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Assessment of Nurses' Knowledge and Management of Diabetic Foot and its Correlation with Hba1c Levels in Al-Diwaniyah Hospitals

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Abstract: One of the main consequences of diabetes mellitus is diabetic foot, which can result in infection, ulceration, or even amputation. Nurses are essential to management, early detection, and prevention. Poor patient outcomes, however, might be caused by gaps in practice and knowledge. HbA1c is a crucial biomarker that indicates the risk of complications and glycemic management.

Objective: to evaluate nurses' diabetic foot knowledge and treatment methods and ascertain how they relate to patients' HbA1c levels at Al-Diwaniyah hospitals.

Methods: A cross-sectional descriptive-correlational study was carried out among nurses in particular hospitals in Al-Diwaniyah. Knowledge and the Management/Practice Checklist were evaluated using a structured questionnaire, and real practices were verified using an observation checklist. Patients' HbA1c readings (from records within three months) were connected to the care provided by the corresponding nurses. Descriptive statistics, regression testing, and correlation were used to examine the data.

Results: One hundred nurses who worked in the hospitals of Al-Diwaniyah took part in the study. The majority of participants were male (59%) and held a Bachelor of Science in Nursing (54%). Regarding diabetic foot care, over half of the nurses demonstrated strong understanding (53%) and good management techniques (55%). However, a significant portion lacked sufficient practice (39%) and expertise (35%). Of the patients, 39% had poor control and 57% had moderate HbA1c. Nurses' expertise ($r = -0.688$, $p < 0.001$) and management techniques ($r = -0.709$, $p < 0.001$) were found to be highly adversely linked with HbA1c levels.

Conclusions: Patient outcomes, especially glycemic control, can be improved by strengthening evidence-based practices and expanding nurses' expertise. Ongoing supervision and training are advised.

Key points: Nurses' Knowledge, Diabetic Foot, HbA1c.

INTRODUCTION

Diabetes is a prevalent health issue that impacts a significant portion of the world's population. Over 422 million people have diabetes, and 1.6 million people die from the disease annually, according to a new World Health Organization estimate. Nearly 600 million people will have diabetes mellitus by 2035, and during the following few decades, the prevalence rate is expected to climb significantly. The number of Iraqis with diabetes was about 1.4 million. Furthermore, type 2 diabetes (T2D) affects 8.5% to 13.9% of Iraqis. Y. Raziani et al. (2022). However, 537 million

persons worldwide suffer from diabetes, The International Diabetes Federation claims that... By 2045, 783 million individuals, or around one in ten, are expected to develop diabetes.

Diabetes International Federation, 2021 One common consequence of diabetes is diabetic foot ulcers, or DFUs.

Approximately 18.6 million individuals globally experience DFUs each year (Armstrong DG et al, 2023). According to Nguyen L. (2018), DFUs have a significant burden. Consequently, a large number of diabetes individuals already have difficulties before they seek medical attention. Peripheral vascular disease, neuropathy, and poor wound healing are among the complications that are commonly treated in the departments of trauma and orthopedics, cardiology, endocrinology, and neurology. The expertise of primary healthcare providers, especially nurses, is crucial to the care or treatment of patients with DFUs. Inadequate nursing support is closely associated with patients' ignorance of diabetic foot care, according to several research (Alkhatieb M et al, 2022, Dung PT et al, 2020). The incidence and prevalence of diabetes have steadily increased during the last few decades. Renal illness, heart attacks, strokes, blindness, and lower extremity amputation which frequently arises from infected foot ulcers—are all significantly increased by diabetes (WHO, 2022). At some time in their life, between 15% and 25% of people with diabetes develop foot ulcers (Armstrong DG et al., 2017).

However, a simple solution, such as regular foot care, can prevent these problems (Azmi NH et al., 2020). In order to reduce the morbidity and mortality of this debilitating condition, a diabetes care program, particularly with regard to foot care, must prioritize changing the way healthcare is established and provided, improving educational care, increasing access to healthcare, and strengthening preventative measures (Lim JZM et al., 2017). Early detection of foot ulcer risk, early adoption of preventative measures, and prompt and intensive treatment of foot problems in multidisciplinary foot care facilities are potential strategies to reduce the effects of foot complications. Patients can help identify foot issues early on and prevent foot injuries and infections by using appropriate foot care techniques (Schaper NC et al, 2020).

Furthermore, patient education has been found to be a critical component in lowering the occurrence or recurrence of DFUs. This entails imparting knowledge of fundamental foot care concepts, such as recommendations for suitable footwear and wound care.

It is also important to stress the need of practicing proper foot hygiene (Lim JZM et al, 2017). However, studies show that people's perceptions of their own diabetic foot issues are erroneous (Khunkaew S et al., 2019). According to Hadi Sulistyo AA et al. (2018), a survey conducted to evaluate the effectiveness of patient education on diabetic foot care found that it improved patients' attitudes toward their health.

