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Are diabetic Patients Adequately Educated About Their Disease?

Diyabet Hastalarının Hastalıklarıyla İlgili Eğitimi Yeterli mi?

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ÖZET
Amaç: Diyabetik ayak ülserleri (DAÜ), diyabetin en ciddi ve maliyetli komplikasyonları arasında yer almakta; hastaların yaşam kalitesini önemli ölçüde düşürmekte ve hastaneye yatış ile ampütasyon riskini artırmaktadır. Bu çalışmanın amacı, DAÜ tanılı hastalarda diyabetik ayak öz bakım davranışları ile diyabet öz yönetim becerilerini değerlendirmektir.
Gereç ve Yöntem: Gözlemsel, kesitsel tipteki bu çalışma, üçüncü basamak bir hastanenin Sualtı Hekimliği ve Hiperbarik Tıp ile Diyabetik Ayak Polikliniklerine başvuran 228 DAÜ tanılı hasta ile gerçekleştirilmiştir. Hastaların demografik özellikleri, klinik verileri ve yara ile ilişkili değişkenler kaydedilmiştir. Diyabet Öz Yönetim Ölçeği (DSMS) ve Diyabetik Ayak Öz Bakım Davranışları Ölçeği (DFSBS) yüz yüze görüşme yöntemiyle uygulanmıştır. İstatistiksel analizler SPSS v25.0 programında yapılmış; anlamlılık düzeyi p<0,05 olarak kabul edilmiştir.
Bulgular: Katılımcıların yaş ortalaması 63,1±10,5 yıl olup, %72,4'ü kadındı. Hastaların %55,3'ü diyabetik ayak cerrahisi geçirmiş, %38'inde Wagner evre 4 yara saptanmıştır. Ortalama DSMS puanı 6,6±1,7; ortanca DFSBS puanı ise 28,0 (ÇKB: 9,0) olarak bulunmuştur. Eğitim düzeyi ile hem DSMS hem de DFSBS alt boyut puanları arasında anlamlı pozitif ilişki tespit edilmiştir (p<0,001). Diyet kontrol puanları, cerrahi öyküsü olan hastalarda ve Wagner evresi daha yüksek olanlarda anlamlı olarak daha yüksekti (sırasıyla p=0,019 ve p=0,003). Ancak, toplam DSMS veya DFSBS puanları ile Wagner evresi arasında anlamlı bir ilişki bulunmamıştır.
Sonuç: Gelişmiş öz bakım ve öz yönetim davranışları, daha yüksek eğitim düzeyi ile ilişkilidir ve diyabetik ayak komplikasyonlarının şiddetinden etkilenebilir. Hedefe yönelik eğitim programları hasta farkındalığını artırarak daha sağlıklı davranışları teşvik edebilir ve DAÜ'ye bağlı komplikasyonlar ile sağlık harcamalarını azaltabilir. Bu davranışların uzun dönem sonuçlar ve yaşam kalitesi üzerindeki doğrudan etkisini değerlendirmek için ileriye dönük uzunlamasına çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Ampütasyon, cerrahi, ayak ülseri, öz bakım, hemşirelik

ABSTRACT
Objective: Diabetic foot ulcers (DFU) are among the most severe and costly complications of diabetes, significantly affecting patients' quality of life and increasing the risk of hospitalization and amputation. This study aims to evaluate diabetic foot self-care behaviors and diabetes self-management skills in patients with DFUs.
Materials and Methods: This observational cross-sectional study was conducted with 228 patients diagnosed with DFUs who were admitted to the Underwater and Hyperbaric Medicine and Diabetic Foot Outpatient Clinics of a tertiary hospital. Patient demographic characteristics, clinical data, and wound-related variables were recorded. The Diabetes Self-Management Scale (DSMS) and Diabetic Foot Self-Care Behavior Scale (DFSBS) were administered via face-to-face interviews. Statistical analyses were performed using SPSS v25.0. P<0.05 was accepted as the statistical significance level.
Results: The mean age of participants was 63.1±10.5 years, and 72.4% were female. Among the patients, 55.3% had undergone diabetic foot surgery, and 38% had Wagner stage 4 wounds. The mean DSMS score was 6.6±1.7, and the median DFSBS score was 28.0 (IQR: 9.0). A significant positive relationship was found between education level and both DSMS and DFSBS subdimension scores (p<0.001). Dietary control scores were higher among patients who had undergone surgery and those with higher Wagner stages (p=0.019 and p=0.003, respectively). However, no significant correlation was observed between total DSMS or DFSBS scores and Wagner stage.
Conclusion: Improved self-care and self-management behaviors are associated with higher education levels and may be influenced by the severity of diabetic foot complications. Targeted educational interventions may enhance patient awareness, promote healthier behaviors, and potentially reduce DFU-related complications and healthcare costs. Further longitudinal studies are warranted to explore the direct impact of these behaviors on long-term outcomes and quality of life.

