



## Knowledge, attitude, and practice regarding risk of diabetic foot among diabetic patients in Arar city, Saudi Arabia

Diabetic foot risk awareness

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### Abstract

**Aim:** To evaluate the knowledge, attitudes, and practices (KAP) related to diabetic foot risk in people with diabetes in Arar, Saudi Arabia.

**Methods:** A cross-sectional design was conducted among 384 diabetic patients. Knowledge, practices, and attitudes regarding diabetic foot care were the three primary areas addressed in the questionnaire. The demographic traits and KAP scores were compiled using descriptive statistics. To examine correlations between demographic factors and KAP scores, Chi-square tests were used. Statistical significance was set at  $p < 0.05$ .

**Results:** Among 384 participants, 84.89% were aware of the role of antidiabetic medications. However, only 59.89% were aware of proper moisturizing practices. High rates of negative practices, such as barefoot walking (65.11%), were observed. Attitudes were generally positive, with 78.12% supporting on daily foot inspections. However, 65.11% believed they could self-manage diabetes without medical consultation. A significant relationship was found among knowledge, attitude, and practice (KAP) scores, as well as level of education ( $p < 0.001$ ), duration of diabetes ( $p < 0.01$ ), and previous foot problems ( $p < 0.05$ ).

**Conclusion:** Educational interventions are necessary to enhance diabetic foot care KAP among patients with a longer duration of diabetes and lower educational attainment.

### Keywords

diabetic foot, knowledge, attitudes, practices

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## Introduction

Diabetic foot problems pose a significant global health burden and are a major concern for people with diabetes.<sup>1,2</sup> Diabetic foot ulcers (DFUs) and other associated complications are increasingly prevalent due to the rising incidence of diabetes.<sup>3</sup> Various factors, including peripheral vascular disease, neuropathy, prolonged hyperglycemia, and decreased immunological response, cause foot-related problems with delayed wound healing and increased risk of infection.<sup>4</sup> If left untreated, they can lead to severe consequences, including lower limb amputations, disabilities, and a reduced quality of life for those affected.<sup>5,6</sup>

Diabetes patients' knowledge, attitude, and practice (KAP) on diabetic foot care are crucial for preventing and treating foot problems.<sup>7</sup> Previous studies have shown that a lack of awareness about foot care, combined with misconceptions about diabetes and its complications, often leads to inadequate practices, increasing the risk of foot-related problems.<sup>8,9</sup> Patient attitudes and practices, such as routine foot examinations, suitable footwear, and prompt medical consultation, are crucial to lower the prevalence of diabetic foot ulcers and other associated problems.<sup>10,11</sup>

The existing KAP of diabetic patients about foot care must be understood to identify gaps that require targeted health interventions. Identifying these gaps will help healthcare providers to improve education for patients and strengthen preventative strategies, which will eventually help lower the prevalence of diabetic foot problems.

## Materials and Methods

This research was carried out in Arar, Saudi Arabia, between June 2023 and June 2024, using a cross-sectional design. Patients with diabetes who were above 18 years of age and had been diagnosed with the disease for at least one year were included after providing informed consent. Patients who refused to participate in the trial or had significant co-morbid disorders, such as cardiovascular diseases or neuropathy unrelated to diabetes, were excluded. The cross-sectional study formula was used to determine the sample size:  $N = Z^2 \times P \times (1 - P) / d^2$  where  $d$  is the 5% margin of error,  $P$  is the 50% predicted prevalence of KAP with a 5% margin of error, and  $Z$  is 1.96 (95%). Based on these parameters, the estimated sample size was 384 participants.

Knowledge, practices, and attitudes about diabetic foot care were evaluated using a pretested structured questionnaire that was validated by prior research and based on recommendations from the American College of Foot and Ankle Surgeons and Diabetes UK.<sup>12,13</sup> Demographic information such as gender, age, education, duration of diabetes, and the existence of any previous foot issues was obtained. The practice section covered daily foot checks, shoe inspections, and hygiene practices. The knowledge section included information on foot care practices, the frequency of inspections, and potential complications. The attitude section addressed self-care beliefs, consultations with foot specialists, and the importance of diabetic foot care. To ensure that their answers were consistent and clear, participants were interviewed by qualified researchers while they filled out the questionnaire.

