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Diabetes Burden and Self-Efficacy Levels As Determinants of Foot Care Behaviors in Older Adults: Descriptive Comparative Study

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ABSTRACT

Aim: This study aimed to determine foot care behaviors, diabetes burden, and self-efficacy levels of older adults with and without diabetic foot ulcer and to examine the determinants affecting their foot care behaviors.

Material and Methods: This descriptive comparative study was included 115 older adults with diabetic foot and 115 older adults without diabetic foot. Descriptive statistics, chi-square test, t test, one way anova, mann whitney u, kruskal wallis test and multiple regression analysis were used in the analysis of the data.

Results: Being literate *(β=0.674)*, living in a city *(β=0.549)*, not complying with the diabetes diet *(β=0.408)*, having four chronic diseases *(β=0.838)*, using insulin *(β =0.761)*, not measuring blood glucose level *(β=0.398)*, visiting a doctor once a year or more *(β=0.573)*, not being hospitalized due to diabetes complications in the last year *(β =0,789)*, mean scores for the overall Self-Efficacy Scale *(β=0.832)* and its subdimensions, mean scores for the overall Elderly Burden Diabetes Scale *(β=0.838)* and its subdimensions (p<0.001). Being literate *(β=0.745)*, not complying with diabetes diet *(β=0.823)*, not doing regular physical exercise *(β=0.736)*, mean scores for the overall Self-Efficacy Scale *(β = 0.801)* and its subdimensions, mean scores for the overall Elderly Burden Diabetes Scale *(β=0.817)* and its subdimensions were predictors of foot care behaviors of the older adults without diabetic foot ulcer (p<0.001).

Conclusion: Older adults without diabetic foot ulcer displayed poor foot care behaviors. It was determined that the diabetes burden and self-efficacy levels of older adults had a effect on predicting foot care behaviors. In line with this result, increasing the self-efficacy level of older adults may reduce the burden of disease. It may also positively affect foot care behaviors.

Keywords: *Type 2 diabetes, Diabetes burden, Foot care behavior, Older adults, Self-efficacy*

Yaşlı Bireylerde Ayak Bakım Davranışlarının Belirleyicileri Olarak Diyabet Yükü ve Öz-Etkililik Düzeyleri: Tanımlayıcı Karşılaştırmalı Çalışma

ÖZ

Amaç: Bu çalışmada, diyabetik ayak ülseri olan ve olmayan yaşlı bireylerin ayak bakım davranışlarını, diyabet yükünü ve öz-etkililik düzeylerini belirlemek ve ayak bakım davranışlarını etkileyen belirleyicileri incelemek amaçlamıştır.

Gereç ve Yöntemler: Bu tanımlayıcı ve karşılaştırmalı çalışmaya diyabetik ayak ülseri olan 115 ve diyabetik ayak ülseri olmayan 115 yaşlı birey dahil edilmiştir. Verilerin analizinde Mann Whitney U, Kruskal-Wallis, çoklu regresyon analizi kullanılmıştır.

Bulgular: Diyabetik ayak ülseri olan yaşlı bireylerde okuryazar olmak *(β=0,674)*, ilde yaşamak *(β=0,549)*, diyabet diyetine uymamak *(β=0,408)*, kronik hastalık sayısının dört olması *(β=0,838)*, insülin kullanmak *(β =0,761)*, kan şekerini ölçmemek *(β=0,398)*, yılda bir ve daha fazla doktora gitmek *(β=0,573)*, son bir yıl içinde şeker hastalığı komplikasyonları nedeniyle hastaneye yatmamak *(β =0,789)*, öz-etkililik toplam puanı *(β=0,832)* ve alt boyutları, diyabet yükü toplam puanı *(β=0,838)* ve alt boyutları ayak bakım davranışlarının yordayıcılarıdır (p<0,001). Diyabetik ayak ülseri olmayan yaşlı bireylerde ise okuryazar olmak *(β=0,745)*, diyabet diyetine uymamak

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(β=0,823), düzenli fiziksel egzersiz yapmamak *(β=0,736)*, öz-etkililik *(β=0,801)* ve alt boyutları, diyabet yükü düzeyleri *(β=0,817)* ve alt boyutları ayak bakım davranışlarının yordayıcılarıdır (p<0,001).