Keywords: Amputation, surgical, foot ulcer, self-care, nursing

INTRODUCTION

Diabetes mellitus is associated with serious microvascular and macrovascular complications, and diabetic foot ulcer (DFU) is among the most critical of these complications. The prevalence of DFU is reported to be 4–10%, with an annual incidence of 2.4–6.6%, and recurrence rates exceeding 50% within three years. As a chronic complication, DFU is one of the leading causes of hospitalization, amputation, and mortality in diabetic patients, and it has increasingly become a significant public health concern (1–4).

DFU can be prevented not only by maintaining optimal glycemic control but also through effective foot care. In diabetic patients, management of risk factors for ulcer development, adherence to preventive measures, determination of appropriate follow-up intervals, and sustained compliance with these strategies play a critical role in both preventing ulcer formation and ensuring early treatment before infection occurs (5).

Self-management in diabetes refers to self-care behaviors that support adherence to medication use, medical nutrition therapy, and physical activity. For effective self-management, patients must acquire sufficient knowledge and develop self-care skills. Transforming these skills into a lifestyle is essential for maintaining blood glucose levels within the normal range and preventing complications (6). Supporting self-management in diabetic patients contributes to the regulation of metabolic control, improvement of quality of life, and prevention of complications. Conversely, poor metabolic control is closely associated with the development and progression of both microvascular and macrovascular complications (7).

Effective foot care requires adherence to basic principles aimed at maintaining hygiene, reducing the risk of infection, and enabling the early detection of complications. Regular cleaning, proper footwear selection, and self-examination of the feet play a crucial role in preventing injuries. Furthermore, educating patients about foot care enhances awareness and supports the preservation of long-term foot health. In patients with DFU, metabolic control and proper foot care are critical factors in the development and recurrence of ulcers; therefore, the evaluation of self-management and self-care behaviors is of great importance. Nevertheless, the self-management and self-care behaviors of patients with existing DFU, particularly in relation to ulcer recurrence prevention, remain insufficiently studied in the literature. This study aims to address this gap by evaluating self-care behaviors and diabetes self-management skills in patients with DFU, with the objective of identifying factors that may help reduce the risk of recurrence.

METHODS

The study was conducted with diabetic foot patients admitted to the Underwater Medicine and Hyperbaric Medicine Outpatient Clinic and the Diabetic Foot Outpatient Clinic. The demographic data and wound characteristics of the patients were recorded by the researchers. The Diabetes Self-Management Scale (DSMS) and Diabetic Foot Self-Care Behavior Scale (DFSBS) were filled out by a face-to-face interview technique.

Ethical Approval and Consent to Participate

This study was approved by the Clinical Research Ethics Committee (Protocol No:2022/160). All participants were informed about the purpose and procedures of the study, and written informed consent was obtained from each participant before data collection. In addition, permission was granted for the use of the questionnaires in the study. All procedures involving human participants were conducted in accordance with ethical standards, and written informed consent was obtained from each participant before enrollment. This study

was conducted in accordance with the principles of the Declaration of Helsinki.

Inclusion criteria for the study

• The patient has applied to Underwater Medicine and Hyperbaric Medicine and/or Diabetic Foot Outpatient Clinic due to DFU.

• 18 years old or over

• Signing the informed consent form to participate in the study.

• Volunteering to participate in research

Exclusion criteria for the study

• Not signing the informed consent form to participate in the study.

• Being under 18 years old

• Not volunteering to participate in research.