## Ethical Approval

This study was approved by the Ethics Committee of Northern Border University (Date: 03.05.2023, Decision No. 42/44/H).

## Statistical Analysis

The collected information was analyzed using SPSS version 26 (IBM Corp., Armonk, NY, USA). Descriptive statistics summarized the demographic data of the participants and their KAP scores. The Chi-square test was used to assess the associations among demographic characteristics and KAP scores. Statistical significance was determined by  $p < 0.05$ .

## Reporting Guidelines

The study was reported in accordance with STROBE guidelines.

## Results

The majority of the 384 patients with diabetes (43.75%) were between the ages of 31 and 50, followed by those over 50 (32.29%) and those between 18 and 30 (23.96%). Of those that participated, 55.73% and 44.27% were males and females, respectively. The bulk of participants (49.58%) had only completed basic or secondary school, followed by those with higher education (34.38%) and those without any formal education (16.15%). 36.46% had diabetes for less than five years, 40.63% had it for five to ten years, and 22.92% had it for more than ten years. 75.00% of individuals had no previous foot issues, while 25% of participants reported having foot issues.

The knowledge assessment revealed that most participants were aware of important diabetic foot care practices, with 88.02% acknowledging that redness, blisters, or wounds should be treated by a doctor and 84.89% realizing the significance of taking antidiabetic medications regularly and avoiding smoking (Table 1). Although fewer people were aware of avoiding barefoot walking (67.96%) or checking footwear (61.97%), awareness of daily foot washing (79.94%) and thorough drying (76.04%) was high. Significantly, just 64.84% of respondents knew the right water temperature for foot washing, and only 59.89% knew the suitable moisturizing techniques, suggesting that knowledge must be improved in these areas.

According to the practice's evaluation, only 70.05% of participants dried between their toes, even though 84.89% of them cleaned their feet and 78.12% made sure they were dry afterwards (Table 2). 61.97% of people examined their feet, and 67.96% cut their toenails properly. About half of the participants examined their shoes after taking them off, and just 58.07% did so before putting them on. Negative practices were common, with 65.11% of respondents walking barefoot indoors, 71.88% walking barefoot outdoors, and 65.11% applying moisturizing lotion between their toes. Furthermore, only 47.91% of people applied moisturizing lotion to their feet, indicating a significant lack of knowledge in the effective foot care practices.

Most participants had positive thoughts on diabetic foot care, according to the attitude evaluation. 84.89% agreed that visiting a doctor is essential for foot infections or wounds, and 78.12% supported checking foot wounds daily. Furthermore, 71.87% of respondents agreed with physicians' recommendations to use special shoes. However, given that 65.11% of respondents

**Table 1.** Diabetic patients' awareness of diabetic foot care

Question	Correct Response (n; %)	Incorrect Response (n; %)
Antidiabetic drugs should be used on a regular basis.	326 (84.89)	58 (15.11)
Patients with diabetes cannot notice small injuries	315 (82.03)	69 (17.97)
Infection and injury may take a long time to heal.	300 (78.12)	84 (21.88)
Patients with diabetes may develop foot ulcers	288 (75.00)	96 (25.00)
Patients should consult a doctor for redness, blisters, cuts, or wounds.	338 (88.02)	46 (11.98)
Foot cleaning should be followed by thorough drying.	292 (76.04)	92 (23.96)
Both inside and outdoors, diabetic patients must not go barefoot.	261 (67.96)	123 (32.04)
Change your socks each day.	276 (71.87)	108 (28.13)
Trimming toenails straight across is recommended.	269 (70.05)	115 (29.95)
Individuals who smoke should abstain as it impairs circulation, which affects the foot.	326 (84.89)	58 (15.11)
What is the ideal water temperature for washing your feet?	249 (64.84)	135 (35.16)
Every day, diabetic patients should moisturize their feet, excluding their toes.	230 (59.89)	154 (40.11)
Do you need frequent checking of feet?	261 (67.96)	123 (32.04)

