

## Self-Care Knowledge, Attitude, and Practice among Diabetic Foot Patients: A Cross-Sectional Research

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### Abstract

**Background:** Foot self-care is a critical aspect of maintaining and upgrading foot health. Notably, foot problems are markedly more common in diabetic patients than in nondiabetic people and are anticipated to grow worldwide by 2030. However, appropriate foot care can help preserve foot health and prevent foot problems. **Aim of the study:** This study aimed to identify the level of self-care knowledge, attitude, and practice among diabetic foot patients in Ismailia city. **Subjects and Methods: Research design:** A cross-sectional descriptive study. This study was conducted at medical-surgical wards at Ismailia General Hospital in Ismailia city from February to May 2022. **Subjects:** A convenience sample of eighty-four patients was recruited for the study. **Tools of data collection:** Utilized a semi-structured interview questionnaire to assess the level of self-care (Knowledge, attitude, and practice) among diabetic foot patients. **Results:** According to the results of the present study, most of the studied patients (56%) were male. More than one-third of the studied patients had a moderate level of knowledge. Less than half had a good attitude. Moreover, less than two-quarters of the studied patients had a moderate level of practice in diabetic foot self-care. There was significant correlation between the studied patients' levels of knowledge, attitude, and practice, with  $p$  values  $\leq 0.05$ . **Conclusion:** Our study showed that most of the participants had moderate knowledge, good attitude, and moderate practice levels toward diabetic foot self-care. However, there are no available guidelines or/and training sessions regarding diabetic foot self-care. **Recommendations:** There is a pressing need to establish and motivate coordinated foot care services to provide continuous foot care education to patients to increase their level of self-care practice and attitude. Constant endorsement of brochures and electronic videos regarding diabetic foot self-care. Multidisciplinary research studies should focus on large probability samples for further assessment of patients and generalization of the study.

**Keywords:** Attitude, diabetic foot, knowledge, practice, self-care.

### Introduction

Diabetic foot (DF) is one of the most prevalent complications of diabetes mellitus (DM) and is associated with high mortality, morbidity rate, and financial consequences.<sup>[1]</sup> According to the

According to health organization (WHO) data, that diabetes is one of the common prevalent chronic diseases worldwide and has a higher prevalence in the Middle East and in low- and middle-income countries. Approximately 1.5 million deaths are directly attributed to diabetes each year.<sup>[2]</sup> Diabetes mellitus

(DM) describes a chronic developing metabolic disorder characterized by hyperglycemia caused by either a defect or challenge with the hormone insulin. It is an international public health problem.<sup>[3]</sup>

Diabetic foot (DF) disease, which is one of the most common complications of diabetes mellitus, is associated with considerable financial concerns about diabetic patients, their families, the community, and the government.<sup>[4]</sup> The predisposing risk factors for prevalent diabetic foot disease include advanced age, length of diabetes, cardiovascular disease, care, culture, and beliefs. However, neuropathy leading to sensory deficiency and peripheral vascular disease producing ischemia are the main risk factors for foot ulcer development and eventually foot amputation.<sup>[5-6]</sup>

Prevention and prophylactic foot care practice are promoted to reduce the prevalence of morbidity, expensive resource use and amputation possibilities.<sup>[7]</sup> These interventions focus on risk factor identification, intensive training, education and care, and patient follow-up. This approach has been shown to be both cost-effective and cost saving.<sup>[8-9]</sup> An effective way to reduce the incidence of diabetic foot ulcers and amputations is through proper knowledge and attitude; by practicing daily routine foot self-care; and by maintaining good adherence to therapeutic regimens

such as glycemic control, diet, exercise, rest, sleep, and follow-up.<sup>[10]</sup>

Currently, many scientific societies and organizations provide guidelines on proper training, education, and practice in foot care.<sup>[11]</sup> Therefore, according to the American Diabetic Association and World Health Organization, all diabetic foot patients should be trained and educated about self-foot care to increase their knowledge, prompt good attitude, and maintain adequate practice.<sup>[12]</sup> Other previous studies have shown that diabetic patients exhibit discrepancies between knowledge and practice; for example, they have good knowledge of diabetes in contrast with poor practice and lack of education about the disease.<sup>[13]</sup>

