Araştırma Makalesi/Research Article

Diyabetik Ayak Ülseri Olan Yaşlı Bireylerin Diyabet Yükü ve Sağlık İnançları: Kesitsel Bir Çalışma

Diabetes Burden and Health Beliefs of Elderly Individuals with Diabetic Foot Ulcer: A Cross-sectional Study

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Abstract:

Aim: This study was conducted to examine the diabetes burden and health beliefs of elderly individuals with diabetic foot ulcers.

Methods: The sample of this study, which is carried out in descriptive and cross-sectional design, consists of 65 individuals who are diagnosed with diabetic foot, 115 years and older. Data were collected using the identification form, the Elderly Diabetes Burden Scale and the Health Belief Model Scale in Diabetic Patients. The tests used are Mann–Whitney U, Kruskal–Wallis and Spearman's correlation tests.

Results: The mean age of elderly was 70.47 ± 5.82 (Min-Max: 65-98) and the burden of diabetes (52 ± 10.40) was at a moderate level. There was a difference between the total mean scores of the Elderly Diabetes Burden Scale and marital status, diabetes duration, diabetic foot stage, additional complication and foot care ($p <0.05$). It was determined that the health beliefs of elderly individuals with diabetic foot ulcers were high ($4.18 \pm.51$). There was a difference between the total score averages of the Health Belief Model Scale in Diabetic Patients and gender, education level, living place, regular foot care and diabetes education ($p <0.05$). In the study, as the total Health Belief Model Scale score of the elderly increased, the total diabetes burden score decreased.

Özet:

Amaç: Bu çalışma, diyabetik ayak ülseri olan yaşlı bireylerin diyabet yüklerini ve sağlık inançlarını incelemek amacıyla yapılmıştır.

Yöntem: Tanımlayıcı ve kesitsel tasarımda yürütülen bu çalışmanın örneklemini diyabetik ayak tanısı alan, 65 yaş ve üstü 115 birey oluşturmaktadır. Veriler tanılama formu, Yaşlılarda Diyabet Yükü Ölçeği ve Diyabet Hastalarında Sağlık İnanç Modeli Ölçegi kullanılarak toplanmıştır. Verilerin analizinde Mann-Whitney U, Kruskal-Wallis ve Spearman korelasyon testleri kullanılmıştır.

Bulgular: Yaşlı bireylerin yaş ortalaması 70.47 ± 5.82 (Min-Max:65-98) ve diyabet yükü (52 ± 10.40) orta düzeyde bulunmuştur. Yaşlılarda Diyabet Yükü Ölçeği toplam puan ortalamaları ile medeni durum, diyabet süresi, diyabetik ayak yara evresi, ek komplikasyon durumu ve düzenli ayak bakımı yapma durumu arasında fark bulunmuştur ($p <0.05$). Diyabetik ayak ülseri olan yaşlı bireylerin sağlık inançlarının ($4.18 \pm.51$) yüksek olduğu belirlenmiştir. Diyabet Hastalarında Sağlık İnanç Modeli Ölçegi toplam puan ortalamaları ile cinsiyet, eğitim düzeyi, yaşadığı yer, düzenli ayak bakımı yapma ve diyabet eğitimi alma durumu arasında fark bulunmuştur ($p <0.05$). Araştırmada diyabetik ayağı olan yaşlı bireylerin Sağlık İnanç Modeli Ölçeği toplam puanı arttıkça diyabet yükü

Conclusion: It is recommended that nurses take into consideration variables such as marital status, education, living place, diabetes duration, diabetic foot wound stage and foot care behaviors which may affect the burden of diabetes and health beliefs, while providing care.

Key Words: Aged; diabetic foot; Health Belief Model; Burden of illness

toplam puanının azaldığı bulunmuştur (p <0.05).

Sonuç: Hemşireler bakım verirken diyabet yükünü ve sağlık inancını etkileyebilen medeni durum, eğitim, yasadığı yer, diyabet süresi, diyabetik ayak yara evresi, ayak bakım davranışları gibi değişkenleri göz önünde bulundurması önerilmektedir.