The calculation of the sample size was done with the G*Power software (ver. 3.1.9.7). The minimum sample size was calculated as 204 participants by taking type 1 error 5%, type 2 error 20%, power of the study 80%, and effect size 0.35 from Cohen's table of constant values. In the event of data loss, it was deemed appropriate to reach 10% more people, resulting in a target of 225 participants.

Data Collection Forms

Demographic Data and Wound Characteristics Form

The age, gender, occupation, educational status, whether the patient had received hyperbaric oxygen therapy, history of surgical procedure, and Wagner stage of the wound were recorded on the "demographic data and wound characteristics" form.

Participant Recruitment and Data Collection

After obtaining ethical approval for the study, the sample consisted of individuals who presented to the diabetic foot outpatient clinic, met the inclusion and exclusion criteria, and agreed to participate in the study. After all participants were informed about the research, written informed consent was obtained, and data were collected through face-to-face interviews using a structured questionnaire. The interview with each participant lasted an average of 15 minutes. The data collection process, conducted between December 15, 2022, and February 1, 2023, was concluded upon reaching the target sample size, which was determined based on the sample size calculation.

Validity and Reliability of Instruments

The Diabetes Self-Management Scale (DSMS) and the Diabetic Foot Self-Care Behavior Scale (DFSBS) used in this study have been previously validated and tested for reliability, ensuring their appropriateness for use in this population (8,9).

Diabetes Self-Management Scale (DSMS)

It consists of 16 items and is a 4-point Likert-type. Items are scored with the options "does not apply to me" (0 points), "applies to me to some degree" (1 point), "applies to me to a considerable degree" (2 points), and "applies to me very much" (3 points). Participants are asked to rate the extent to which each statement applies to them with respect to the past eight weeks. The DSMS consists of four subscales. These are "glucose management" (items 1, 4, 6, 10, and 12); "dietary control" (items

2, 5, 9, and 13); "physical activity" (items 8,11, and 15), and "healthcare use" (items 3, 7, and 14). Item 16 requests an overall assessment of self-care. Seven of the items (items 1, 2, 3, 4, 6, 8, and 9) are scored straightforwardly, and nine of them (items 5, 7, 10, 11, 12, 13, 14, 15, and 16) are reverse-scored. The scale scoring is calculated as follows: [(Item total score from the total scale or sub-dimension) / (Maximum item total score that can be obtained from the total scale or sub-dimension) x 10]. If a non-skippable item (that has no "not required as a part of my treatment" option) is skipped, that item will be evaluated as -3 points. It is interpreted that as the score approaches 10 points, the level of diabetes self-management also increases. The scale does not have a defined cut-off value (9,10).

Diabetic Foot Self-Care Behavior Scale (DFSBS)

The scale has 7 items and 2 parts. While the items in the first part assess the behaviors exhibited by the patient over the course of the last week, the items in the second part assess the frequency of the particular foot self-care behaviors performed by the patient, ranging from 1 (never) to 5 (always). When calculating the total scale score, the number of items in Part 1 is categorized into 5 groups (0 days, 1-2 days, 3-4 days, 5-6 days, and 7 days). Thus, all items in the scale are rated on a 5-point Likert-type scale, indicating better foot care behavior. A minimum score of 7 and a maximum score of 35 can be obtained from the scale. The first sub-dimension of the DFSBS refers to self-care related to the feet, while the second sub-dimension refers to self-care related to the shoes (8,11). As the score obtained from the DFSBS scale increases, the level of self-care improves. The scale does not have a defined cut-off value.

Statistical Analysis

Analyses were evaluated using SPSS (v25, Statistical Package for Social Sciences; SPSS Inc., Chicago, IL) package program. In this study, descriptive data were expressed as n (%) for categorical variables and mean±standard deviation (Mean±SD) or median (IQR) for numerical variables. The suitability of the numerical variables for normal distribution was determined using visual (histograms and probability graphs) and analytical (Kolmogorov-Smirnov/Shapiro-Wilk