Self-care is crucial for diabetes regulators.<sup>[14]</sup> Self-care routines are essential not only for people who already have diabetic foot but also for those who are at risk of contracting this disease in the prediabetic foot population. It can be defined as efforts taken by those who have diabetic feet or are at risk of getting the condition to effectively manage it on their own.<sup>[15]</sup>

People with diabetes must adhere to a number of self-care regimens recommended by the World Health Organization (WHO).<sup>[12]</sup> Patients with diabetes should prioritize nutrition, exercise, foot care, blood sugar testing, and adherence to their treatment plan. Adherence to treatment diminishes the patient's risk of developing diabetes complications and

death by necessitating considerable motivation and consistent effort. [4-16]

### **Significance of the study:**

Diabetic foot disease is the most common cause of hospital admission among diabetic patients and accounts for up to 25% of all hospital admissions for diabetes. DF affects nearly 50% of patients and accounts for almost 80% of all lower limb nontraumatic amputations. [2-13] In 2019, approximately 463 million adults were diagnosed, which is predicted to increase to 578 million people in 2030 and up to 700 million by 2045. [15] In Egypt, the diabetes incidence is estimated to be 20.9% of the population aged >20 to >79 years in 2021 and to increase by 2030. [2-6]

The cost of diabetic foot care reached \$13 billion in the United States in addition to the cost of management of DM itself, which clearly illustrates how much financial impact is placed on diabetic foot management. [1-2] Investigation and exploration of diabetic foot patients and levels of self-care knowledge, attitude, and practice play essential roles in fostering a sense of preparedness and safety for patients, their families, hospitals, and healthcare workers. Furthermore, in line with the national Egyptian vision, the 2030 goal three was to identify health disparities and promote the delivery of care. [3-6]

### **Aim of the study:**

This study aimed to evaluate the level of self-care knowledge, attitude, and practice among diabetic foot patients in Ismailia city. To accomplish this overall

goal, the following goals were pursued to:

1. Identify the level of self-care knowledge among diabetic foot patients.
2. Determine the level of self-care attitude among diabetic foot patients.
3. Assess the level of self-care practice among diabetic foot patients.
4. Identify the correlation between the level of self-care knowledge, attitude, and practice among diabetic foot patients.

### **Research questions:**

- What is the level of self-care knowledge among diabetic foot patients?
- What is the level of self-care attitude among diabetic foot patients?
- What is the level of self-care practice among diabetic foot patients?
- What are the correlations between the level of self-care knowledge, attitude, and practice among diabetic foot patients?

## **Subjects and Method**

### **Design of the study**

A cross-sectional descriptive study (It is a powerful tool used to gather information about a particular group or phenomenon at a single point in time without influencing them) was utilized to fulfill the study's objectives.

### **Setting:**

The study was conducted at medical-surgical wards at Ismailia General Hospital in Ismailia city from February to May 2022.

**Sampling:**

The nonprobability convenient sample of diabetic foot patients in the present study included eighty-four patients from the previously mentioned setting. The sample size and power were estimated with 90% power, a 10% dropout rate, and a 95% confidence interval using an epidemiological information system.<sup>[17-18]</sup>

**Data collection tool**

The data were collected by using a pretested semi-structured face-to-face questionnaire. The questionnaire was adapted from a validated and reliable instrument.<sup>[3-11-13]</sup> Similarly, to ensure cultural acceptance, the questionnaire was translated into Arabic language. The survey consisted of four sections, as follows.

Section (1) The demographic traits (which included seven items designed to capture the characteristics of the participating patients) included closed-ended inquiries concerning age, sex, marital status, educational level, occupation, and prior attendance of training programs for diabetic foot self-care and the availability of guidelines or/and policies in the unit.

Section (2) The level of diabetic foot self-care knowledge (participant 12 questions about diabetes definition, causes, manifestations, and management). Furthermore, Section (3) the researchers assessed the participants' level of diabetic foot self-care attitude (6 items related to patient behavior toward the diabetic foot) and

Section (4) level of self-care practice (13 questions related to diabetic foot self-care).