Anahtar Kelimeler: Yaşlı; diyabetik ayak; Sağlık İnanç Modeli; hastalık yükü

Introduction

Diabetes is a major health problem that has reached alarming levels. The incidence of diabetes increases with age. As the world's population ages, people over 60 with diabetes will increase. [1] Diabetes can lead to serious complications. [2,3] Diabetic foot ulcer (DFU) is one of the most serious complications of diabetes. The lifetime incidence rate of diabetic foot ulceration is 19% to 34%. [4,5] In people with previous DFUs, the probability of diabetic foot recurrence within the first three years varies between 40% and 65%. [4] Elderly diabetic patients are a high prevalence of diabetic foot ulcers. [2,3] It is expected that the incidence of DFUs will increase even more because of the aging of society, an increase in the incidence of diabetes, and its unpredictable prevalence. [1,6]

Diabetes and diabetes complications increase the disease burden. Thus the economic burden by adversely affecting the prognosis of the disease, the compliance of the patients with treatment, and the quality of life. [1,3,5] DFUs lead to amputations of lower extremities and increased mortality. [3,7] Approximately 50% of patients with DFUs die within five years. This rate rises to 70% after amputation. [7] Global health expenditures for managing diabetes and its complications were reported to be $760 billion in 2019, and this figure is estimated to be $845 billion by year 2045. Most of the healthcare expenditures incurred due to diabetes are for individuals between the ages of 60-69. [1] In Turkey, it was reported that national health expenditures to manage diabetes and its complications were on average $4.5 billion, and the average patient cost was $591,145 in 2020. The health expenditure of 991,945 people diagnosed with major vascular complications due to diabetes was $1 billion in 2020. [8] It is thought that to reduce the economic burden of diabetes, especially in elderly, it is very important to control the burden of disease and its complications. The first step in doing this is to determine the burden of the disease and its associated factors. [9] However, studies examining the diabetes burden of elderly patients are quite limited. [10-16] According to Ovayolu et al. and Celik et al. it was determined that the diabetes burden of elderly patients with diabetes is high. [10,15] Most studies have found the burden of diabetes in elderly to be moderate. [11-14,16] In the studies conducted, it was determined the burden of diabetes is related to social support [11], health literacy [13], self-efficacy [16] and quality of life [14] in elderly individuals with diabetes. Another study reported that there was no relationship between diabetes burden and successful aging. [15] When studies investigating the burden of diabetes in elderly are examined, only one study was found focusing on elderly individuals with diabetic foot ulcers. [16] In the study

conducted by Canlı Duran et al., it was found that the diabetes burden of elderly people with diabetic foot ulcers was higher than those without diabetic ulcers. [16] It was reported in the studies that one of the factors that may affect the diabetic burden of elderly with diabetes is the health beliefs of the patients. [17-19] Most people with diabetes do not perceive the seriousness of the disease unless complications of the disease occur. [2,8,17,20,21] Since elderly population is a neglected population all over the world, it is recommended to determine the problems correctly and evaluate them appropriately. [9] Determining diabetes burden and health beliefs of elderly with diabetic foot ulcer may contribute to the care of elderly with diabetic foot ulcer. There have not been any studies that examining the relationship between the burden of diabetes and health belief in elderly individual with diabetic foot. Therefore, the present study focused on burden of diabetes and health belief of elderly with diabetic foot ulcers. It is considered that the results of this study will guide the determination of approaches to reduce the diabetes-related burden of elderly with diabetic foot ulcer.

The research questions of this study were:

1. What is the diabetes burden level of the elderly with diabetic foot ulcer?
2. Is there a difference between the average diabetes burden scores of elderly individuals with diabetic foot ulcers according to their descriptive characteristics?
3. What is the health belief level of the elderly with diabetic foot ulcer?
4. Is there a difference between the average health belief level scores of elderly individuals with diabetic foot ulcers according to their descriptive characteristics?
5. What is the relationship between diabetes burden and health beliefs level in elderly with diabetic foot ulcer?

