background is a significant factor influencing knowledge about diabetic foot care. Literate individuals may have better access to educational materials and healthcare resources compared to illiterate individuals. This finding underscores the importance of developing targeted educational interventions accessible to both literate and illiterate patients, potentially incorporating visual aids and hands-on training to bridge any knowledge gaps.

A high proportion of participants are married, suggesting that married individuals might have more familial support in managing diabetes. This demographic detail could

influence the study's findings, as marital status may correlate with better disease management and knowledge sharing within the family unit. Future studies could explore how the presence of a support system impacts diabetic foot care practices and knowledge.

History of Foot Problems

A significant number of participants have experienced sores or cuts on their feet or legs that took more than two weeks to heal, indicating that chronic wounds are a common issue among the diabetic patients in this study. Such prolonged healing times suggest potential complications related to diabetes, such as poor circulation or impaired wound healing. This underscores the critical need for effective education and intervention strategies to manage and prevent such issues.

A slightly higher percentage of participants reported having had foot ulcers at some point, highlighting a serious complication of diabetes that can lead to more severe outcomes if not managed properly. The high prevalence of foot ulcers in this sample emphasizes the need for targeted educational programs focusing on prevention, early detection, and management of foot ulcers.

In contrast, a smaller percentage of participants reported having undergone an amputation of a toe, foot, or leg. While this proportion is lower compared to those with sores or ulcers, it still represents a significant number of individuals who have experienced severe diabetic complications. The lower prevalence of amputations could indicate that timely medical intervention and proper foot care practices are helping to prevent the progression of foot problems to the point of requiring amputation.

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Current Foot or Leg Problems

The data reveals that a substantial number of participants currently have ulcers, sores, or blisters on their feet. This high prevalence indicates a significant ongoing issue with foot health among the diabetic patients in the study. Such conditions can exacerbate into more severe complications if not managed properly, highlighting the need for immediate and effective foot care interventions.

A substantial portion of participants reported having blood or discharge on their socks, indicating active bleeding or infection. This suggests that many patients might be experiencing severe foot issues that could lead to complications such as infections or gangrene if not treated promptly. The presence of blood or discharge is a red flag that demands urgent attention from healthcare providers.

In contrast, a smaller percentage of respondents reported having calluses on their feet. While this is a lower percentage compared to other symptoms, calluses can still be a precursor to more serious foot problems. This indicates a need for patient education on managing calluses through regular foot care routines and consultations with podiatrists.

An overwhelming number of participants reported experiencing numbness, tingling, pins and needles, or itching sensations in their feet. These symptoms are indicative of diabetic neuropathy, a common complication of diabetes that can significantly impair foot health and increase the risk of injuries. This high prevalence points to a critical area for intervention, where patients need education on managing neuropathy and protecting their feet from injuries they might not feel due to the loss of sensation.

Similarly, a significant proportion of respondents reported experiencing tightness, heaviness, pain, or cramps in their feet or legs. These symptoms can be associated with peripheral artery disease, another common complication in diabetic patients. This finding emphasizes the necessity for regular cardiovascular assessments and interventions aimed at improving blood circulation to the lower extremities.

Foot Care Practices

The data shows that many respondents can reach and see the bottoms of their feet, which is crucial for regular self-examination and early detection of foot problems. The fact that a significant majority of participants can perform this task is encouraging, as it indicates that many are physically capable of inspecting their feet. However, fewer participants examine their feet regularly, which is concerning as regular foot examinations are essential for early detection and management of foot issues in diabetic patients. This highlights the need for increased education and encouragement for patients to perform daily foot checks.

A significant portion of respondents wash their feet every day, which is a good practice for maintaining hygiene and preventing infections. However, a notable percentage do not adhere to this daily routine, suggesting that while many patients understand the importance of daily foot washing, there remains a substantial number who need education on its benefits.

Only a portion of respondents dry well between their toes after washing. This practice is crucial for preventing fungal infections and maintaining overall foot health. The majority who do not dry between their toes properly are at higher risk for developing moisture-related issues such as athlete's foot or other fungal infections, indicating a gap in knowledge or adherence to proper foot care techniques.

A relatively small percentage of participants use moisturizing cream on their feet. Moisturizing helps to prevent dry skin and cracking, which can lead to infections. The fact that many patients do not use moisturizing cream suggests that they might be unaware of its importance or lack access to appropriate products. This highlights an area where healthcare providers can offer more guidance and support.

A large majority of respondents cut their own toenails, which is a positive indicator of their self-care abilities. However, it is essential that they do so correctly to avoid injuries that can lead to infections. Those who do not cut their own toenails might benefit from professional foot care services or more education on safe toenail-cutting practices.