Sonuç: Diyabetik ayak ülseri olmayan yaşlı bireylerin ayak bakımı davranışları kötüdür. Yaşlı bireylerin diyabet yükü ve öz-etkililik düzeyleri ayak bakım davranışlarını yordamada bir etkiye sahiptir. Bu sonuç doğrultusunda yaşlı bireylerin öz-yeterlik düzeylerinin artırılması hastalık yükünü azaltabilir. Aynı zamanda ayak bakım davranışlarını da olumlu yönde etkileyebilir.

Anahtar Sözcükler: *Tip 2 diyabet, Diyabet yükü, Ayak bakım davranışı, Yaşlı birey, Öz-etkililik*

INTRODUCTION

Diabetic foot (DF) is a serious chronic complication because it reduces quality of life, threatens life, and leads to economic burden (1). It consists of deep tissue lesions associated with neurological disorders and peripheral vascular disease in the lower extremities (2). The prevalence of DF was determined as 6.3% in the world (3) and as 3.2% in Turkey (4).

Age, education level, sex, diabetes distress, family support, foot care knowledge, diabetic foot ulcer history, and nephropathy have been reported as the determinants of foot care behaviors (5,6). In the present study, variables such as diabetes burden and self-efficacy, which might be the determinants of foot care behavior, were investigated. The burden of DM increases in older adults who have difficulties in performing the activities of daily living and fulfilling their care needs due to physiological and biological changes. Therefore, they have difficulty in complying with their treatment and performing especially their practices related to foot care behaviors. Thus, old age creates a burden in individuals with type 2 DM; besides, complications such as DM and DF lead to a secondary burden (1,7).

The self-efficacy levels of older adults with type 2 DM play an important role in coping with conditions such as diabetes burden, gaining positive health behaviors, and reducing health risks (8,9). D'Souza et al. reported that self-efficacy affected glycemic control, diet, exercise, drug use, and foot care behaviors (10). A review of study conducted on foot care behaviors and self-efficacy demonstrated a positive relationship between self-efficacy and foot care behavior, and individuals whose self-efficacy levels were high displayed better foot care behaviors (8). However, Wendling & Beadle reported no significant relationship between self-efficacy and foot care behavior (9).

Determining the self-efficacy level and diabetes burden of older adults with type 2 DM and revealing their foot care practices can contribute to the planning of the type 2 DM treatment. Studies mostly focused on foot care knowledge and practices, or self-efficacy (5,8,10-12). The present study aimed at the investigation of self-efficacy and diabetes burden, which can affect foot care behavior; hence, it is expected to contribute to the relevant literature. Given the importance of self-efficacy in gaining positive health behaviors, the present study can also provide guidance for the planning of interventional studies to be conducted to investigate effects of self-efficacy on diabetes burden and foot care behaviors.

The present study was conducted to determine foot care behaviors, diabetes burden, and self-efficacy level, and to investigate the mean scores of foot care behaviors according to their sociodemographic and disease/health-related characteristics, and to specify the determinants affecting their foot care behaviors in older adults with and without diabetic foot ulcer.

MATERIAL and METHODS

Study Design and Participants

This descriptive comparative study was conducted in a state hospital, a province in (Redacted For Peer Review). Sixteen independent variables (education level, compliance with the diabetes diet, doing regular physical activity, the number of chronic diseases, diabetes treatment method, frequency of blood glucose measurement, frequency of visiting the doctor about diabetes, hospitalization due to diabetes complications in the past year, diabetes management self-efficacy scale total and burden diabetes scale total and its subdimensions symptom burden, social burden, dietary restrictions, worry about diabetes, treatment dissatisfaction, burden by tablets or insulin) were determined as determinants of foot care behaviors for individuals with and without diabetic foot ulcer. The minimum sample size was estimated as 230 patients (power: 95%, significance level: 0.05, effect size: 0.15), of which 115 were patients with diabetic foot ulcer and 115 were patients without diabetic foot ulcer (13). The convenience sampling method, was used for sample selection. The inclusion criteria of the study were as follows: being in the age group of 65 and above, having the diagnosis of type 2 DM for 6 months or more, and having DF ulcers (for those in the diabetic foot ulcer group). The exclusion criteria of the study were as follows: having verbal communication difficulties, having undergone foot/leg amputation, and having the diagnosis of type 1 DM.

Before the study was conducted, ethical approval was obtained from the ethics committee of the Faculty of Health Sciences, University (Ethics no: 2019/218), and the written permission was obtained from Health Sciences University Training and Research Hospital (Decision no:2019/03-13) where the study was to be conducted. An informed consent form was provided to all individuals who participated in the study.