**Table 2.** Practices of diabetic foot care among diabetic patients

Question	Positive Practice (n; %)	Negative Practice (n; %)
Do you look at your toes when you walk?	238 (61.97)	146 (38.03)
Do you check your shoes before you put them on?	223 (58.07)	161 (41.92)
Do you check your shoes when you take them off?	192 (50.00)	192 (50.00)
Do you go barefoot throughout your residence?	134 (34.89)	250 (65.11)
Do you walk outside the house barefoot?	108 (28.12)	276 (71.88)
Do you wash your feet?	326 (84.89)	58 (15.11)
After cleaning your feet, do you make sure they are dry?	300 (78.12)	84 (21.88)
Do you dry between your toes?	269 (70.05)	115 (29.96)
Do you apply hydrating lotion on your feet?	184 (47.91)	200 (52.09)
Do you use a hydrating lotion beneath your toes?	134 (34.89)	250 (65.11)
Do you trim toenails?	261 (67.96)	123 (32.04)
Every day, diabetic patients should moisturize their feet, excluding their toes.	230 (59.89)	154 (40.11)
Do you need frequent checking of feet?	261 (67.96)	123 (32.04)

**Table 3.** Chi-Square test results assessing associations between demographic variables and KAP scores

Demographic Variable	KAP Domains	Chi-Square Test Value	p-value	Association
Age Group	Knowledge	$\chi^2=12.34$	$p<0.05$	Significant
	Practices	$\chi^2=14.57$	$p<0.01$	Significant
	Attitudes	$\chi^2=18.45$	$p<0.001$	Significant
Gender	Knowledge	$\chi^2=5.78$	$p<0.05$	Significant
	Practices	$\chi^2=7.84$	$p<0.01$	Significant
	Attitudes	$\chi^2=3.27$	$p=0.071$	Not Significant
Educational Level	Knowledge	$\chi^2=21.45$	$p<0.001$	Significant
	Practices	$\chi^2=19.34$	$p<0.001$	Significant
	Attitudes	$\chi^2=15.78$	$p<0.001$	Significant
Duration of Diabetes	Knowledge	$\chi^2=8.34$	$p<0.05$	Significant
	Practices	$\chi^2=6.78$	$p<0.01$	Significant
	Attitudes	$\chi^2=9.45$	$p<0.01$	Significant
Prior Foot Complications	Knowledge	$\chi^2=10.23$	$p<0.05$	Significant
	Practices	$\chi^2=15.56$	$p<0.001$	Significant
	Attitudes	$\chi^2=11.89$	$p<0.05$	Significant

believed they could manage their diabetes without visiting a doctor and 60.16% did not prioritize routine diabetic clinic visits, there is still an opportunity for attitude improvement.

Chi-square test results showed that all KAP categories (knowledge, practices, and attitudes) were significantly correlated with age, educational attainment, duration of diabetes, and previous foot problems ( $p$ -values ranged from  $<0.05$  to  $<0.001$ ; Table 3). Knowledge ( $p<0.05$ ) and practices ( $p<0.01$ ) were substantially correlated with gender, while attitudes ( $p=0.071$ ) were not. The greatest correlation across KAP categories was seen at the educational level ( $p<0.001$ ), highlighting the vital role that education plays in enhancing diabetic foot care.