Safety and Prevention Practices

A significant majority of participants inspect their shoes for foreign objects or torn linings, which is crucial for preventing injuries and infections. This high percentage indicates a strong awareness and adherence to this important preventive measure among the study participants. Most respondents avoid walking barefoot, which is essential for preventing injuries and infections. The adherence to this safety practice suggests a good level of understanding of its importance.

Many respondents do not soak their feet or use a hot water bottle or heating pad on their feet, as these practices can lead to burns or maceration of the skin. The majority avoiding these practices reflects positive adherence to safety guidelines.

However, a portion of respondents always test the water temperature before putting their feet in, which is essential to prevent burns. The low percentage indicates a need for better education on this safety practice.

A smaller percentage of participants use medicated products for treating warts, corns, or calluses. While these products can be effective, they must be used cautiously to avoid skin damage. The relatively low percentage suggests that many patients may prefer or are advised to seek professional treatment for these conditions.

Only a portion of respondents put moisturizing creams or lotions between their toes. This practice can lead to excessive moisture, which can promote fungal infections, indicating good adherence to appropriate moisturizing techniques among those who avoid this practice.

A significant number of respondents do not wear shoes without socks, which is important to reduce friction and absorb moisture, preventing blisters and infections. The high adherence to this practice suggests a good understanding of its importance. A large portion of respondents sit with their legs crossed, which can impair circulation, especially in diabetic patients who already have compromised blood flow. This common behavior highlights a need for education to minimize the risk of circulatory issues. Many respondents do not smoke, which is positive given the harmful effects of smoking on foot health and overall health. This indicates awareness of smoking's detrimental impact.

Foot Care Education

Less than half of the participants have attended a class on how to care for their feet, indicating moderate engagement with formal educational sessions. This suggests room for improvement in offering and encouraging participation in educational programs.

A small percentage of respondents have read handouts on foot care, highlighting a gap in self-education through available written materials. Handouts can reinforce learning and provide ongoing reference material, suggesting a need for increased availability or awareness of these resources.

A very small percentage have read handouts specifically about proper footwear, which is critical in preventing foot complications. The low engagement with this type of educational material indicates a need for increased emphasis on proper footwear in patient education programs.

Despite the low current engagement with educational resources, there is a strong demand for handouts on how to care for feet. This indicates that patients recognize the need for more information and are open to learning how to better manage their foot health.

Overall, these findings underscore the critical need for improved foot care education and preventive measures to address serious foot health challenges and promote better management practices among diabetic patients.

5.2 Comparison with Previous Studies

The comparison of the demographic data and history of foot problems among diabetic patients in Peshawar, Pakistan, with findings from various studies on diabetic foot care knowledge in other regions, reveals critical insights into the current challenges and opportunities for improvement. The demographic analysis from Peshawar shows a predominance of male participants and a significant number of middle-aged and older individuals. This mirrors broader trends seen in other studies, such as those by Pourkazemi et al. (2020) and Abdulghani et al. (2018), which also highlighted gender and age-related factors influencing foot care practices and knowledge among diabetic patients. The high prevalence of foot problems, such as ulcers and amputations, among participants in Peshawar is consistent with findings from Saudi Arabia, India, and Turkey, indicating a widespread issue across different regions.

The reported history of foot problems in Peshawar, with over half of the participants experiencing sores, ulcers, and a notable percentage undergoing amputations, underscores the severity of diabetic foot complications. Similar findings were noted by Yılmaz Karadağ et al. (2019) and Goweda (2017) in Turkey and Saudi Arabia, respectively, where higher education and better foot care practices were linked to reduced incidences of severe foot complications. This suggests that despite regional differences, the underlying issue of inadequate foot care and its consequences is a common challenge that needs to be addressed through improved education and preventive measures.

Current foot or leg problems among participants in Peshawar, such as numbness, pain, and ongoing sores or blisters, highlight the ongoing struggle with diabetic neuropathy and peripheral artery disease. These symptoms are prevalent among diabetic patients in various regions, as seen in studies by Biçer & Enç (2016) in Turkey and Selvakumar & Shah (2016) in rural India, emphasizing the need for continuous and comprehensive foot care. The high prevalence of such issues indicates that despite some awareness, there is a significant gap in the effective management of these symptoms, necessitating targeted interventions to improve patient outcomes.