Table 1. Descriptive characteristics of the patients who participated in the study

	n (%) or Mean ± SD / Median (IQR)
Age	63.1±10.3
Gender	228 (100)
Female	165 (72.4)
Male	63 (27.6)
Employment status (n=228)	228 (100)
Working	53 (23.2)
Not working	144 (63.2)
Unknown	31 (13.6)
Education level (n=228)	228 (100)
Elementary school or lower	155 (68.0)
Middle school and higher	73 (32.0)
HBOT	222 (100.0)
Suggested	123 (55.4)
Not suggested	99 (44.6)
Surgical procedure	228 (100.0)
Do not have a history of surgical procedure	101 (44.7)
Have a history of surgical procedure	125 (55.3)
Type of surgical procedure	125 (100.0)
Digit amputation	113 (90.4)
Below-knee amputation (foot)	10 (8.0)
Above-knee amputation (foot)	2 (1.6)
Wagner stage of the wound	212 (100.0)†
Wagner 1	13 (6.1)
Wagner 2	69 (32.5)
Wagner 3	50 (23.5)
Wagner 4	80 (37.7)
DSMS	6.6±1.7
Glucose management	8.0 (3.3)
Dietary control	6.7 (3.3)
Physical activity	5.0 (3.3)
Healthcare use	6.7 (3.3)
DFSBS	28.0 (9.0)
Sub-dimension 1	16.0 (7.0)
Sub-dimension 2	11.0 (5.0)

† Due to rounding, some totals may not correspond with the sum of the separate figures. (HBOT – Hyperbaric Oxygen Treatment, DFSBS – Diabetic Foot Self-Care Behavior Scale, DSMS – Diabetes Self-Management Scale, SD – Standard Deviation, IQR – Interquartile Range)

tests) methods. For normally distributed variables, Student's t-test was used to compare the means between two groups, and one-way ANOVA analysis was used to compare more than two groups. For non-normally distributed variables, the Mann-Whitney U test was used for the comparison of two groups, and the Kruskal-Wallis test was used for the comparison of more than two groups. Spearman's correlation test was used to examine the relationship between continuous variables. P<0.05 was considered statistically significant in the analyses.

RESULTS

A total of 228 patients with DFU participated in the study, comprising 165 (72.4%) females and 63 (27.6%) males. The mean age of the patients was 63.1±10.5 years (min=23-max=96). While 63.2% of the patients were unemployed, 68.5% were either primary school graduates or illiterate. Hyperbaric oxygen therapy was recommended for 55.4% of the patients, and a surgical procedure was recommended for 55.3% of them. Digit amputation was performed in 90.4% of those who were recommended a surgical procedure. The mean score of the

patients on the DSMS was 6.6±1.7, and the median score on the DFSBS was 28.0 (9.0) (Table 1). When the recommendation for HBOT was compared based on the Wagner Classification, the frequency of patients with Wagner wound stage ≥3 among those recommended for HBOT (63.6%) was significantly higher than those with stage ≤2 (40.3%) (p=0.001). (Table 2.)

No significant difference was observed in the scores obtained from the DSMS according to gender, age, and employment status. Those with a higher level of education had a significantly higher score in the DSMS than those with a lower level of education (p<0.001). Although patients who underwent diabetic foot surgery had higher DSMS scores than those who did not, the difference was not significant (p = 0.078). No significant difference was observed in the DSMS score according to the localization of the surgical procedure and the Wagner stage of the wound. No significant difference was found for the scores obtained from the DFSBS according to the variables of gender, age, employment status, educational status, history of surgical procedure, surgical procedure localization, and the Wagner stage of the wound (Table 3).

Table 2. Comparison of HBOT Recommendation Based on Wagner Classification

	Wagner Classification		
	≤2	≥3	p-value*
HBOT	n (%)	n (%)	
Recommended	31 (40.3)	82 (63.6)	0,001
Not Recommended	46 (59.7)	47 (36.4)	

*Pearson's Chi-square test was applied, (HBOT – Hyperbaric Oxygen Treatment)

Table 3. Comparison of total scores of DSMS and DFSCB scales according to all parameters

