

## Original Article

## Determination of Foot Health Problems, Foot Care Knowledge and Behavior in Older People

**Fatma Zehra Genc, RN, MSc, PhD(c)**

Instructor, Department of Public Health Nursing, Faculty of Nursing, Necmettin Erbakan University, Konya, Turkey

**Emel Dogan, RN, MSc, PhD(c)**

Instructor, Health Care Services, Vocational School of Health Services, Selçuk University, Konya, Turkey

**Suzan Yildiz, RN, MSc, PhD(c)**

Instructor, Resadiye Vocational School, Tokat Gaziosmanpaşa University, Tokat, Turkey

**Naile Bilgili, RN, PhD**

Professor, Department of Public Health Nursing, Faculty of Health Sciences, Gazi University, Ankara, Turkey

**Correspondence:** Fatma Zehra Genc, Necmettin Erbakan University, Faculty of Nursing, Department of Public Health Nursing, Konya, Turkey, fzehra1992@hotmail.com fgenc@erbakan.edu.tr

### Abstract

**Aim:** Changes that occur with aging, increasing chronic diseases, inadequacies in maintaining basic foot care, and problems related to shoe selection lead to an increase in foot problems. Foot health problems are an important public health problem that lead to increased risk of falling, functional disability and social problems. The aim of this study was to identify foot health problems, foot care knowledge and behaviors of community-dwelling older people and nursing home residents.

**Methods:** This descriptive study was performed with 364 older individuals living in a nursing home who were admitted to three family health centers. Data were collected with personal information form, foot health problems form, foot care knowledge level form and foot care behavior scale. Independent samples t-test, Mann-Whitney U test, Kruskal-Wallis and Dunn test were used to analyze the data.

**Results:** Note that 70.6% of the older individuals were community-dwellers, 52.7% were women, 75% had chronic disease. The most common foot health problems in older individuals were dermatological problems (93.7%). These were identified as nail problems (82.4%), hallux valgus (20.6%), circulatory problems (26.9%) and sensation problems (30.5%). There were foot appearance problems in 60.7% of individuals, the most common of these problems were cracks (31.1%) and tinea pedis (22.8%). Almost all older individuals (91.8%) stated that foot health is important, 61.3% emphasized its importance in maintenance of walking/balance function. Moreover, 24.7% of the individuals had a foot examination before but only 7.7% received foot care education. More than 50% of the participants (57.7%) had inadequate foot hygiene. Care behavior differed depending on the education level and regular exercise.

**Conclusion:** Older individuals have insufficient knowledge of foot health and foot health is a neglected issue.

**Keywords:** old age, foot care, foot health, foot problems

### Introduction

Foot health is of great importance in old age and in any age group. Foot problems are more common in older people compared to other age groups because of reasons such as decreased skin elasticity, bone deformations, increased incidence of chronic disease that increase with age. Moreover, the inadequacy of older individuals in

maintaining basic foot care and the use of materials such as inappropriate footwear or socks increases the incidence of foot problems for older people (Stolt et al., 2013; Ikpeze et al., 2015; Tobin, 2017). Frequent foot health problems in older people cause morbidity, pain, increased risk of falling and functional disability, and bring financial burden to the health care system. Frequent foot health problems affecting the

quality of life of older individuals is an important public health problem (Eskiyurt, 2010; Kaoulla, Frescos & Menz, 2011; López-López et al., 2018; Muchna et al., 2018).

Rodríguez-Sanz et al. (2018) reported that foot problems affect 71-87% of older individuals, López-López et al. (2015) reported that 88% of older individuals have foot problems and Lai et al. (2014) stated that 81% of older individuals have at least one foot problem. The most common foot problems in older people are foot structural deformities (hallux valgus), skin problems (dry skin, hyperkeratosis), nail problems (thickened toenail, onychomycosis) and foot pain (Lai et al., 2014; Lam et al., 2017; Palomo-López et al., 2017; Galois et al., 2020).

Maintaining foot health in older people while improving the independence of the individual, the quality of life will help them remain an active member of society while at the same time ensuring the continuity of daily life activities (Eskiyurt, 2010; Stolt et al., 2013; Muchna et al., 2018). Therefore, various foot problems that are a source of pain, discomfort and disability in older individuals require to be detected and treated early. In addition to education and periodic controls of older individuals on issues such as foot hygiene, foot care information and behaviors and proper shoe wear, preventive approaches and education and medical services capabilities on foot health should be increased (Eskiyurt, 2010; Stolt et al., 2013).