Materials and Methods

Study Design

This is a descriptive and cross-sectional research to describe and examine the relationship between diabetes burden and health beliefs in elderly individual with diabetic foot ulcer. This study was reported according to STROBE chekclist. [22]

Study Population and Sample

The sample size was calculated by using G* Power 3.1.9.7 (Heinrich-Heine-Universität Düsseldorf, Dusseldorf, Germany). [23] The sample size was calculated with a correlation analysis test based on a probability of α = 0.05, effect size of 0.3 and a power level of 1-β=0.8. [23,24] The study required a minimum sample size of 84 elderly individuals with diabetic foot ulcers. The elderly population is defined as people aged 65 and over. [23] Convenience sampling was utilized. All individuals aged 65 years or older who applied for diabetic foot in one year were reached, only one person did not want to participate in the study because he was tired. This study finally included 115 elderly individuals with diabetic foot, who presented to "the Undersea Medicine and Hyperbaric Medicine Service" or "Orthopedics and Traumatology service" due to diabetic foot within a year.

Inclusion criteria were:

- Volunteering to participate in the study,
- Aged 65 years or older,
- Had diabetic foot problems,
- Have a diabetic foot ulcer,
- Have ability to speak and understand Turkish.

Exclusion criteria were:

- Have not place and time orientation,
- Have not psychiatric illness or treatment,
- Have not hearing problems.

Data Collection Tools

The data of the study came from a sociodemographic form, the elderly diabetes burden scale (EDBS) and the Health Belief Model Scale in Diabetic Patients (HBMSDP).

Sociodemographic form

The sociodemographic form elicited personal information such as gender, age, and educational status, duration of the illness, additional complications. [17,26,27] (Table 1).

Elderly Diabetes Burden Scale

EDBS was used to measure diabetes burden in elderly individuals with diabetic foot ulcer. The scale was developed by Araki and Ito in 2003. [28] The validity and reliability of the scale in Turkish was conducted by Usta-Yıldırım and Esen in 2012. [29] EDBS is 22-item Likert-type scale (0-4). The scale comprises 6 sub-dimensions: symptom burden (four items), social burden (five items), burden because of dietary restrictions (four items), worry about diabetes (four items), treatment dissatisfaction (two items), and burden by oral tablets/insülin (three items). The total score interval of the scale was 18–88. A higher score indicates a stronger level of diabetic burden. Cronbach's alpha value of the scale was 0.92 in the Turkish validity and reliability study [29], and 0.86 in the present study.

Health Belief Model Scale in Diabetic Patients

HBMSDP was used to examine the health beliefs and attitudes of elderly individuals with diabetic foot ulcers regarding the disease. The scale was developed by Tan in 2004 and consists of 36 items. [20] The validity and reliability study of the scale was conducted by Kartal & Ozsoy in 2007 for use in type 2 diabetic patients in Turkey. [30] Three items were removed from the scale by Kartal & Ozsoy in the Turkish validity and reliability study. [30] Thus, 36 items were reduced to 33 items. The scale consists of five sub-dimensions: Perceived Susceptibility (four items), Perceived Severity (three items), Perceived Benefits (seven items), Perceived Barriers (nine items) and Recommended Health-Related Activities (10 items). Scale items were graded from 1 to 5 with Likert-type scoring. Items 3 and 4 in the perceived susceptibility sub-dimension of the scale and items 16, 17, 18, 19, 20, 21, 22 and 23 in the perceived barriers sub-dimension are calculated by coding in reverse. If the score from the scale was 4 and above, it shows a high (positive) belief in health. A score less than 4 showed a low (negative) belief in health. [30] The test-retest reliability of the scale was 0.90. Cronbach's alpha value of the scale was 0.72 in the original study [20], 0.89 in the Turkish validity and reliability study [30], and 0.94 in the present study.

Data Collection

This study was conducted between April 2016 to April 2017 in a university hospital in Istanbul. The data were collected by the researcher from patient records and from the patients included in the sample using the face-to-face interview technique. Data collection took an average of 20–25 minutes. Data were collected in a separate room located in the Undersea and Hyperbaric Medicine

service or Orthopedics and Traumatology service. Department of Undersea and Hyperbaric Medicine consists of three sections: outpatient clinic, hyperbaric oxygen therapy unit and clinic with a total of 16 beds. In the Department of Undersea and Hyperbaric Medicine, a diabetic foot council meets on Thursdays and patients with diabetic foot wounds are evaluated with a multidisciplinary approach. The Department of Orthopedics and Traumatology consists of three sections: an outpatient clinic, a clinic with a total of 36 beds, and an operating room.