Therefore, in order to help create an appropriate education program for patients with foot ulcers, a comprehensive systematic review of DFU self-care knowledge and practice is required.

Determining the range of self-care habits of individuals with DFUs and knowledge is the aim of This evaluation. Health systems will use the review's findings as a useful guide when developing educational initiatives to raise DFU patients' self-care practices and knowledge levels (Pourkazemi A et al., 2020). By implementing the review's suggestions to raise patient awareness, such educational initiatives may help prevent and lessen the severity of DFUs.

For this reason, researcher feel the need to evaluate diabetic foot management techniques and information regarding the relationship between patients' HbA1c levels in Al-Diwaniya Province, Iraq.

METHODOLOGY

Current study used a cross-sectional descriptive–correlational design with an application of stratified proportional sampling technique, study group approach to evaluate the nurses' knowledge and management practices regarding diabetic foot at a single point in time, and to examine the correlation between these variables and patients' HbA1c levels for adult patients who are diagnosed with diabetic foot for 100 patients in hospitals of Al-Diwaniyah. in Al- Diwaniyah, Al- Hamza, and Al- Shamiya public hospitals in Iraq. A structured questionnaire assessed knowledge and Management/Practice Checklist measured and Patients' HbA1c values (from records within 3 months) were documented from medical record or laboratory tests.

Study instrument: involves of the following: **Demographics questionnaire:** knowledge (20items) of the respondent are all included in this partition. **Management/Practice Checklist** (16 items). **Observation checklist: Validated tool to assess actual management practices. HbA1c values:** Extracted from patient records (last 3 months).

RESULTS

Table 1 Nurses' Sociodemographic Features

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	59	59.0
Gender	Female	41	41.0
Educational Level	Diploma	43	43.0
Educational Level	B.ScN	54	54.0
Educational Level	Higher Diploma	2	2.0
Educational Level	M.ScN	1	1.0

In table 1 Male nurses made up 59% of the workforce. 54% of the study participants had a Bachelor of Science in Nursing, suggesting that their educational backgrounds were generally sufficient.

Table2 Nurses' Knowledge Regarding Diabetic Foot Care

Knowledge Level	Score Range	Frequency (n)	Percentage (%)
Good knowledge	≥75% (≥15/20)	53	53.0
Fair knowledge	60–74% (12–14/20)	12	12.0
Poor knowledge	<60% (<12/20)	35	35.0

In table2 Over half of the nurses (53%) showed high knowledge about diabetic foot care, whereas 35% showed inadequate knowledge, suggesting that ongoing education programs are necessary.

Table 3 Nurses' Management Practices of Diabetic Foot

Practice Level	Score Range	Frequency (n)	Percentage (%)
Good practice	≥75% (12–16)	55	55.0
Fair practice	60–74% (10–11)	6	6.0
Poor practice	<60% (0–9)	39	39.0

In table3 Despite the fact that over half of the nurses (55%) showed strong management practices, a sizable percentage (39%) showed poor practice, indicating gaps in clinical application and knowledge.

Table 4 Patients' HbA1c Levels

HbA1c Level	Frequency (n)	Percentage (%)
Good control	4	4.0
Moderate control	57	57.0
Poor control	39	39.0

In table 4 The majority of patients (57%) had intermediate glycemic control, but 39% had poor control, indicating that hospitalized patients have a significant prevalence of uncontrolled diabetes.

Table 5 Correlation Between Nurses' Knowledge and HbA1c Levels

Variables	Correlation Coefficient (r)	p-value
Nurses' knowledge × HbA1c	−0.688	< 0.001*

In table 5 The results showed a considerable negative correlation ($r = -0.688$, $p < 0.001$) between nurses' knowledge and HbA1c levels. This implies that more nursing experience is closely associated with better diabetes control and lower HbA1c levels.

Table 6 Correlation Between Nurses' Management Practices and HbA1c Levels

Variables	Correlation Coefficient (r)	p-value
Nurses' Practice × HbA1c	−0.709	< 0.001*

In table6 Improved nursing practices are linked to better glycemic control, according to the analysis, which showed a strong statistically significant inverse relationship between nurses' management practices and HbA1c levels ($r = -0.709$, $p < 0.001$).

Table 7 Descriptive Statistics of Main Study Variables

Variable	Possible Score Range	Mean	SD
Nurses' Knowledge	0–20	13.85	4.36
Nurses' Management Practices	0–16	10.92	3.61
HbA1c Levels (%)	-	8.77	1.18

In table7 The average score for nurses' understanding of diabetic foot care was 13.85 ± 4.36 out of 20. Nurses' management techniques received an average score of 10.92 ± 3.61 out of 16. The patients' mean HbA1c level was 8.77 ± 1.18, indicating inadequate glycemic management.