Data Collection

The researcher used the face-to-face survey method to collect the data from individuals who presented to the emergency service, internal medicine clinic, infectious disease clinic, plastic surgery clinic, and the dressing room of the outpatient clinic from 8.00 a.m. to 5.00 p.m. between October 1, 2019, and March 1, 2020. The researcher was informed about the participants presented to these units by their respective heads.

Assessment Tools

The Personal Information Form, Foot Care Behavior Assessment Form, Self-Efficacy Type 2 Scale for patients with type 2 DM, and Elderly Burden Diabetes Scale were used to collect data.

Personal Information Form: The Personal Information Form prepared by the researcher following the pertinent literature (7,10) comprised 2 parts and 21 items related to the sociodemographic and health- and disease-related characteristics of the participants.

Foot Care Behavior Assessment Form: The Foot Care Behavior Evaluation Form, which the researcher prepared after reviewing the relevant literature, was used to assess the foot care practices of participants (10,14-16). This evaluation form was reviewed by five public health nursing experts. No statistically significant differences were observed between the scores given by the experts related to foot care behaviors (Kendall's W=.182, p = .551).

The form consisted of 16 questions. The responses given to the questions had three options: "yes, always," "yes, sometimes," and "no, never." Individuals with positive foot care behaviors were expected to mark the "yes, always" option for all the questions. The participants were recommended to practice the foot care behaviors listed in all of the questions on the Foot Care Behavior Assessment Form on a daily basis (15-17). Individuals were expected to mark the "yes, always" option for all the 16 questions in the form if their foot care behaviors were to be considered as good. The number of marked "yes, always" was used as continuous data. Reduction the number of marked "yes, always" was evaluated as poor foot self-care behavior.

Self-Efficacy Type 2 Scale: The scale was developed by Bijl et al. to determine the perception of self-efficacy among patients with diabetes in performing their own care activities (18). The Turkish version of the scale whose validity and reliability study was carried out by Kara et al. (19). The scale has three dimensions (diet + foot control, medical treatment; physical exercise) and 20 items rated on a 5-point Likert-type scale. The minimum and maximum possible scores to be obtained from the overall scale are 20 and 100 respectively. According to the mean score obtained from the scale, individuals were said to have a low, medium, or high level of self-efficacy. As the score increased, the level of self-efficacy increased (18,19).

Elderly Diabetes Burden Scale: The scale was developed in 2003 in Japan by Araki and Ito (20) to measure the burden of diabetes in older adults. The Turkish validity and reliability study of the scale was carried out by Usta and Esen (21). The scale has 22 items whose responses are rated on a Likert-type scale and the following six dimensions: symptom burden, social burden, dietary restrictions, worry about diabetes, treatment dissatisfaction, and burden by tablets or insulin. The minimum and maximum possible scores to be obtained from the overall scale are 18 and 88 respectively. An increase in the sub-dimension score indicated that the level of burden in that domain was high, whereas a decrease indicated that the level of burden in that domain was low (21).

Statistical Analyses

The study data were analyzed on the computer using the IBM SPSS 25. In the analysis of data were used descriptive statistics, chi-square test, t test, one way anova, mann whitney u, kruskal wallis test and multiple regression analysis (choosing backward method). The Kolmogorov-Smirnov test and Q-Q plots were used to find out whether the data were normally distributed. In the analysis, categorical variables were determined as 1 for the groups with risk factors. The coding of groups at risk was decided according to the significance values of the t test, ANOVA, and Kruskal-Wallis test. p values <0.05 indicated statistically significant differences.

RESULTS

Participants' Sociodemographic and Health- and Disease-Related Characteristics

The mean age of the participants with diabetic foot ulcer was 69.18 ± 4.49 years. Of these, 67.0% were men, 73.9% were married, 49.6% were primary school graduates, 55.7% perceived their economic status as moderate, 46.1% lived with their spouses, and 80.0% lived in a city. The mean age of the participants without diabetic foot ulcer was 71.30 ±

5.98 years. Of these, 56.5% were women, 63.5% were married, 44.3% were primary school graduates, 61.7% perceived their economic status as moderate, 39.1% lived with their spouses, and 89.5% lived in a city (Table 1).

The variables such as educational status, place of residence, compliance with the diet, number of chronic diseases, diabetes treatment method, frequency of having blood glucose measurements, frequency of visiting the doctor about diabetes, being hospitalized in the past year, and having an education demonstrated significant differences in terms of foot care behavior scores in the participants with diabetic foot ulcer (p<0.05). The variables such as educational status, compliance with diabetes diet, and doing regular physical activity demonstrated significant differences in terms of in the older participants without diabetic foot ulcer (p<0.05) (Tables 1, 2).