**Scoring system:** Each answer concerning knowledge, attitude, and practice was assigned a score of zero to one. A grade of known knowledge was given one grade, and no knowledge was given zero grade. Furthermore, regarding attitude, agree was given one grade, disagree was given zero grade, do practice was given one grade, and not-done practice was given zero grade.

The score range was calculated from a total KAP score of 0:31, knowledge score of 12, attitude score of 6, and practice score of 13. Moreover, based on related previous studies and demographic characteristics of the studied patients, satisfactory levels of diabetic foot self-care (KAP) knowledge, attitude and practice were considered poor≤50%, moderate 51-65% and good>65%, respectively. The results were also consistent for self-care practice level.<sup>[3-4]</sup>

**Content validity and reliability:**

Five academic nurses with expertise in medical surgical nursing from the faculty of nursing and internal medicine from Suez Canal University's teaching hospital evaluated the current study to determine its content validity. These specialists carefully examined the study's content to ensure that it was acceptable and clear, and they offered insightful suggestions for improvement. The study materials were then updated to include the recommended changes. Furthermore, Cronbach's alpha values

were calculated, and the value for the adapted tool was 0.88, which indicates high internal consistency.

### **Administrative and Ethical considerations:**

Informed consent was obtained from all patients, and privacy and confidentiality were protected. The hospital administration provided a letter of authorization for the distribution of the questionnaire. The vice dean of faculty for student affairs and education authorized the plan to be implemented during clinical rotations.

**Fieldwork:** The following study was conducted by the researchers:

### **Pilot study:**

Eight patients from the previously described context participated in a pilot trial that was carried out before the main study was underway. As a result, these participants were not included in the primary study sample, and the required modifications were made. It was helping the researchers to estimate how long it would take participants to finish the forms and offer insightful information about the questionnaire administration procedure.

The extensive data collection procedure took place between February and May 2022, for a total of almost four months. This prolonged duration allowed the researchers to efficiently gather information from the subjects and guarantee the precision and dependability of the results. The researcher was always available to answer any questions or concerns. The

researcher assessed the participants individually utilizing a printed Arabic copy of the sei-structured face-to-face questionnaire within 5-7 minutes. A total of eighty-four data collection sessions were included, with an average of seven hours. After gathering the data, the researcher double-checked the data, provided brief comments on the questionnaire responses, and greeted the nurses and healthcare professionals who participated in the study.

### **Statistical design:**

The statistical software SPSS was used to tabulate, statistically analyze, and examine the data (version 24). The obtained data were found to be parametric after the Kolmogorov–Smirnov test was performed to ascertain whether the data were normal. The author examined the frequency and distribution of the gathered data to characterize the patients' features. One-way analysis of variance (ANOVA) was used to plot means and measure variable differences. A P value of less than .05 was considered to indicate statistical significance, and the means were compared with a 95% confidence interval (CI).

### **Results:**

**Table 1.** It clarifies that the studied patients' the mean (SD) age of the studied patients was 54.2 (4.1). Approximately half (61%) of the patients were male. Furthermore, more than two-thirds (78%) of the participants were married. Moreover, more than half (55%) of the respondents had a rural place of residence.

**Figure 1.** This figure clarifies all (94%) of the studied patients did not attend related training courses, and more than two-thirds had no access to related guidelines or/and policies. Otherwise, more than half (68%) (58%) were able to read and write, and they had consecutive occupations.

**Table 2.** This table shows the distribution of the studied patients' level of self-care knowledge toward diabetic foot self-care. Approximately three-quarters (72.6%) of the studied patients knew that diabetic patients are likely to develop foot ulcers. About half (52.4%) of them knew that poor circulation in the feet may result from smoking. Moreover, more than three-quarters (75.6%) knew that it is important to examine the inside of footwear for any object or tear.

**Figure 2.** This figure shows the distribution of the studied patients' levels of self-care attitude toward diabetic foot self-care. Three-quarters (75%) of the studied patients agreed that they could live a normal life with appropriate measures for diabetes treatment. Approximately half (42.9%) of them agreed that they could use special footwear advised by foot care specialists. Similarly, more than two-thirds (78.6%) agreed that they could perform regular exercise and change their food habits to prevent further diabetic complications.