Data Analysis

Data were analyzed with the Statistical Package Program for Social Sciences 21.0. General characteristics of the patients were analyzed and expressed in numbers and percentages. Normality of the data was evaluated by the Shapiro–Wilk test. [31] Three non-parametric tests the Mann–Whitney U test, the Kruskal–Wallis test and Spearman's correlation analysis were used. Spearman's correlation coefficient (r_s) values between 0 and 1 = positive correlation, 0 = no correlation, and 0 to −1 = negative correlation. [32] According to Schober et al., the correlation coefficient is defined as 0.00-0.10 negligible correlation; 0.10-0.39 weak correlation; 0.40-0.69 modarate correlation; 0.70-0.89 strong correlation; 0.90-1.00 very strong correlation. [32] $p < 0.05$ was considered statistically significant.[24]

Ethical considerations

The ethics committee approval for the study was obtained from a university hospital in Turkey (Reference number: 2016/226). Written permissions from the institution where the study was conducted. In both scales used in the study, permission to use was obtained from the scale owners via e-mail. The patients were given information about the purpose of the study, and then written consent was obtained.

Limitation

A limitation of our study is that the diabetic foot duration of the patients was not questioned. Diabetic foot duration may affect health belief or diabetes burden. Another limitation is that the research was conducted in a single hospital. Therefore, the results of the study can only be generalized to elderly diabetic foot patients in the hospital where the study was conducted.

Results

The mean age of elderly with diabetic foot ulcer was 70.47±5.82 (min 65, max 98). It was found that 52.2% had diabetes for 21 years and longer and almost all of the elderly had complications other than diabetic foot (93.9%). Table 1 presents the distribution of demographic characteristics, diabetes characteristics.

Table 1. Demographic and Clinical Characteristics of Elderly Individuals with Diabetic Foot Ulcer (*n*= 115)

	$\overline{\text{X}}$±SD (Min-Max)		(X)‾±SD (Min-Max)
Age (years)	70.47±5.82 (65-98)		
	n (%)		
Age groups		Regular foot care	48 (41.70)
65-74 age	89 (77.40)	Yes	67 (58.30)
75-84 age	26 (22.60)	No	
Gender		**Diabetes education**	
Female	31 (27.00)	Received information	26 (22.60)
Male	84 (73.00)	Did not receive information	89 (77.40)
Marital status	103 (89.6)	**Diabetic foot wound stage ª**	
Married	12 (10.40)		
Single			
Education level	63 (54.80)	Grade 1	11 (9.60)
Primary	37 (32.20)	Grade 2	35 (30.40)
High school	15 (13.00)	Grade 3	30 (26.10)
University		Grade 4-5	39 (33.90)
Living place	17 (14.80)		
Village	36 (31.30)	**Additional complications**	
Town	62 (53.90)		
City		Yes	108 (93.90)
Duration of diabetes (years)	13 (11.30)	No	7 (6.10)
≤ 10	42 (36.50)		
11-20	60 (52.20)		
≥21			

ª Wagner Classification ; $\overline{\text{X}}$±SD: Mean± Standard Deviation

The results of diabetes burden

The mean total score on the diabetes burden scale was 52.00 ± 10.40 (Min:23; Max: 86) (Table 2). Sub-dimension of the scale means total score; "symptom burden" was 8.73 ± 2.96, "social burden" 14.30 ± 4.38, "dietary restrictions" was 11.30 ± 3.06, "worry about diabetes" was 8.18 ± 3.20, "treatment dissatisfaction" was 2.94 ± 1.47 and "burden by tablets/insülin" was 6.52 ± 2.47 (Table 2).