The variability in foot care practices among participants in Peshawar, where many wash their feet daily but fewer dry well between the toes or use moisturizing creams, reflects a similar pattern observed in other studies. For instance, Abdulghani et al. (2018) in Saudi Arabia and Pinakin et al. (2016) in India found that while some patients engaged in positive foot care practices, many lacked comprehensive knowledge and adherence to recommended practices. This highlights the need for enhanced patient education that not only addresses basic foot care but also emphasizes the importance of specific practices to prevent complications.

The notable lack of foot care education among participants in Peshawar, with less than half having attended a class and even fewer having read handouts on foot care, is a critical finding that resonates with studies from other regions. For example, Asim et al. (2023) and Shamim et al. (2021 & 2022) in Pakistan, as well as Al-Gaows et al. (2019) in Saudi Arabia, identified significant gaps in education and awareness. However, the strong interest in receiving educational materials among Peshawar participants indicates a valuable opportunity for healthcare providers to meet this demand. By providing accessible and comprehensive educational resources, similar to successful interventions noted by Biçer & Enç (2016) in Turkey and Sonal Sekhar et al. (2019) in India, healthcare systems can significantly enhance diabetic foot care knowledge and practices, ultimately improving patient outcomes.

5.4 Strengths and Limitations

The study's strengths lie in its comprehensive data collection, providing a thorough analysis of demographic data, foot health history, current foot issues, foot care practices, and educational engagement among diabetic patients in Peshawar, thus offering a detailed understanding of their challenges. A high participation rate enhances the reliability and validity of the findings, while comparisons with previous studies provide a broader context, highlighting common challenges and potential solutions. Additionally, the study identifies critical educational gaps, offering valuable insights for healthcare providers aiming to improve patient education and outcomes. However, the study's limitations include significant gender disparity, which may affect the generalizability of the findings, reliance on self-reported data that could introduce bias, and a limited geographic scope that may restrict applicability to other regions with different demographics, healthcare systems, and cultural practices. The measurement of

educational engagement primarily through class attendance and reading handouts might not fully capture the depth of understanding or the quality of education received, and the cross-sectional design only provides a snapshot of the current situation without assessing changes over time or the long-term effectiveness of educational interventions.

5.5 Recommendations and Suggestions

Based on the findings from the study on diabetic foot care among patients in Peshawar, Pakistan, several recommendations and suggestions can be made to improve foot health outcomes. Firstly, it is crucial to enhance foot care education by developing and promoting comprehensive educational programs that cater to the specific needs of different demographic groups. Given the high interest among participants in receiving educational materials, healthcare providers should focus on increasing the availability of foot care classes and handouts, including visual aids and practical demonstrations. These programs should address the importance of regular foot examinations, proper drying techniques, moisturizing, and the use of appropriate footwear. Additionally, healthcare systems should implement targeted interventions to address the gaps identified in current practices, such as emphasizing the need for routine testing of water temperature and avoiding risky behaviors like walking barefoot.

Secondly, proactive measures should be taken to address the prevalent foot problems and complications observed among participants. This includes improving access to medical care and routine foot inspections to manage and prevent serious issues such as ulcers and amputations. Regular follow-ups and comprehensive monitoring should be integrated into diabetes management plans to identify and address emerging foot health concerns promptly. Moreover, there is a need for community-based initiatives to promote awareness and self-care practices, supported

by healthcare professionals. Collaborating with local organizations to provide resources and support can further enhance patient education and adherence to foot care practices, ultimately reducing the incidence of severe foot complications and improving overall quality of life for diabetic patients.

CONCLUSION

The data underscores a critical need for enhanced diabetic foot care education and preventive measures among diabetic patients in Peshawar, Pakistan. The demographic analysis reveals a male predominance and an older age profile, consistent with global trends, indicating that these factors significantly influence foot care knowledge and practices. The high prevalence of foot problems, such as sores, ulcers, and amputations, aligns with findings from other regions, emphasizing a widespread issue of inadequate foot care that necessitates targeted interventions.

Current foot or leg problems, including numbness, pain, and ongoing sores or blisters, highlight the severe impact of diabetic neuropathy and peripheral artery disease among the participants. Despite some awareness of essential foot care practices, significant gaps remain in comprehensive management, such as drying between toes and using moisturizing creams. These findings indicate an urgent need for continuous and comprehensive patient education on effective foot care practices to prevent complications and improve overall health outcomes.

The lack of foot care education among participants, with less than half having attended a class or read relevant handouts, is a critical issue. However, the strong interest in receiving educational materials presents a valuable opportunity for healthcare providers. By leveraging this demand and providing accessible, practical, and comprehensive educational resources, healthcare systems can empower patients to better manage their

foot health. This approach has the potential to significantly reduce the prevalence of severe diabetic foot complications and enhance the quality of life for diabetic patients in Peshawar and beyond.

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