**Table 3.** This figure shows the distribution of the studied patients' level of self-care practice toward diabetic foot self-care. Approximately half (52.4%) of the studied patients provided answers by

examining their feet daily. In the same direction, less than one-quarter (14.3%) of the participants completed the survey while walking barefoot. In addition, less than half (46.4%) of the participants answered with the application of moisturizer daily on their feet, and more than two-quarters answered regularly with changing footwear, even without damage.

**Table 4.** This table illustrates the correlations, satisfaction levels and scores of knowledge, attitude, and practice among the studied patients toward diabetic foot self-care. Approximately half (42.9%) of the studied patients had a moderate level of knowledge, more than half (53.6%) had a good attitude, and two more than one-third (34.5) of them had a moderate level of practice regarding diabetic foot self-care.

However, the Mean $\pm$ SD values were 7.1 $\pm$ 1.3, 4.3 $\pm$ 0.3 and 7.9 $\pm$ 0.7 for diabetic foot self-care knowledge, attitude, and practice, respectively. Conversely, based on the Pearson correlation coefficient test results in the present study, there was a statistically significant correlation between the studied patients' level of diabetic foot self-care knowledge, attitude, and practice, with a p value  $\leq$ 0.05.

## Discussion

Diabetes-related foot illness is a major source of morbidity and mortality in diabetic people. Interventions to lessen the burden of diabetic foot disease are extremely cost effective.<sup>[19]</sup> An estimated more than ten parentage of diabetic patients

experience foot ulcers. Diabetic foot problems can be alleviated with good education and practice. Diabetes is a chronic disease that is a serious health concern worldwide, with a prevalence of less than ten percentage. The Middle East and North Africa region had the highest age-adjusted diabetes incidence (18.1%).<sup>[10-20]</sup>

Diabetes mellitus closely related to type 2 diabetes mellitus (T2DM) is the most common type of diabetes and has a significant economic impact on patients, their families, health systems, and counties. Its short- and long-term consequences might cause premature death and a lower quality of life.<sup>[21]</sup> Patients with diabetes who do not practice or understand about self-care are more likely to develop complications, increasing morbidity and death.<sup>[1-2]</sup>

Diabetes and its complications generate a significant amount of morbidity and death, putting the health-care system at risk.<sup>[22]</sup> Consequently, the present study was conducted to determine the level of self-care knowledge, attitude, and practice among diabetic foot patients in Ismailia city.

The demographic characteristics of the patients included in the present study are shown in Table 1 and Figure 1. The mean (SD) age was 54.2 ±4.1 years. Moreover, more than half of the participants answered of the studied patients were male, and most of them were married and lived in rural areas. In the same vein, more than half of the participants had an occupation and were able to read and write.

Additionally, more than three-quarters had not attended related training programs or/or lacked related guidelines and/or policies toward diabetic foot self-care.

The present study was supported by the findings of Amer et al. in Egypt and Alkalash et al. in Saudi Arabia, who reported that most of the studied patients were of advanced age and male sex and had low training guidelines regarding diabetic foot self-care.<sup>[3-4]</sup> Contradictions with Mekonnen and Hussien, in Ethiopia, mentioned that most participants were adults and single.<sup>[16]</sup> The authors' view that mainly due to mostly of diabetic foot patient with low education level, poor follow up with regimens, prevalence of chronic disease, catching type two of diabetes, the study hospital offers free high-quality health care service to all Egyptian communities.

Concerning the studied patients' level of knowledge toward diabetic foot self-care. The results illustrate that the overall level of diabetes foot self-care knowledge was moderate in more than one-third of the studied patients, while less than one-quarter had a highly good level of satisfaction.

These findings are consistent with those of Marzouk et al. and ALotaibi, who reported that most of the studied patients had adequate knowledge regarding diabetic foot self-care.<sup>[23-24]</sup> This finding was incompatible with that of Suguna et al. and Niroomand et al., who demonstrated a low level of knowledge among the studied patients.

[25-26] The authors mentioned that a low education level among elderly people, the burden of disease, improper socioeconomic status, the burden of disease and/or low healthcare facilitation were predisposing factors for this issue.