	DSMS		DFSBS	
	Mean±SD	p-value	Median (IQR)	p-value
	Gender (n=228)			
Female	6.5±1.9	0.830[a]	28.0 (7.0)	0.388[c]
Male	6.6±1.7		28.0 (9.0)	
	Age (n=228)			
63 and younger	6.6±1.6	0.986[a]	28.0 (9.0)	0.787[c]
Older than 63	6.6±1.8		28.0 (9.0)	
	Employment status (n=228)			
Working	6.4±1.7	0.584[b]	29.0 (11.0)	0.341[d]
Not working	6.6±1.7		28.0 (9.0)	
Unknown	6.8±2.0		30.0 (7.0)	
	Education level (n=228)			
Elementary school or lower	6.3±1.7	<0.001[a]	28.0 (8.0)	0.308[c]
Middle school and higher	7.2±1.6		29.0 (9.5)	
	History of surgical procedure (n=226)			
Undergone	6.8±1.6	0.078[a]	28.0 (9.0)	0.485[c]
No surgery	6.4±1.8		28.0 (8.0)	
	Localization of the surgical procedure (n=125)			
Digit amputation	6.8±1.6	0.846[a]	28.0 (9.0)	0.953[c]
Below or above-knee amputation	6.7±2.3		28.5 (11.3)	
	Wagner stage of the wound (n=212)			
≤2	6.5±1.7	0.235[a]	29.0 (8.0)	0.378[c]
≥3	6.7±1.7		28.0 (10.0)	

[c]Mann-Whitney U test; [d]Kruskal-Wallis test (DFSCB – Diabetic Foot Self-Care Behavior Scale, DSMS – Diabetes Self-Management Scale, IQR – Interquartile Range)

Table 4. Comparison of the sub-dimensions of the DSMS according to all parameters

	Glucose management Median (IQR)	p-value*	Dietary control Median (IQR)	p-value*	Physical activity Median (IQR)	p-value*	Health-care use Median (IQR)	p-value*
Gender (n=228)								
Female	8.0 (3.3)	0.709	6.7 (3.3)	0.885	5.6 (3.9)	0.424	6.7 (3.3)	0.227
Male	8.0 (3.3)		6.7 (3.8)		4.4 (3.3)		6.7 (2.8)	
Age (n=228)								
63 and younger	8.0 (2.7)	0.245	6.7 (3.3)	0.262	5.6 (3.3)	0.833	6.7 (2.2)	0.196
Older than 63	8.0 (3.3)		6.7 (4.2)		4.4 (4.4)		6.7 (3.3)	
Employment status (n=228)**								
Working	7.3 (2.7)	0.157	6.7 (4.2)	0.676	4.4 (3.3)	0.839	6.7 (3.3)	0.810
Not working	8.0 (3.3)		6.7 (4.0)		5.0 (4.2)		6.7 (2.2)	
Unknown	8.0 (3.3)		5.8 (4.2)		5.6 (3.3)		6.7 (4.4)	
Education level (n=228)								
Elementary school or lower	7.3 (2.7)	<0.001	5.8 (4.2)	0.001	4.4 (4.4)	0.049	6.7 (2.2)	0.044
Middle school and higher	8.7 (2.7)		7.5 (3.3)		5.6 (3.3)		6.7 (2.2)	
History of surgical procedure (n=226)								
Undergone surgery	8.0 (3.3)	0.401	7.5 (4.2)	0.019	4.4 (3.3)	0.795	6.7 (3.3)	0.178
No surgery	8.0 (3.0)		5.8 (4.2)		5.6 (4.4)		6.7 (2.2)	
Localization of the surgical procedure (n=125)								
Digit amputation	8.0 (3.3)	0.333	7.5 (4.2)	0.527	4.4 (3.3)	0.980	6.7 (2.2)	0.070
Below and or above-knee amputation	9.0 (4.8)		8.3 (4.8)		5.6 (5.3)		6.1 (3.9)	
Wagner stage of the wound (n=212)								
≤2	8.0 (2.7)	0.652	5.8 (3.5)	0.003	5.6 (3.3)	0.273	6.7 (3.3)	0.906
≥3	8.0 (3.3)		7.5 (4.2)		4.4 (3.3)		6.7 (3.3)	

*Mann-Whitney U test, **Kruskal-Wallis test, (DSMS – Diabetes Self-Management Scale, IQR – Interquartile Range)

Table 5. Comparison of the sub-dimensions of the DFSBS according to all parameters