Mean Scores the Participants Obtained from the Scales and Some of Their Health-Related Characteristics

Statistically significant differences were found between the participants with and without a diabetic foot ulcer in terms of the total mean scores they obtained from the self-efficacy scale, elderly burden diabetes scale, and foot care behavior assessment form (p<0.05). The number of the items marked as yes by the participants with diabetic foot ulcer was higher than that marked by the participants without diabetic foot ulcer. Statistically significant differences were observed between the participants with and without diabetic a foot ulcer in terms of the variables such as the HbA1c level, duration of smoking in smokers and ex-smokers (p<0.05) (Table 3).

Determinants Factors the Foot Care Behaviors of the Participants with Diabetic Foot Ulcer

The predictors of the foot care behaviors of the participants with diabetic foot ulcer were as follows: education level (β=0.674); place of residence (β 0.549); compliance with the diabetes diet (β=0.408); number of chronic diseases (β=838); diabetes treatment method (β=0.761); frequency of blood glucose measurements (β=0.398), frequency of visiting a doctor for diabetes (β=0.573); hospitalization due to diabetes complications in the last year (β=0.789); mean scores for the overall Self-Efficacy Scale (β=0.832) and its diet + foot control (β= 0.640), medical treatment (β=0.654),

Table 1: Distribution of mean scores of foot care behavior according to the participants' socio-demographic characteristics

Variables	Participants with foot ulcer (n=115)			Participants without foot ulcer (n=115)			p[d]
	n (%)	Mean±SD	p[a]	n (%)	Mean±SD	p[a]	
Sex[b]							
Female	38 (33.0)	8.68±2.74	0.910	65 (56.5)	6.73±2.14	0.051	0.003*
Male	77 (67.0)	8.74±2.76		50 (43.5)	7.40±2.96		
Marital status[b]							
Married	85 (73.9)	9.05±2.72	0.730	73 (63.5)	7.27±2.71	0.257	0.001*
Single	30 (26.1)	7.76±2.63		42 (36.5)	6.59±2.17		
Educational status[c]							
Literate but not a graduate of any school	27 (23.5)	7.55±2.10**	0.030*	46 (40.0)	6.34±2.01**	0.030*	0.001*
Primary school	57 (49.6)	9.03±2.85		51 (44.3)	7.56±2.89		
Middle school and above	31 (27.0)	9.16±2.82		18 (15.7)	7.22±2.41		
Perceived economic level[c]							
Good	15 (13.0)	9.73±2.86	0.070	23 (20.0)	7.26±1.88	0.776	0.017*
Middle	64 (55.7)	8,82±2.87		71 (61.7)	7.04±2.71		
Bad	36 (31.3)	8.11±2.37		21 (18.3)	6.71±2.64		
Households[c]							
Spouse	53 (46.1)	9.05±2.87	0.390	45 (39.1)	7.37±2.81	0.586	0.103
Spouse and children	32 (27.8)	9.06±2.48		27 (23.5)	7.07±2.63		
Children	16 (13.9)	7.75±2.76		23 (20.0)	6.69±2.22		
Alone	14 (12.2)	7.78±2.57		20 (17.4)	6.55±2.13		
Place of residence[c]							
Village/town	16 (13.9)	7.87±2.55	0.006*	8 (7.0)	5.87±2.90	0.418	0.026*
District	7 (6.1)	9.00±1.63		4 (3.5)	6.75±2.36		
City	92 (80.0)	7.46±2.65**		103 (89.5)	6.68±3.14		

*p<0.05 **Post hoc test "Duncan" [a] foot care behavior status significance values [b] independent samples t test [c]one way anova test [d] Chi-square analysis

and physical exercise subdimensions (β=0.843); and mean scores for the overall Elderly Burden Diabetes Scale (β=0.838) and its symptom burden (β=0.727), social burden (β=0.826), dietary restrictions (β=0.582), worry about diabetes (β=0.703), treatment dissatisfaction (β=0.739), and tablets or insulin use subdimensions (β=0.814) (p<.001).