The attitude of the studied patients toward diabetic foot self-care was also assessed. The findings of the present study showed that more than three-quarters of the participants had a good attitude toward diabetic foot self-care. This conclusion, which was approved by Alsareii and Mekonen and Demssie, was that most of the studied patients had a positive attitude toward diabetic foot self-care. [11-27]

These findings were like those of Akça Doğan et al. and Mekonnen and Hussien, who verified the inadequacy of the study for determining attitude toward diabetic foot self-care. [10-16] According to the investigator's view, the enhanced attitude of the participants in the study could be due to a moderate level of information about diabetic foot self-care, religion, culture, family belonging, national governmental vision 2030 toward this issue and competent nursing and medical counseling/or care in the study setting.

Furthermore, around the studied patients' level of practice in diabetic foot self-care was assessed. The current study concluded that less than two-quarters of the participants had a moderate level of practice regarding diabetic foot self-care. These findings

are consistent with those of other studies conducted by Asim et al. and Albaiuomy et al., who demonstrated that more than half of the studied patients had adequate self-care practice in the study setting. [28-29]

Moreover, these findings are not supported by Ewais et al. in Beni-suef University Hospital or Abd- Allah et al. in Zagazig City, Egypt; these authors found that the practice of foot self-care among the studied patients was inadequate. [12-30] Furthermore, in a study carried out in Canada, Al-Sayah et al. reported that self-care was limited mainly to foot self-care. [31] This is undoubtedly due to a deficiency of training in related practices, which is also an important role of nurses in the management of diabetes. This highlights the need for further foot care teaching and training to limit complications and improve patients' level of self-care.

The results were related to the correlations, satisfaction levels and scores of knowledge, attitude, and practice among the studied patients toward diabetic foot self-care. The present study clearly demonstrated that there were significant positive correlations ( $P < 0.05$ ) based on the Pearson correlation coefficient test between the total diabetic foot self-care knowledge, attitude and practice scores. The overall scores of the studied patients were  $7.1 \pm 1.3$ ,  $4.3 \pm 0.3$ , and  $7.9 \pm 2.7$  for knowledge, attitude, and practice, respectively.

These findings agreed with those of Ewais et al. in Beni-Suef University Hospital and Abd- Allah et al. in Zagazig city, Egypt. A study conducted in Egypt revealed that improved knowledge scores were significantly correlated with positive changes in foot self-care attitude and practice scores.<sup>[12-30]</sup> Moreover, this could be explained by the fact that the investigator, as diabetic foot patients who lived in rural areas, had low awareness of foot self-care knowledge, attitude and practice, as well as poor adherence to prescribed walk shoes to avoid wearing bare feet. This may cause foot damage and allow the progression of foot ulcers. The scope of the study's limitations clarified that there were no restrictions on the implementation of the study or data collection.

## Conclusion

This study revealed that more than half of the studied patients were male, and the mean (SD) age was 54.2 (4.1). The overall percentage of patients with a moderate knowledge level regarding diabetic foot self-care. Moreover, less than half had a good level of self-care for diabetic foot. About less than half of the studied patients had a moderate level of self-care practice. However, there was a statistically significant positive correlation between the studied patients' overall self-care scores (knowledge, attitude, and practice). The conclusions of the present study also support diabetic foot patients' readiness and sensitivity to self-care.

## Recommendations

- Specialized self-care training courses should be designed and implemented for patients to improve their diabetic foot practices.
- A valid learning booklet and/or pamphlet on self-care management must be developed and distributed to patients to increase their awareness and attitude toward diabetic foot self-care.
- Healthcare organizations should implement specific strategies to improve patients' knowledge, attitude, and practice related to diabetic foot self-care.
- Supporting patients' independence is an important aspect of self-care practice.
- Regular follow-up care for diabetic foot patients is provided by a specialized team to avoid further complications.
- Self-care practices can be adjusted by providing financial, educational, and social support.
- However, further large-sample research studies on diabetic foot self-care and prevention on a large sample are needed.

## Abbreviations

Diabetes mellitus (DM), diabetic foot (DF), diabetic foot self-care (KAP), World Health Organization (WHO).

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**Competing interests**

This study has no conflicts of interest.

**Funding Statement**

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**Availability of Data**

The corresponding author can provide the datasets used and/or analyzed in this study upon reasonable request.