	DFSBS sub-dimension 1 Median (IQR)	p-value*	DFSBS sub-dimension 2 Median (IQR)	p-value*
Gender (n=228)				
Female	17.0 (6.0)	0.256	11.0 (5.0)	0.818
Male	16.0 (8.0)		12.0 (5.0)	
Age (n=228)				
63 and younger	17.0 (6.0)	0.767	11.0 (5.0)	0.836
Older than 63	16.0 (7.0)		12.0 (5.0)	
Employment status (n=228)**				
Working	16.0 (8.0)	0.330	12.0 (6.0)	0.225
Not working	16.0 (7.0)		11.0 (4.0)	
Unknown	17.0 (5.0)		12.0 (5.0)	
Education level (n=228)				
Elementary school or lower	16.0 (7.0)	0.853	11.0 (6.0)	0.030
Middle school and higher	16.0 (8.0)		12.0 (6.0)	
History of surgical procedure (n=226)				
Undergone surgery	17.0 (7.0)	0.847	12.0 (5.0)	0.063
No surgery	16.0 (6.5)		11.0 (5.0)	
Localization of the surgical procedure (n=125)				
Digit amputation	17.0 (6.5)	0.678	12.0 (5.0)	0.354
Below or above-knee amputation	17.0 (10.0)		13.0 (4.3)	
Wagner stage of the wound (n=212)				
≤2	17.0 (6.0)	0.175	11.0 (5.0)	0.953
≥3	16.0 (8.0)		12.0 (5.0)	

**Kruskal-Wallis test (DFSBS – Diabetic Foot Self-Care Behavior Scale, IQR –Interquartile Range)

Table 6. Correlation of scale scores with Wagner stage of the wound

		DSMS score	DFSBS score
Wagner stage of the wound	R-value	0.109	-0.060
	p-value	0.113	0.387

Spearman's rank correlation test was applied. (DFSCB – Diabetic Foot Self-Care Behavior Scale, DSMS – Diabetes Self-Management Scale)

The scores obtained from the sub-dimensions of the DSMS were also compared according to all parameters. Significant difference was found in all sub-dimension scores according to education level (p<0.05 for each sub-dimension). The scores of those with higher education levels were found to be higher in the sub-dimensions of the scale. The dietary control score of those who had undergone surgery was found to be higher than those who had not undergone surgery (p=0.019). The score obtained from the dietary control sub-dimension was significantly higher in patients with a higher Wagner stage compared to those with a lower Wagner stage (p = 0.003). (Table 4) When comparing patients with and without amputation according to education level, no significant difference was found between the groups (p = 0.746)

The scores obtained from the sub-dimensions of the DFSBS were also compared according to all parameters. The score obtained from the first sub-dimension of the DFSBS did not show a significant difference according to any variable. The score obtained from the second sub-dimension of the DFSBS showed a significant difference only according to the level of education (p=0.030). Those with a higher education level had higher scores in the second sub-dimension of the DFSBS. No significant correlation was observed between the DSMS and DFSBS scores and the Wagner stage. (Table 6)

DISCUSSION

In our study, socio-demographic and diabetic foot-related characteristics of 228 patients with foot ulcers and the relationship between diabetes self-management and diabetic foot self-care were examined. It was observed that as the patients' level of education increased, their scores of the DSMS and the second sub-dimension of the DFSBS increased. The subscale of the DSMS that measures dietary control yielded higher scores for those who underwent surgery compared to those who did not, and the dietary control score was also found to be significantly higher in patients with higher Wagner stage wounds compared to those with lower Wagner stage wounds.

The primary goal in the treatment of diabetes is to prevent complications and maintain quality of life. By ensuring self-management, it is possible to maintain the patient's well-being. The goal of diabetes self-management is to empower individuals to make lifestyle changes, adhere to medical nutrition therapy, maintain desired blood glucose levels, reduce or eliminate the symptoms of diabetes, prevent complications, and manage diabetes in a comprehensive way. For achieving this goal, self-management includes aspects such as knowledge, skills, decision-making, coping with stress, and cooperation with health professionals (12). Luo et al.