Table 2: Distribution of the mean scores of the foot care behavior according to the participants disease/health-related characteristics

Variables	Participants with foot ulcer			Participants without foot ulcer			p[d]
	n (%)	Mean±SD	p[a]	n (%)	Mean±SD	p[a]	
Smoking status[c]							
Smoker	13 (11.3)	7.30±2.35	0.136	12 (10.4)	7.25±3.07	0.811	0.002*
Non-smoker	56 (48.7)	8.82±2.94		81 (70.4)	6.92±2.58		
Ex-smoker	46 (40.0)	9.00±2.52		22 (19.1)	7.27±2.11		
Alcohol consumption[b]							
Non-drinker	104 (90.4)	8.83±2,77	0.300	112 (97.4)	7.00±2.55	0.725	0.143
Ex-drinker	11 (9.6)	7.63±2.29		3 (2.6)	7.66±2.08		
Compliance with the diabetes diet[c]							
Yes	24 (20.9)	10.37±2.68	0.001*	40 (34.8)	7.95±1.97	0.011*	0.067
No	39 (33.9)	7.23±2.57**		29 (25.2)	6.20±3.21**		
Sometimes	52 (45.2)	9.07±2.35		46 (40.0)	6.73±2.30		
Doing physical activities regularly[c]							
Yes	2 (1.7)	9.00±4.24	0.634	8 (7.0)	8.87±1.95	0.043*	0.001*
No	94 (81.7)	8.60±2.64		75 (65.2)	6.73±2.69**		
Sometimes	19 (16.5)	9.26±3.22		32 (27.8)	7.25±2.09		
Presence of other chronic diseases[b]							
Yes	80 (69.6)	8.71±2.77	0.681	101 (87.8)	6.83±2.31	0.239	0.138
No	35 (30.4)	8.74±2.73		14 (12.2)	8.42±3.61		
The number of other chronic diseases[c]							
1	31 (27.0)	9.00±2.59	0.030*	30 (26.0)	6.83±2.35	0.145	0.002*
2	24 (21.0)	9.35±2.93		35 (30.6)	6.75±2.24		
3	20 (17.2)	8.56±2.59		30 (26.0)	6.86±2.55		
4	5 (4.4)	5.83±1.47**		6 (5.2)	6.83±1.16		
Diabetes treatment method[c]							
Oral diabetic	19 (16.5)	9.40±2.83	0.001*	43 (37.4)	6.09±2.26	0.451	0.003*
Insulin	61 (53.0)	8.22±2.72		51 (44.3)	7.70±2.20		
Oral diabetic and insulin	35 (30.4)	9.18±2.63		21 (18.3)	6.70±1.89		
Frequency of having blood glucose measurements[c]							
Everyday	33 (28.7)	9.87±2.68	0.006*	38 (33.0)	7.89±2.15	0.063	0.001*
Sometimes	25 (21.7)	8.16±2.59		19 (16.5)	6.47±2.45		
If I feel bad	31 (27.0)	9.03±2.83		33 (28.7)	7.51±3.01		
I don't measure	26 (30.6)	7.52±2.25**		25 (21.7)	5.48±1.63		
Frequency of visiting a doctor for diabetes[c]							
Once every 3 months	31 (27.0)	9.16±3.19	0.001*	41 (35.7)	7.60±2.09	0.350	0.002*
Once every 6 months	20 (17.3)	11.20±1.67		25 (21.7)	7.36±1.91		
Once a year or more	64 (55.7)	7.67±2.78		49 (42.6)	6.10±2.39		
Being hospitalized in the past year[b]							
Yes	102 (88.7)	8.91±2.52	0.003*	56 (48.7)	7.12±2.83	0.127	0.002*
No	13 (11.3)	7.23±3.94		59 (51.3)	6.93±2.25		
Having education on diabetic foot[b]							
Yes	65 (56.5)	9.25±2.74	0.046*	56 (48.7)	7.38±2.33	0.102	<0.001*
No	50 (43.5)	7.20±2.15		59 (51.3)	6.00±1.90		

*p<0.05 **Post hoc test "Duncan" [a] foot care behavior status significance values [b] independent samples t test [c]one way anova test [d] Chi-square analysis

These factors explained the change in foot care behavior by 72.4% (adjusted $R^2 = 0.724$) (Table 4).

Determinants Factors the Foot Care Behaviors of the Participants Without Diabetic Foot Ulcer

The predictors of the foot care behaviors of the participants without diabetic foot ulcer were as follows: educational level (β=0.745); compliance with the diabetes diet (β=0.823); regular physical exercise (β=0.736); mean scores for the overall Self-Efficacy Scale (β=0.801), and its diet + foot control (β=0.683), medical treatment (β=0.739), and physical exercise subdimensions (β=0, 0.741); and mean scores for the overall Elderly Burden Diabetes Scale (β=0.817) and its symptom burden (β=0,677), social burden (β=0.583), dietary restrictions (β=0.746), worry about diabetes (β=0.625), dissatisfaction with treatment (β=0.803), and tablets or insulin use subdimensions (β=0.634) (p<.001). These factors explained 80.9% (adjusted $R^2 = 0.809$) of the change in foot care behavior (Table 5).