Identifying foot health problems in older individuals and improving foot care behaviors will have a positive impact on the overall health of older individuals. Based on this idea, this study aimed to determine foot health problems, foot care information and behavior of society-dwelling older people and nursing home residents.

Research questions:

- What are the common foot health problems in older individuals?
- What is the level of foot care knowledge in older individuals?
- What are the foot care behaviors of older individuals?
- Do certain sociodemographic characteristics of older individuals affect foot care behavior?

## Methods

**Type of research:** This is a descriptive study.

**Population and sample of research:** The study was performed with the participation of older individuals living in Nursing Home Elderly Care Rehabilitation Center and admitted to three family health centers (FHC) selected with purposeful sampling method. G\*Power (3.1.9.2) program was used to determine the sample size, and minimum sample size was found to be 352. A total of 364 people who met the inclusion criteria were included in the study, including all older people living in the nursing home (107 older individuals) and 257 community-dwelling older individuals.

**Inclusion criteria:** Being 60 years old and older, not having problems that will interfere with communication, not being bedridden, having good cognitive and mental health, and having no diagnosis of diabetes.

**Data collection forms: Personal information form:** This form comprises 21 items on certain socio-demographic characteristics of older individuals (age, sex, marital status, education status, profession, smoking and alcohol use, BMI, exercise) and foot health (such as foot problems, hospitalization because of foot problem, foot care).

**Foot health problems form:** This form was created by the researchers based on the literature to collect data on foot health problems (Stolt et al., 2010; Menz et al., 2011; Stolt et al., 2012; Chan et al., 2012; Cuesta-Vargas et al., 2013; Erkoç et al., 2015; Menz, 2016; Gur et al., 2017; Muchna et al., 2018; Rodríguez-Sanz et al., 2018). Foot health assessment form comprises three sections: "Foot Evaluation, Footwear and Socks Assessment and Self-Care Skills". The first part was filled by researchers by examining twelve criteria such as amputation status of the foot, dermatological appearance of the foot, humidity, and hygiene. The second part comprises questions about the choice of shoes and socks. The third part comprises eight questions to assess the self-care skills of older people.

**Foot care knowledge level form:** Foot care knowledge level form was created in accordance with the literature (Chan et al., 2012; Stolt et al., 2013; Erkoç et al., 2015). It includes 10 questions on foot health, changes in feet, foot ailments, foot care, nail care, and characteristics of footwear.

**Foot care behavior scale:** The scale was created by Borges & Ostwald in accordance with the American Diabetes Association (ADA) criteria for developing foot self-care behaviors (Borges &

Ostwald, 2008). Bicer & Enc (2014) conducted the Turkish validity and reliability study of Foot Care Behavior Scale. The scale comprises 15 items. The Cronbach alpha value of the scale is 0.85. Scale items contain information on nail cutting, foot hygiene, care and footwear materials (Bicer & Inc, 2014).

**Ethical considerations:** The necessary approvals were obtained from the University Ethics Commission (Research Code No: 2019/060), the institutions where the research would be performed, and from older people participating in the research. Permission to use the scale was obtained from researchers who developed the foot care behaviors scale.

**Statistical analysis:** Descriptive statistics were presented as number, percentage, mean, standard deviation, median, minimum and maximum values. To assess the normal distribution of data, Kolmogorov–Smirnov test and kurtosis and skewness values were used. Independent samples t test, Mann–Whitney U test and Kruskal–Wallis test were used to compare foot care behaviors scale scores. Statistical significance level was accepted as  $p < 0.05$ . In case of three or more groups, Dunn test was used to determine by which group the difference was caused.

## Results

Note that 70.6% of the participants were community-dwelling older people, 52.7% were female, 65.1% were between 60 and 74 years old, 48.9% graduated from primary school/secondary school, and 75% had chronic disease (Table 1). Moreover, 24.7% of the individuals had a foot examination before but only 7.7% received foot care education (Table 2).