Table 2. Mean scores of the Elderly Diabetes Burden Scale and the Health Belief Model Scale in Elderly Individuals with Diabetic Foot Ulcer (*n*=115)

Scale and Subscales	$\overline{\text{X}}\pm\text{SD}$	Min-Max
Elderly Diabetes Burden Scale		
Perceived susceptibility	3.34±.51	2.00-5.00
Perceived severity	4.66±.71	1.00-5.00
Perceived benefits	4.30±.85	1.00-5.00
Perceived barriers	4.08±.65	1.44-5.00
Recommended health-related activities	4.50±.71	1.00-5.00
Total score of the scale	4.18±.51	1.75-4.80
Elderly Diabetes Burden Scale		
Symptom burden	8.73±2.96	4.00-16.00
Social burden	14.30±4.38	5.00-20.00
Dietary restrictions	11.30±3.06	4.00-16.00
Worry about diabetes	8.18±3.20	4.00-16.00
Treatment dissatisfaction	2.94±1.47	2.00-8.00
Burden by tablets/insulin	6.52±2.47	3.00-12.00
Total score of the scale	52±10.40	23.00-86.00

$\overline{\text{X}}\pm\text{SD}$**:** Mean± Standard Deviation

The mean total EDBS score was statistically higher in individuals with a disease duration of 21 years or more, with stage 4 or 5 diabetic foot ulcer, with an additional complication, who did not perform regular foot care, and who were single (p <0.05) (Table 3). There was no significant

difference between the total score averages of the EDBS and age, gender, education level, living

place, receiving diabetes education ($p > 0.05$) (Table 3).

Table 3. Distribution of Scale Total Score Averages According to Demographic and Clinical Characteristics (*n*=115)

Demographic and Clinic Characteristic	Frequency (%) n=115	HBMSDP Total Score $\overline{X}\pm SD$	p Value-test	EDBS Total Score $\overline{X}\pm SD$	p Value-test
Age			U=934.500		U=896.500
65-74 age	89 (77.40)	4.20±00.53	Z=-1.488	50.86±9.95	Z=-1.743
75-84 age	26 (22.60)	4.10±00.43	p=0.137	55.88±11.13	p = 0.081
Gender			U=929.500		U=1085.000
Female	31 (27.00)	4.07±00.39	Z= -2.201	54.00±9.97	Z=-1.211
Male	84 (73.00)	4.21±00.54	**p=0.028**	51.25±10.50	p=0.226
Marital status			U= 601.500		U= 399.500
Married	103 (89.60)	4.17±00.52	Z= -0.151	51.28±10.13	Z= -2.001
Single	12 (10.40)	4.25±00.34	p=0.880	58.16±11.10	**p=0.045**
Educational level				53.61±11.20	
Primary	63 (54.80)	4.05±00.58	X² = 8.044	49.51±9.18	X² = 3.633
High school	37 (32.20)	4.30±00.36	**p=0.018**	51.33±8.88	p=0.163
University	15 (13.00)	4.42±00.27			
Living place				54.05±9.99	
Village	17 (14.80)	3.84±00.70	X² = 6.488	53.47±9.81	X² = 2.228
Town	36 (31.30)	4.24±00.43	**p=0.039**		p=0.328
City	62 (53.90)	4.24±00.45		50.58±10.77	

Table 3. Distribution of Scale Total Score Averages According to Demographic and Clinical Characteristics (*n*=115)

		HBMSDP		EDBS	
Duration of diabetes (years)					
≤ 10	13 (11.30)	4.08±00.65	$X^2 = 3.036$	50.69±10.88	$X^2 = 7.359$
11-20	42 (36.50)	4.25±00.45	p=0.219	50.14±9.03	**p=0.025**
≥21	60 (52.20)	4.09±00.47		57.32±11.44	
Regular foot care					
Yes	48 (41.70)	4.26±00.57	U=1154.000	50.02±8.97	U= 1251.000
No	67 (58.30)	4.11±00.45	Z= -2.576	53.41±11.16	Z=-2.027
			p=0.010		**p=0.043**
Diabetes education					
Received information	89 (77.40)	4.26±00.42	U= 767.000	52.88±10.45	U= 920.000
Did not receive information	26 (22.60)	3.90±00.67	Z= -2.608	48.96±9.80	Z= -1.586
			p=0.009		p=0.113
Diabetic foot wound stage [a]					
Grade 1	11 (9.60)	4.34±00.46	$X^2 = 4.945$	47.00±7.82	$X^2 = 12.201$
Grade 2	35 (30.40)	4.26±00.41	p=0.176	48.11±10.36	**p=0.007**
Grade 3	30 (26.10)	4.03±00.63		53.36±9.14	
Grade 4-5	39 (33.90)	4.17±00.48		55.84±10.33	
Additional complications					
Yes	108 (93.90)	4.16±0.51	U= 215.500	52.58±10.05	U= 179.000
No	7 (6.10)	4.48±0.30	Z= -1.902	43.00±12.30	Z= -2.330
			p=0.057		**p=0.020**