DISCUSSION

Diabetic foot is an important complication due to its social and psychological effects and economic burden (22). The risks to the foot can be reduced by performing evaluations and procedures such as diabetic foot training, care, determining foot pressure points, practices to reduce standing load, insoles, skin and nail care (23,24). On the other hand, the fact that individuals with type 2 DM have poor foot care behaviors increases their risk of developing DF (17) therefore, determining the factors affecting their foot care behaviors can help prevent the development of DF and its complications. In several studies, participants with high education levels had good knowledge and practice of foot care, which was consistent with the results of the present study (5,11,25). On the contrary, unlike the results of our study, in some other studies, the educational status of the participants was reported not to have a significant effect on foot care behaviors (26). However, individuals with higher education levels were expected to have better foot care behaviors because besides the information given to them during the training, they can easily search for, access, read, and understand information on foot care.

In the present study, no difference was found between the foot care behaviors of the participants in both groups in terms of the variables such as sex and marital status (Table 1).

Table 3: Distribution of foot care behavior, self-efficacy, and burden diabetes, and some of their disease/health-related characteristics of participants

Variables	Participants with foot ulcer	Participants without foot ulcer	p
Foot care behavior			
The number of the items marked as "Yes"[a]	8.68±2.78	6.91±2.28	0.038*
Self-efficacy [a]			
Diet+foot control	35.15±7.54	38.82±7.77	<0.001
Medical treatment	18.98±4.02	18.88±4.23	0.861
Physical exercise	7.23±3.00	7.02±3.03	0.601
Self-efficacy scale total	61.37±12.04	64.73±12.22	0.037*
Burden diabetes [a]			
Symptom burden	7.89±3.41	8.23±3.91	0.485
Social burden	12.57±2.79	12.62±3.93	0.908
Dietary restrictions	9.53±2.63	8.57±3.17	0.013
Worry about diabetes	9.92±2.87	8.57±3.26	0.001*
Treatment dissatisfaction	3.13±1.11	2.99±1.06	0.333
Burden by tablets or insulin	5.33±1.71	4.84±1.54	0.025*
Burden diabetes scale total	48.41±8.21	45.86±10.80	0.045*
Health / disease characteristics			
Duration of diabetes (years)[a]	16.03±6.82	15.60±8.49	0.310
Hba1c (%)[a]	8.83±2.10	8.77±2.31	0.020*
Duration of smoking in smokers (years)[b]	13.62±4.74	4.68±2.71	<0.001
Duration of smoking in ex-smokers (years)[b]	14.19±8.52	6.88±2.28	0.002*

*p<0.05 [a] Independent samples t test [b]Mann Whitney U test

Table 4: Determinants factors affecting foot care behaviors of the participants with diabetic foot ulcer

Variables	β	t	p	Collinearity	
				Tolerance	VIF
Education level (1=literate but not a graduate of any school)	0.674	4.659	<0.001	0.735	4.509
Place of residence (1=city)	0.549	7.029	<0.001	0.746	5.930
Compliance with the diabetes diet (1=no)	0.408	3.739	<0.001	0.537	5.729
The Number of Chronic Diseases (1=4)	0.838	4.812	<0.001	0.928	6.813
Diabetes treatment method (1=Insulin users)	0.761	3.892	<0.001	0.762	5.782
Frequency of blood glucose measurement (1=those who do not measure)	0.398	6.719	<0.001	0.195	5.825
Frequency of visiting the doctor about diabetes (1=once a year or more)	0.573	6.829	<0.001	0.328	7.823
Hospitalization due to diabetes complications in the past year (1=no)	0.789	6.139	<0.001	0.584	7.470
Diet+ foot control	0.640	5.267	<0.001	0.649	8.342
Medical treatment	0.654	5.094	<0.001	0.708	8.734
Physical exercise	0.843	6.304	<0.001	0.816	7.773
Self-efficacy scale total	0.832	7.369	<0.001	0.476	8.178
Symptom burden	0.727	7.457	<0.001	0.647	7.435
Social burden	0.826	5.038	<0.001	0.612	8.883
Dietary restrictions	0.582	6.389	<0.001	0.745	6.607
Worry about diabetes	0.703	4.739	<0.001	0.667	7.368
Treatment dissatisfaction	0.739	8.883	<0.001	0.784	6.725
Burden by tablets or insulin	0.814	7.037	<0.001	0.882	7.047
Burden Diabetes Scale Total	0.838	6.734	<0.001	0.547	8.284
	R^2=0.626	Adjusted R^2= 0.724		F=6722.537	p<0.001