DISCUSSION

Sociodemographic Characteristics of Nurses

One hundred nurses employed by Al-Diwaniyah hospitals participated in this study. The majority of participants had a Bachelor of Science in Nursing (B.ScN), and the majority were men. The clinical competence and care quality of nurses are significantly influenced by their educational background. This outcome is consistent with studies conducted in Iraq and neighboring countries, which discovered that nurses with higher levels of education perform better and are better informed about diabetic foot care (Al-Hussaini et al., 2021; Mohammed & Hassan, 2020). Conversely, lower educational levels have been associated with less adherence to evidence-based diabetic foot treatment guidelines (Saleh et al., 2019).

Nurses' Knowledge Regarding Diabetic Foot Care

The study's results showed that the mean nurses' knowledge score was 13.85 ± 4.36 out of 20, indicating a moderate to good level of understanding. Although more than half of the nurses demonstrated good knowledge, a significant portion still lacked it.

These findings align with studies conducted in Saudi Arabia and Egypt, which discovered that nurses' knowledge of diabetic foot care was mediocre due to a lack of training opportunities and continuous professional growth (Abd El-Hay et al., 2018; Alshammari et al., 2020). Similarly, a study in Ethiopia found that nurses providing care for patients with diabetes lacked adequate knowledge, highlighting the need for structured training programs (Bekele et al., 2021).

The availability of specialist diabetic foot clinics and organized training programs may be the reason for the better knowledge scores found in research conducted in industrialized nations (Schaper et al., 2020).

Nurses' Management Practices of Diabetic Foot

A modest level of practice was indicated by the mean score of 10.92 ± 3.61 out of 16 for nurses' management strategies in the current study. Despite having the necessary levels of knowledge, a sizable portion of nurses had poor practices. This result corroborates earlier research that found a mismatch between diabetic foot care knowledge and practice (Hasnain & Sheikh, 2019; Al-Khaledi et al., 2021).

Numerous issues, such as a heavy workload, a staffing shortage, a lack of equipment, and ambiguous clinical guidelines, have been identified to impede effective nursing practice. Studies conducted in healthcare settings with multidisciplinary diabetic foot teams indicated significantly higher practice scores, demonstrating the significance of planned processes and organizational assistance (Bus et al., 2020).

Patients' Glycemic Control (HbA1c Levels)

The mean HbA1c level of 8.77 ± 1.18 indicates that the patients in this study had poor glycemic control. This result is in line with regional research (Ahmed et al., 2019; Al-Rubeaan et al., 2017) that revealed hospitalized diabetes patients had mean HbA1c values over the recommended threshold. Poor glycemic control is a recognized risk factor for diabetic foot issues, including neuropathy, ulceration, infection, and lower limb amputation (International Diabetes Federation [IDF], 2023). The higher HbA1c levels seen in this study may be the result of insufficient diabetes treatment strategies and patient education.

Relationship Between Nurses' Knowledge and HbA1c Levels

A strong and statistically significant inverse association between patients' HbA1c levels and nurses' proficiency was discovered in the current investigation. This implies that more skilled nurses are associated with better glycemic control. According to studies (Funnel et al., 2018; Shrivastava et al., 2019), patients receiving care from qualified nurses who actively provide teaching and monitoring had improved glycemic outcomes. Knowledgeable nurses are crucial for promoting self-care behaviors, medication adherence, and the early detection of diabetic foot problems.

Relationship Between Nurses' Management Practices and HbA1c Levels

Furthermore, a significant negative correlation was found between nurses' management strategies and HbA1c levels, suggesting that effective nursing practices are crucial for improved glycemic control. Improved nursing techniques dramatically lowered HbA1c levels and diabetic foot issues in interventional investigations (Alotaibi et al., 2020; Lavery et al., 2019). This demonstrates how the actual use of knowledge directly affects patient outcomes.

Overall Analysis and Contrast with Earlier Research

Overall, the study's results are in line with local and global research showing that nurses' expertise and management techniques are important factors influencing diabetic outcomes. However, the results show comparatively lower performance levels when compared to research carried out in

industrialized healthcare systems, underscoring the necessity of ongoing education, consistent procedures, and institutional support.

CONCLUSION

The findings demonstrated that although more than half of the nurses have high managerial and knowledge skills, a considerable portion still lacked both. The study found that most patients had moderate to poor glycemic control, indicating a high risk of diabetic foot problems. Notably, there was a strong and statistically significant inverse correlation between nurses' knowledge and patients' HbA1c levels, as well as between nurses' management strategies and HbA1c levels.

This indicates that improved clinical performance and nurse knowledge are critical to preventing diabetic foot issues and improving glucose control. Overall, the findings highlight the critical role nurses play in controlling and preventing diabetic foot, as well as the need for continuing education, skill development, and evidence-based practice to enhance patient outcomes.

FINANCIAL DISCLOSURE

There was no disclosure of financial data.

CONFLICT OF INTEREST

No announcement at all.

ETHICAL CLEARANCE

All trials were approved by the Al-Diwaniyah Health Directorate in Iraq and followed the agreed-upon protocols.

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