X̄±SD= Mean± Standard Deviation; U, Z =Mann–Whitney U test; X²=Kruskal-Wallis test

HBMSDP = Health Belief Model Scale in diabetic patients ; EDBS = Elderly Diabetes Burden Scale

[a] Wagner Classification

The results of health beliefs

The mean total score on the HBMSDP was 4.18 ±.51. The mean of the sub-dimensions of the scale were 3.34±.51 for "perceived sensitivity", 4.66±.71 for "perceived severity ", 4.30±.85 for "perceived benefits", 4.08±.65 for "perceived barriers" and 4.50±.71 for "recommended health-

related activities" (Table 2). The mean total score of the HBMSDP was statistically lower in female, in primary school graduates, in people who lived in the country, in those who did not receive information about diabetes, and in those who did not perform foot care regularly ($p < 0.05$) (Table 3). There was no significant difference between the total score averages of the HBMSDP and age, marital status, diabetic disease duration, and diabetic foot wound stage ($p > 0.05$) (Table 3).

Relationship between Health Beliefs and Diabetes Burden

A significant negative, weak correlation was found between the mean total EDBS and HBMSDP scores ($r_s = -0.227$; $p < 0.05$). There was also a statistically significant negative, weak correlation between the total scores of EDBS and perceived benefits ($r_s = -0.204$; $p < 0.05$) (Table 4). A statistically significant negative, weak correlation was found between the symptom burden and perceived benefits ($r_s = -0.277$; $p < 0.05$), perceived barriers ($r_s = -0.283$; $p < 0.05$), health-related activities ($r_s = -0.268$; $p < 0.05$), total HBMSDP scores ($r_s = -0.329$; p<0.001). [32] (Table 4)

Table 4. Relationship between Health Belief Model Scale Scores and the Elderly Diabetes Burden Scale Scores (*n*=115)

EDBS	HBMS					
	Perceived susceptibility	Perceived severity	Perceived benefits	Perceived barriers	Recommended health-related activities	Total score
Total score						
r_s	-0.167	-0.051	-0.204	-0.160	-0.160	-0.227
p	0.075	0.591	0.029*	0.088	0.088	0.015*
Symptom burden						
r_s	-0.148	-0.109	-0.277	-0.283	-0.268	-0.329
p	0.113	0.245	0.003**	0.002**	0.004**	0,000**
Social burden						
r_s	-0.084	-0.017	-0.107	-0.101	-0.048	-0.108
p	0.373	0.860	0.253	0.281	0.607	0.250
Dietary restrictions						
r_s	-0.124	0.016	-0.084	-0.101	-0.095	-0.112
p	0.185	0.865	0.373	0.284	0.310	0.235

Table 4. (Devam) Relationship between Health Belief Model Scale Scores and the Elderly Diabetes Burden Scale Scores (n=115)

Worry about diabetes						
r_s	0.063	-0.134	-0.08	-0.01	-0.053	-0.056
p	0.506	0.154	0.397	0.913	0.577	0.555
Treatment dissatisfaction						
r_s	-0.126	0.044	-0.076	0.000	-0.02	-0.049
p	0.179	0.643	0.422	0.998	0.836	0.606
Burden by tablets/insülin						
r_s	-0.171	0.037	-0.03	0.039	-0.013	-0.049
p	0.068	0.693	0.747	0.675	0.887	0.605

*$p<0.05$; **$p<0.01$

r_s: Spearman Correlation Coefficient

HBMS: Health Belief Model Scale; **EDBS**: Elderly Diabetes Burden Scale

Discussion

The elderly population accounts for a significant proportion of all diabetic patients worldwide. [1,2,33] It has been reported that diabetes constitutes the highest disease burden among all diseases and is among the top 10 diseases with an increasing burden. [33] Health beliefs may affect the burden of diabetes in the elderly. [18,19] Therefore, it is important to focus on the burden of diabetes and health beliefs in the elderly. In the study, it was aimed to examine the diabetes burden and health beliefs of elderly individuals with diabetic foot ulcers.