Table 5: Determinants factors affecting foot care behaviors of the participants without diabetic foot ulcer

Variables	β	t	p	Collinearity	
				Tolerance	VIF
Education level (1=literate but not a graduate of any school)	0.745	6.702	<0.001	0.673	5.037
Compliance with the diabetes diet (1=no)	0.823	6.735	<0.001	0.625	4.627
Doing regular physical activity (1=no)	0.736	4.692	<0.001	0.734	5.936
Diet+ foot control	0.683	6.856	<0.001	0.368	6.364
Medical treatment	0.739	7.634	<0.001	0.452	7.237
Physical exercise	0.741	3.836	<0.001	0.478	6.036
Self-efficacy scale total	0.801	5.728	<0.001	0.257	5.376
Symptom burden	0.677	6.378	<0.001	0.563	8.653
Social burden	0.583	5.251	<0.001	0.692	8.374
Dietary restrictions	0.746	6.367	<0.001	0.719	7.384
Worry about diabetes	0.625	8.267	<0.001	0.592	7.321
Treatment dissatisfaction	0.803	5.067	<0.001	0.573	7.527
Burden by tablets or insulin	0.634	7.814	<0.001	0.912	8.884
Burden Diabetes Scale Total	0.817	6.450	<0.001	0.735	7.574
	R^2=0.854	Adjusted R^2= 0.809		F=7283.703	p<0.001

Similarly, in the study by Solan et al., no relationship was determined between marital status and foot care behaviors (27). The review of studies in the literature demonstrated no significant relationship between sex and foot care behaviors (26-28). These results contradicted the existing literature, which indicated that men were generally reluctant to accept their health problems and seek help for foot care. Unlike our study, several studies reported a statistically significant relationship between sex and foot care behaviors, and that women displayed better foot care behaviors than did men (11,29), which might was probably due to the differences in the educational and socio-cultural statuses of the participants.

In the present study, no significant relationship was observed between the perceived economic status and the mean scores obtained from the foot care behavior by the participants in both groups. However, unlike our study, in some studies, groups with poor economic status displayed poor foot care behaviors (30,31). The poor economic status might cause individuals to lead a risky lifestyle because they could not access and afford recommended personal care practices. In other studies, unlike the present study, participants living in rural areas had poorer knowledge and practice scores on foot care behavior than did participants living in urban areas (11,32). This could be explained by the fact that individuals living in city centers could access health services more easily than those living in rural areas.

In addition to socio-demographic characteristics, health/disease characteristics may have an effect on foot care behavior. In individuals with type 2 DM, the frequency of presenting to a health institution for control plays a significant role in controlling metabolism, evaluating compliance with treatment, and raising awareness about diabetes and foot care with the training. In a study conducted by Yücel and Sunay, foot care behaviors of those who did not have regular check-ups were significantly poorer than were foot care behaviors of those who had check-ups regularly every 3 or 6 months, consistent with the findings of the present study (26). For individuals with type 2 DM, having a regular blood glucose measurement is essential because this ensures that they have a healthy diet and regular physical activity, and also encourages them to display risk-reducing behaviors.

Similarly, in several studies, individuals who did not measure their blood glucose levels were less likely to display healthy foot care behaviors than were individuals who measured their blood glucose levels (33,34). Unlike the present study, Yıldırım Usta et al. determined a positive relationship between having blood glucose measurements and displaying foot care behaviors (6). In another study, it was reported that glycemic control level did not affect foot function in individuals with type 2 diabetes (35). In the present study, no significant relationship was found between DM treatment and foot care behaviors. In a study, those who took oral antidiabetic drugs together with insulin had better self-care practices (general and specific diet, physical activity, blood glucose testing, foot care, and medication) than did those who implemented other treatment practices (30).