conducted a meta-analysis of 45 studies to examine the factors affecting diabetes self-management in adult individuals with diabetes in China. As a result of this study, it was found that those with higher levels of education had better diabetes self-management (13). In a study conducted by Khalooei and Benrazavy to evaluate diabetes self-management and associated factors in patients with type 2 diabetes, which included 600 individuals with type 2 diabetes, it was found that those with higher education levels had higher diabetes self-management scores (14). According to our research findings, as the level of education increases, it is observed that the scores obtained from the DSMS significantly increase, which is consistent with the literature. This may be related to the fact that the higher the level of education, the easier it is to access information, put the learned information into practice, and increase the individual's awareness in the field of personal health management. It also suggests that increasing the level of social education may contribute positively to health self-management. In addition to sociodemographic characteristics, current physical examination findings and biochemical parameters are also critical in determining the prognosis of diabetic foot. In particular, renal failure, peripheral neuropathy, and HbA1c levels are significantly associated with amputation rates (15). Although our study primarily focused on self-management and self-care behaviors, it should not be overlooked that these clinical and biochemical indicators play a complementary role in shaping outcomes. For example, patients with poor glycemic control or concomitant renal dysfunction may experience more severe disease progression, which can influence their self-care priorities and engagement with healthcare services. Similarly, the presence of peripheral neuropathy may alter both symptom perception and the urgency of adopting protective behaviors. Considering these factors alongside sociodemographic characteristics could provide a more holistic understanding of the processes leading to adverse outcomes in diabetic foot. These parameters were not included in our study; however, future research should incorporate such clinical and biochemical variables to provide a more comprehensive understanding of the risks and self-management behaviors associated with diabetic foot.

In our study, although no significant difference was found, those who underwent surgery for DFU were found to have a higher DSMS score than those who did not undergo surgery. In addition, the dietary control score of those who had undergone surgery was higher than those who had not undergone surgery, and the dietary control subscale score of those with high Wagner stage was significantly higher than those with low Wagner stage. The study conducted by Aytemur and Inkaya aimed to examine the complication risk perception

and diabetes self-management skills of individuals with diabetes mellitus. That study sample consisted of 153 adults with diabetes mellitus. In that study, it was reported that self-management of individuals with diabetes mellitus was affected by sociodemographic and disease-related characteristics. In that study, it was observed that a high perception of complication risk in individuals with diabetes mellitus provided a positive increase in diabetes self-management (16). Becker et al. reported that individuals with DFU had poor physical activity but were good at self-monitoring of blood glucose and other diabetes self-management skills (17). There are also other studies supporting this finding (12,18). It is thought that individuals with complications pay more attention to nutrition, exercise, blood glucose monitoring, and health checks to prevent the progression of the existing condition, the development of new morbidities, and also against the possible risk of mortality. It is noteworthy that these behaviors are not exhibited until complications arise. In our study, since those who underwent surgery and those with high Wagner stage may have a higher risk perception of diabetes-related complications because of the reasons mentioned above, scores related to dietary control were higher in those groups than in those who did not undergo surgery and those with lower Wagner stage. In addition, those who underwent surgery for a wound also had higher overall DSMS scores than those who did not.

In our study, the mean score obtained from the DSMS, in which we evaluated diabetes self-management, was 6.6±1.7. In the study conducted in Germany in which the scale was developed, the average score obtained from the DSMS was found to be 6.8 (10). During the COVID-19 period, two studies conducted at primary care hospitals in Türkiye reported average DSMS scores of 5.3 and 5.6, respectively (16,19). When the international literature is reviewed, the average scale score of the patients in a study conducted in Iran was found to be 5.0. In studies examining the self-management levels of patients with diabetes in Uganda, Hungary, and Saudi Arabia, it was observed that the average scale scores ranged between 6.5-7.7 (20–23). DSMS includes behaviors such as regular medication use, adherence to a healthy diet, regular physical exercise, blood glucose monitoring, foot care, and compliance with medical check-ups. The successful management of diabetes aims to maintain blood glucose levels within the appropriate range. This will prevent the development of complications (24). The studies mentioned above included diabetic patients who were randomly selected from a specific population. In our study, we found that 55.3% of the patients had undergone surgery for diabetic foot, and 38% of the patients had foot ulcers at Wagner stage 4. At first glance, it might be expected that self-care would be lower in this population because of the development of complications, but the mean DSMS score of our study is higher than many studies in the literature. This may be due to the fact that patients have increased awareness of self-management in diabetes because they have DFU, which seriously affects their quality of life. In addition, as Wagner stages increase, tissue loss may also increase (25); therefore,

patients should be cautious in self-management.