In this study the mean EDBS score was moderate. Congruent with this finding, Canlı et al. reported that the burden of diabetes in elderly individuals with diabetic foot ulcers is moderate. [16] Similar results have been found in other studies examining the burden of diabetes in elderly diabetics. [10-14] Some studies have reported that the burden of diabetes is high in the elderly. [10,15] Although the individuals in this study had diabetic foot ulcers, the fact that the burden of diabetes was moderate, similar to one study in Turkey [16], can be attributed to the strong care and treatment strategies for elderly individuals with diabetic foot ulcers in our country.

In present study, elderly patients who single had a higher diabetes burden mean score than the married ($p <0.05$). Similarly, it has been determined that single people or living alone have higher diabetes burden in other studies. [10,12,14] In contrast to this study result, Yildirim-Usta et al. found that the mean scores of single patients were lower. [29] In this study group, DFUs may have had a negative effect on the patient's body image in single individual. In addition, single individual seem to have difficulties dealing with the disease on their own. It is consider that married patients have social support in terms of regular life, responsibilities, and especially dietary restrictions. The lack of this support in single patients may have a negative impact on the burden of disease. It has been determined that social support for elderly patients with diabetes was mostly provided by their families and that their diabetes burden decreased with social support. [11] For this reason, it is recommended that single elderly individuals with diabetic foot should be considered in the risk group in terms of diabetes burden and social support sources of single individuals with diabetic foot should be determined.

This study results showed that longer disease duration caused a higher burden of diabetes ($p <0.05$). Similarly, other studies have found that the burden of diabetes is higher in elderly with longer duration of diabetes. [12,13,15] There are also studies in the literature showing no significant difference in diabetes burden by disease duration. [14] Prolonging the duration of the disease in diabetic patients increases the risk of developing additional complications. [6] In this study, it is thought that living with diabetes for many years, as well as diabetic foot ulcers and other complications, may have increased the disease burden.

In this study, the diabetes burden was higher in elderly individuals with stage 4 or 5 diabetic foot wounds and additional complications ($p<0.05$). This result is similar to previous studies examining the burden of diabetes in elderly patients. [10-14] Foot complications in diabetes are a leading cause of the global burden of disability. [5,6,8] In a study on patients with diabetic foot ulcers and categorized according to Wagner stage, it was reported that healthcare expenditures increased as the grade increased. [34] For this reason, it was thought that the treatment costs of those with stage 4 or 5 wounds may be higher and increase the burden of diabetes. On the other hand, elderly individuals with complications other than diabetic foot ulcer may have more difficulty coping with the symptoms of the disease. It is recommended that diabetes nurses should carry out diabetes education without interruption and closely monitor the stage of foot wounds in order to prevent additional complications in elderly individuals and to prevent the wound levels from progressing.

In present study, the burden of diabetes was higher in elderly who did not perform regular foot care (*p <0.05*). Similarly, a study found that diabetes burden was a predictor of foot care behaviors. [16] Developing and maintaining foot care behaviours is vary important to coping with diabetic foot ulsers. If regular foot care is not performed, symptoms such as infection in the wound may develop, which may increase the burden of diabetes. In line with this results, peer education and motivating activities may be useful for elderly people to do regular foot care. It is recommended that healthcare professionals who care for geriatric patients and caregivers make these plans.

In this study, the mean total score for HBMSDP in elderly was high. Similarly, in other studies conducted with patients with diabetes, it was determined that patients had high /positive health beliefs. [21,26,27,35] However, other studies stated that diabetic patients have low/negative health beliefs. [17,30,36] The majority of the participants in this study (53.90%) live in the city. Since access to health services may be easier in large living areas, health beliefs may have been affected positively.

In this study, the mean total score of HBMSDP in females was lower than males ($p < 0.05$). Gafvels and Wandell found that the behaviors and attitudes of female toward diabetes were not as positive as those of male. [37] In other studies, no significant relationship was found between gender and health beliefs. [17,20,21,26,36] It has been reported that the education status, health, and employment rates of female in Turkey are not as positive as those of male. It has been reported that low social status, low income and low education level prevent women from accessing health services. [38] For this reason, it is thought that all these factors may adversely affect the perceptions of female patients to protect and improve their health, and this situation is reflected in the results of the study.