It is important for all individuals with diabetes to receive training on DF and its prevention. The data on DF in our study revealed that the rate of getting an education about DF was low especially among the participants without diabetic foot ulcer. The fact that the rate of getting an education about DF among individuals with diabetic foot ulcer is high indicates that they are given training after DF complication develops. However, giving this training before DF develops is more important because this helps prevent the development of DF. Studies showed that structured DF care training improved foot care behaviors (36-38). In this respect, planning training about DF and repeating them at certain intervals may facilitate the acquisition of DF care behavior.

In the present study, the mean score obtained from the Self-Efficacy Scale was high in the participants without diabetic foot ulcer but low in the participants with diabetic foot ulcer. In the present study, the self-efficacy levels of the participants with and without diabetic foot ulcer affected their foot care behaviors. Similarly, in several studies, the self-efficacy levels affected the participants' foot care behaviors (8,39,40). In a study was reported that individuals with poor glycemic control were more likely to have self-efficacy and self-care behaviors, and that glycemic control had an effect on improving diet, exercise, medication, and foot care behaviors (10). In a randomized controlled study, the participants in the intervention group displayed better foot care behaviors than did the participants in the control group, and the self-efficacy development program improved the participants' foot care behaviors (39). The study by Huda et al., reported a relationship between self-efficacy levels and foot care behavior, and that high self-efficacy levels would improve foot care behaviors (40). Unlike the present study, the study by Wendling and Beadle study showed no significant relationship between self-efficacy levels and foot care behaviors (9). Although the results differed from one study to another, programs to be planned to develop self-efficacy can improve foot care behaviors because self-efficacy increases the motivation of the individual to take action.

While aging creates a physiological burden for individuals, the development of type 2 DM and its complications in this process creates an additional burden on the individual; older adults suffer from burden more than do young people.

It is more difficult for older adults with type 2 DM to cope with this additional burden, accept the disease, comply with treatment, and acquire self-care and self-efficacy skills compared with young individuals with type 2 DM. Older adults with type 2 DM may have burdens to different extents depending on their sociodemographic, socioeconomic and health problems, and their needs for care. Therefore, their treatment and care should be implemented accordingly (20).

In the present study, the participants in both groups obtained high mean scores from the elderly burden diabetes Scale, indicating that their total diabetes burden was high. The diabetes burden of the participants with and without diabetic foot ulcer affected their foot care behaviors. The number of studies conducted on the relationship between foot care behaviors and diabetes burden in the literature is very few, and hence we could compare the results of our study with the results of these few studies. In a study by Ovayolu et al. study conducted with individuals aged more the 65 years, the mean score they obtained from the overall Elderly Burden Diabetes Scale (58.5 ± 9.6) was higher than that obtained in our study (7). In the same study, the level of diabetes burden was higher in the participants who were in the advanced age group and single or female, who had low income, who received oral antidiabetic or insulin therapy, whose diabetes duration was 6-11 years, and who had a chronic disease accompanying diabetes (7). In another study, the mean score obtained from the overall elderly burden diabetes scale was 35.21 ± 6.94 (41). In our study, the fact that the participants with DF ulcer obtained a higher mean score from the overall elderly burden diabetes scale than did the participants without DF ulcer suggests that the coexistence of diabetes and DF complications in an individual causes the person to suffer from burden more. Therefore, it is important to raise individuals' awareness of DF and make plans to prevent the development of DF.

The current study has some limitations that may limit the findings' validity. One of these limitations is that only people with type 2 diabetes who applied to a local hospital were sampled. Another limitation, participants were selected by convenience sampling. Therefore, the results cannot be generalized to other individuals with type 2 diabetes.

The participants without diabetic foot ulcer displayed poorer foot care behaviors than did the participants with diabetic foot ulcer. The participants with diabetic foot ulcer obtained lower mean scores from the overall Self-Efficacy Scale and higher mean scores from the overall Elderly Burden Diabetes Scale than did the participants without diabetic foot ulcer.

In line with these results, it is recommended that individuals should be followed up and trained especially by the primary health care institutions to reduce the diabetes burden of older adults and prevent DF complications that may develop due to diabetes. At the same time, person-specific strengthening programs can be planned to improve patients' self-efficacy levels and help them manage type 2 DM more effectively. To determine older adults at risk for DF, their evaluation in terms of foot care behavior can be performed in primary health care institutions.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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Ethical Approval

Before the study was conducted, ethical approval was obtained from the Ethics Committee of the Faculty of Health Sciences University (Ethics no: 2019/218), and the written permission was obtained from Health Sciences University Training and Research Hospital (Decision no:2019/03-13) where the study was to be conducted. An informed consent form was provided to all individuals who participated in the study.

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