**Author Contributions**

The process of organizing reference, manuscript design, journal submission, and contributions was structured by the authors through the industrialization of data assembling, methodological preparation, introduction preparation, interpretation, conceptual framework, and tool conceptualization.

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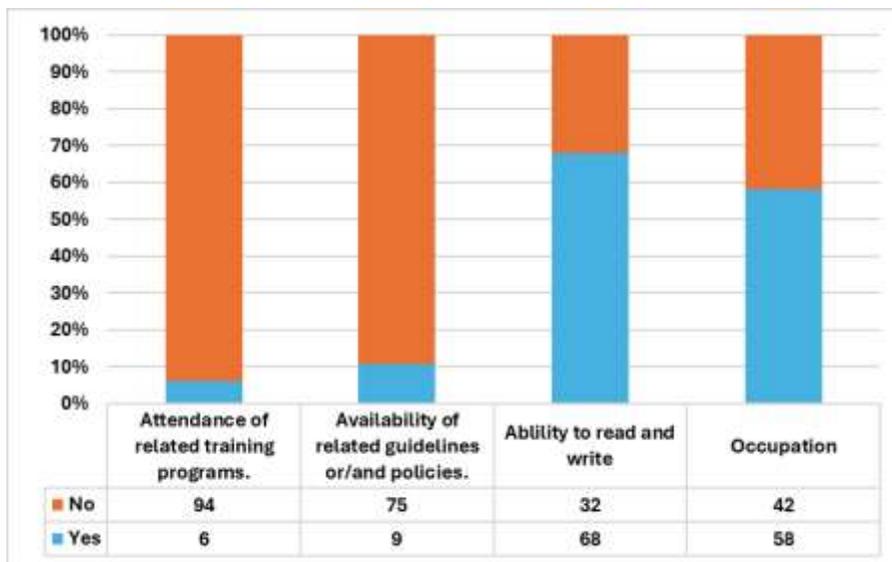
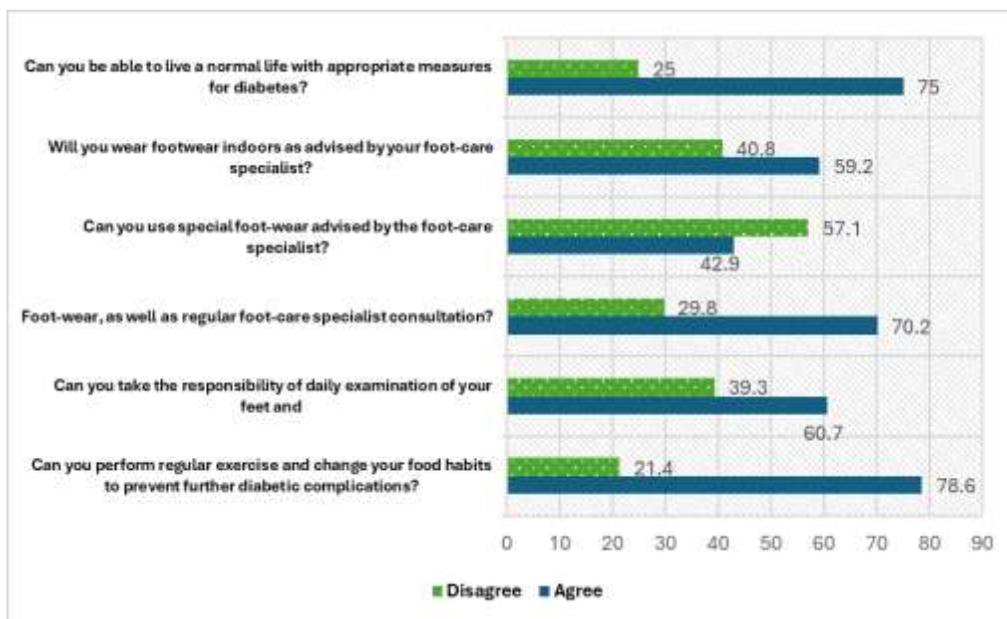


Figure 1: Distribution of the studied patients according to occupation, ability to read and write, availability of related guidelines, and attendance-related programs. (n=84)