## Discussion

This study evaluates key KAP components related to diabetic foot care among individuals with diabetes. In terms of knowledge, most participants (88.02%) recognized the importance of seeking medical care for foot injuries, and 84.89% understood the role of antidiabetic medications in preventing complications. There was a strong understanding of thorough drying (76.04%) and regular foot washing (79.94%). However, knowledge gaps regarding the appropriate water temperature for foot washing (64.84%) and the application of moisturizing cream, particularly the importance of not applying it between the toes (59.89%) were noted. Similar results were observed in previous studies, where participants demonstrated strong knowledge of diabetic foot care; however, gaps remained in areas such as footwear inspection.<sup>14</sup> In a similar vein, prior research found that although over 80% of patients recognized the need to maintain good foot cleanliness, only 25% were aware of the proper footwear.<sup>15</sup>

Participants' adherence to diabetic foot care regimens varied. Only 70.05% dried between their toes, and 58.07% examined their shoes before wearing them. In contrast, 84.89% of respondents reported washing their feet, and 78.12% dried them afterward. Negative practices were surprisingly common, with 71.88% of people going barefoot outdoors and 65.11% of people walking barefoot indoors. These findings are consistent with prior research in which more than 60% of participants chose to go barefoot despite knowing the hazards.<sup>16</sup> A similar pattern was also seen in another research, in which 49% of diabetes patients routinely examined their footwear and just about half did daily foot examinations.<sup>17</sup> These results highlight the gap between knowledge and actual adherence to proper foot care practices. Overall, attitudes were favorable, with 78.12% agreeing that daily foot wound examinations are essential and 84.89% acknowledging the need of seeing a doctor for foot infections. However, 65.11% of participants reported they could manage their diabetes independently without seeking professional help. This aligns with recent research that indicated that 40% of participants relied on home remedies for treatment, despite 75% of participants believing that medical visits are important for diabetic foot issues.<sup>18</sup> These results show that, despite improvements in attitudes about diabetic foot care, important misunderstandings still exist on a worldwide scale.

Our study's substantial correlations between KAP domains and demographic factors, including educational attainment ( $p<0.001$ ) and the length of diabetes ( $p<0.01$ ), are consistent with previous

research results. As related research shows, educational initiatives aimed at these populations may significantly increase adherence to appropriate diabetic foot care.<sup>19</sup>

## Limitations

This study relies on self-reported data that may lead to biases related to social desirability and memory recall. The research was conducted in only one city; the findings may not be representative in other regions. Future studies should consider these factors to improve generalizability and expand their geographic scope.

## Conclusion

The research concludes that while diabetic patients show some awareness of diabetic foot care, there are still gaps in their practices, attitudes, and knowledge. Critical deficiencies were found, especially in areas like checking footwear, moisturizing, and avoiding barefoot walking. Most patients recognized the need of seeing a doctor for foot-related disorders and followed basic foot care. The need for educational interventions to improve foot care practices is highlighted by the strong correlations found between KAP scores and demographic characteristics such as educational level. Specifically designed educational interventions are needed to improve diabetic foot care KAP, particularly for patients with longer periods of diabetes and lower educational attainment. Addressing these gaps could improve patient outcomes and reduce the incidence of diabetic foot complications.

## Ethics Declarations

The study was conducted in accordance with the ethical standards of the institutional and national research committee and with the Declaration of Helsinki and its later amendments.

## Animal and Human Rights Statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

## Informed Consent

Written informed consent was obtained from all participants prior to inclusion in the study.

## Data Availability

The datasets used and/or analyzed during the current study are not publicly available due to patient privacy reasons but are available from the corresponding author on reasonable request.

## Conflict of Interest

The authors declare that there is no conflict of interest.

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## Author Contributions (CRediT Taxonomy)

Conceptualization: Y.M.  
 Methodology: Y.M., P.S.  
 Formal Analysis: M.G.A.  
 Investigation: S.M.F.A.  
 Data Curation: P.S.  
 Writing – Original Draft Preparation: Y.M.  
 Writing – Review & Editing: Y.M., P.S.  
 Supervision: M.G.A.

## Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content, including study design, data collection, analysis and interpretation, writing, and some of the main line, or all of the preparation and scientific review of the contents, and approval of the final version of the article.

**Abbreviations**

DFU: Diabetic Foot Ulcer

KAP: Knowledge, Attitude, Practice

SPSS: Statistical Package for the Social Sciences

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