In this study, the health beliefs of elderly individuals living in villages/towns were lower (*p <0.05*). It has been reported that rural areas are difficult living environments for elderly individuals due to the lack of local services, lack of public transportation and long distances to main centers. [15,39] In this study, elderly individuals with diabetic foot ulcers can access treatment opportunities such as negative pressure wound therapy and wound care materials available in cities, in provincial centers. Therefore, it is thought that the health beliefs of the population may have affected it. Based on this result, it is recommended that nurses manage the care process by taking into account where individuals live.

Education is an important determinant of individuals' decisions about their health and their orientation toward positive health behaviors. [17,21] In this study, as the education level of the patients decreased, the scores for their health beliefs also decreased ($p < 0.05$). Similarly, other studies have reported that there is a significant relationship between health beliefs and education level. [17,20,26,27,35,36] Based on this study result, it is thought that elderly individuals with a low education level also have a low tendency to protect and improve their health.

Beliefs and attitudes toward health play an important role in effective management of diabetes and foot care behaviours. [19,35] In present study, it was seen that patients who did regular foot care had higher health belief scores than those who did not do regular foot care ($p < 0.05$). Other studies have also found that health belief is a predictor of diabetic foot care behavior. [19,40] Education of elderly with diabetic foot ulcer on proper foot care may play a key role. [21] It is thought that education-based policies implemented in hospitals and community health centers for diabetic foot care may have an impact on individuals' health beliefs and healthy care behaviors.

In this study, the scores for health beliefs were higher in patients who received information about diabetes. This outcome was similar to the results obtained by Sermet Kaya and Shabibi et al. [18,41] However, this results differed from those of Agralı who reported that participation in training programs related to diabetes had no effect on the health belief of patient. [17] As complications in the diabetic foot conditions of our patients developed, most of them attended the training programs given by the wound care nurse when they came to the clinic for treatment of their foot injury. This training may have had a positive impact on their health beliefs by addressing the patients' questions and concerns.

This study shows that as elderly individual' health beliefs and perceptions of benefit increase, the disease burden of elderly diabetics decreases. It has been reported that the perceived benefit was the individual's beliefs in the benefit of the proposed protective behavior to prevent or reduce the severity of the disease. [17,19,21] Therefore, as a result of this finding, it is thought that patients' beliefs about the benefits of protective behavior may lead them to exhibit protective behavior. Thus, the negative effects of the disease and the disease burden can be reduced. As elderly with diabetic foot perceptions of benefit, recommended health-related activities, and health belief increase, symptom burden decreases. This result highlights the importance of demonstrating the benefits of controlling the symptoms of the disease. Therefore, in order to reduce the symptom burden, it is

recommended that caregivers and healthcare professionals of elderly individuals plan interventions that will increase their health belief.

Conclusion and Recommendations

As a result, diabetes burden of the elderly individuals with diabetic foot ulcer was moderate level. It was found that being single; having diabetes for 21 years or more; having a stage 4/5 diabetic foot wound; having additional complications and not doing regular foot care were found to increase the diabetes burden. Another finding of this study that elderly individuals with diabetic foot ulcers has high levels of health belief. It was found that being a woman, having a low level of education, living in a village, not receiving information about diabetes and not having regular foot care were associated with lower health beliefs. There was a negative correlation between the EDBS scale total score and the total HBMSDP and "perceived benefits subscale". It was also found that there was negative correlation between the "symptom burden subscale" and HBMSDP total score and the 3 subscale ("perceived benefits", "perceived barriers", and "health-related activities") of the HBMSDP. It is thought that it is important to provide comprehensive diabetes and diabetic foot screenings to elderly individuals. When providing care, variables such as gender, marital status, education level, duration of diabetes, additional complications, stage of diabetic foot wound, and foot care behavior should be taken into consideration. It is recommended to conduct studies with larger samples and comparing different countries investigating the diabetes burden and health beliefs of elderly with diabetic ulcers.

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