Table 1: Distribution of the studied patients according to their demographic characteristics. (n=84)

Characteristics	No.	%
<b>Age years</b>		
Mean±(SD)	54.2 ±4.1	
<b>Gender</b>		
Male	51	61
Female	33	39
<b>Marital status</b>		
Single	5	6
Married	65	78
Divorced	9	11
Widowed	5	5
<b>Place of residence</b>		
Rural	46	55
Urban	38	45



**Figure 2: Percentage distribution of the studied patients' level of self-care attitude toward diabetic foot. (n=84)**

**Table 2: Percentage distribution of the studied patients' level of self-care knowledge toward diabetic foot self-care. (n=84)**

Questions about diabetic foot self-care knowledge.	Known No (%)	Unknown No (%)
▪ Diabetics are likely to develop foot ulcers	61(72.6)	23(27.4)
▪ Diabetics are likely to develop reduced blood flow in their feet	55(65.5)	29(34.5)
▪ Diabetics are likely to develop reduced sensation in their feet	54(64.3)	30(35.7)
▪ It is important to look at the soles because diabetics have reduced sensations	42(50.0)	42(50.0)
▪ It is important to inspect the feet, as wounds and infections may not heal quickly.	70(80.4)	14(19.6)
▪ Poor circulation in feet may result from smoking	44(52.4)	40(47.6)
▪ It is important to look after the feet because they are more prone to be flat foot	51(60.7)	33(39.3)
▪ Taking medication regularly will reduce DM complication	52(62.0)	32(38.0)
▪ It is important to examine the inside of footwear for any object or tear	66(78.6)	18(21.4)
▪ Foot gangrene is one of the diabetic foot complications	49(58.4)	35(41.6)
▪ Do you think doing exercise will help you prevent diabetic foot	44(52.4)	40(47.6)
▪ Uncontrolled diabetes can lead to foot deformity	72(85.7)	12(14.3)

**Table 3: Percentage distribution of the studied patients' level of self-care practice toward diabetic foot self-care. (n=84)**

Questions about diabetic foot self-care practice.	Done	Not done
	No(%)	No(%)
▪ Do you examine your feet daily?	44(52.4)	40(47.6)
▪ Do you use comfortable, closed, and soft footwear?	39(46.4)	45(53.6)
▪ Do you examine your shoes before wearing them?	62(73.8)	22(26.2)
▪ Do you walk barefoot, outside?	12(14.3)	72(85.7)
▪ Do you continuously wear cotton socks?	43(51.2)	41(48.8)
▪ Do you change your socks daily?	38(45.2)	46(54.8)
▪ Do you examine your feet for any marks resulting from shoes/socks?	48(57.1)	36(42.9)
▪ Do you daily wash your feet with warm water?	52(61.9)	32(37.1)
▪ Do you carefully dry the cleft between toes after washing?	54(64.3)	30(35.7)
▪ Do you apply moisturizer daily on your feet?	39(46.4)	45(53.6)
▪ Do you cut your toenails regularly?	29(34.5)	55(65.5)
▪ Do you regularly visit a physician for foot check-ups?	33(39.3)	51(60.7)
▪ Do you regularly change footwear, even without damage?	49(58.4)	35(41.6)

**Table 4: Correlation, satisfactory level and scores of knowledge, attitude, and practice among the studied patients toward diabetic foot self-care. (n=84)**

Variables	Patients' level			Overall scores		Significance					
	Poor	Moderate	Good	MIN-	Mean±	(K)		(A)		(P)	
	No (%)	No (%)	No (%)	Max	SD.	score	score	score	score	score	score
						r	p	r	p	r	p
Knowledge (K)	29(34.5)	36(42.9)	19(22.6)	0.0-12.00	7.1±1.3	1	1	0.31	0.01*	0.62	0.01*
Attitude (A)	9(10.7)	30(35.7)	45(53.6)	0.0-6.00	4.3±0.3	0.41	0.05*	1	1	0.52	0.01*
Practice (P)	32(38)	39(46.5)	13(15.5)	0.0-13.00	7.9±2.7	0.20	0.04*	0.11	0.01*	1	1
<b>(r) Pearson Correlation coefficient</b>						<b>Significant P value ≤0.05 level</b>					

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