In our study, the median score obtained from the DFSBS was found to be 28.0. In a study conducted in Germany with 82 patients who had diabetes, the average score on the DFSBS was 21.9 (26). In a study conducted in Türkiye with 300 patients who had diabetes, the average of the DFSBS was found to be 23.89 (27). In another study, the DFSBS scores of patients with a history of foot ulcers were significantly higher DFSBS scores than those with no history of foot ulcers (11). The mean DFSBS score of our study was found to be higher when compared with the similar studies in the literature. The reason for this could be that all participants in our study had DFU, and the majority of our patients had undergone surgery, and their awareness of diabetic foot may be higher than other patients with diabetes.

The score obtained from the second sub-dimension of the DFSBS showed a significant difference according to the level of education. In a study involving 500 patients, similar to our study, it was found that patients with an academic education had a higher mean score in diabetic foot self-care (28). As the education level increases, patients' awareness of self-care behaviors also increases. Education level is associated with increased awareness and knowledge of health issues, which in turn enables greater emphasis on early intervention and foot health. Individuals with higher levels of education have better self-care skills and can adhere to treatment plans more effectively. The study conducted by Öztaş et al. concluded that patients with DFU have low levels of diabetes health literacy (29). Increased health literacy leads individuals with diabetes to approach foot problems in a more sensitive manner. These individuals may also have received more effective education on diabetic foot care by interacting with healthcare professionals. In conclusion, individuals with a higher level of education may have a more proactive and conscious approach to diabetic foot care. Therefore, it is possible that those with higher education levels scored higher on the second sub-dimension of the DFSBS.

In our study, no significant difference was observed between patients with and without amputation in terms of education level. This finding suggests that education level alone may not be a decisive factor in the development of amputation. Diabetic foot complications are the result of a multifactorial process influenced by various factors, including glycemic control, disease duration, comorbidities, regular follow-up, and appropriate foot care (30,31). Therefore, instead of focusing solely on educational status, comprehensive approaches aimed at enhancing patient awareness, ensuring continuous education, and promoting behavioral changes are considered more effective in reducing the risk of severe outcomes such as amputation (32).

The DSMS and DFSBS did not show a significant correlation with the Wagner stage of the wound. There was no study in the literature that compared the Wagner stage with the DSMS and DFSBS. Since the majority of our patients have undergone surgery, their current Wagner stages may be lower compared to previous Wagner stages. Therefore, a direct correlation between the Wagner stage and the DSMS and DFSBS may not

be expected.

Limitations

This study has several limitations that should be acknowledged. The single-center design of the study limits the generalizability of the findings to broader populations. In addition, important clinical and biochemical parameters such as HbA1c levels, renal function tests, peripheral neuropathy status, and duration of diabetes diagnosis were not assessed. Educational status and frequency of healthcare utilization were also not examined. Future studies with multi-center designs, longitudinal approaches, and objective data collection methods that incorporate these variables are needed to validate and expand upon the present findings.

CONCLUSION

Diabetic foot self-care and diabetes self-management are critical components for individuals with diabetes to reduce the risk of complications and improve health outcomes. By adopting practices such as regular foot inspections, appropriate moisturization, wearing suitable footwear, and early recognition of potential issues, patients can lower the risk of foot ulcers, infections, and related complications. Effective diabetes self-management, which includes regular monitoring of blood glucose levels, adherence to a healthy diet, consistent physical activity, and proper medication use, plays a pivotal role in maintaining glycemic control and preventing diabetes-related complications.

While this study did not directly assess quality of life, it demonstrated that patient education and increased awareness are associated with improved self-care and self-management behaviors, particularly among patients with higher levels of education. The findings suggest that enhancing patient education on diabetic foot care and diabetes management may indirectly contribute to a better quality of life by minimizing complications and reducing hospitalizations. Future studies are recommended to explore the direct impact of these behaviors on quality of life outcomes. Nevertheless, investing in educational programs on diabetic foot care and diabetes self-management has the potential to support better patient outcomes and alleviate the burden on healthcare systems, contributing to more sustainable healthcare solutions.

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