Open-ended questions were asked about the level of foot care knowledge of individuals and the answers given by individuals were grouped. Almost all older individuals (91.8%) stated that foot health is important, 61.3% emphasized its

importance in maintenance of walking/balance function. Moreover, 64.3% of respondents stated that there was a change in their feet as they grew older. The vast majority of participants (74.5%) stated that feet should be regularly verified, skin (47.3%) and nail care (70.3%) is required, assistance should be sought for any foot problems (81.9%) and attention should be paid to things worn on the feet (82.4%).

The most common foot health problems in older individuals are dermatological problems (93.7%). Based on the foot examination performed by researchers, most common dermatological problems were nail problems (82.4%), orthopedic problems hallux valgus (20.6%), circulation related temperature problems (26.9%) and sensory problems (30.5%) (Table 3).

There are problems with foot appearance in 60.7% of older individuals, which include cracks (32.1%) and tinea pedis (22.8%). Problems with foot hygiene are present in 14.6% of the participants and foot odor is the most common problem (9.3%). Moreover, 82.4% of older individuals have nail problems. These include incorrect cutting of nails (round cut) (54.1%) and thickened nail (53.3%) (Table 3).

Shoes and socks of older individuals were evaluated and the results are presented in Figure 1. The distribution of the results of older individuals regarding foot health self-care skills is presented in Figure 2. More than 50% of the participants (57.7%) had inadequate foot hygiene.

Table 4 lists the results of foot care behaviors scale according to sociodemographic characteristics. The mean values of foot care behavior scale vary according to regular exercise status ( $p = 0.01$ ). In older people who regularly exercise, the median value is higher compared to older people who do not exercise. Median values of foot care behaviors scale differ according to the education status, and the median value is higher in the high school graduates ( $p < 0.001$ ).

**Table 1. Socio-demographic characteristics of older individuals and distribution of some habits**

Category	Variable	N	%
Residence	Community-dwelling	257	70.6
	Nursing home	107	29.4
Age	60-74	237	65.1
	75-84	99	27.2

	85 and above	28	7.7
Sex	Female	192	52.7
	Male	172	47.3
Marital status	Married	288	79.1
	Single	76	20.9
Education status	Illiterate	63	17.3
	Literate	61	16.8
	Primary School/Secondary School	178	48.9
	High School	30	8.2
	University	32	8.8
Smoking	Yes	51	14.0
	No	313	86.0
Alcohol use	Yes	9	2.5
	No	350	96.2
Body mass index	Underweight (below 23 kg/m <sup>2</sup> )	46	12.6
	Normal (between 23-27 kg/m <sup>2</sup> )	178	48.9
	Overweight/Obese (27 kg/m <sup>2</sup> and above)	140	38.5
Activity status	Active	132	36.3
	Calm-sedentary	232	63.7
Regular exercise	Yes	74	20.3
	No	290	79.7
Chronic disease	Yes	273	75.0
	No	91	25.0
Continuous drug use	Yes	276	75.8
	No	88	24.2
Disability status	No	322	88.5
	Yes	42	11.5
	Hearing	24	6.6
	Sight	5	1.4
	Loss of extremities	10	2.7
	Other*	3	0.8
Auxiliary device use	Does not use	196	53.8
	Uses	168	46.2
	Cane	61	16.8
	Walker	11	3.0
	Glasses	80	22.0
	Hearing Aid	9	2.5

Other\*\*

7

1.9

\*Physical loss, \*\*dental prosthesis

**Table 2. Distribution of findings related to foot health of participants**

Category	Variable	N	%
Previous problems with the foot	Yes	148	40.7
	No	216	59.3
Hospitalization status due to foot problems	Yes	28	7.7
	No	336	92.3
Medication use due to foot problems	Yes	119	32.7
	No	245	67.3
Previous education on foot health	Yes	28	7.7
	No	336	92.3
Previous foot examination	Yes	90	24.7
	No	274	75.3

**Table 3. Distribution of foot health problems of older individuals**

Foot Health Problems	N (%)	
Dermatological Problems	No	23 (6.3)
	Yes	341 (93.7)
Appearance problems*	221 (60.7)	
Infection	14 (3.8)	
Wound	13 (3.6)	
Erythema	5 (1.4)	
Rash/Redness	47 (12.9)	
Korn Callus	51 (14.0)	
Wart	12 (3.3)	
Crack	117 (32.1)	
Hematoma	14 (3.8)	
Tinea Pedis	83 (22.8)	
Heel Spurs	21 (5.8)	
Hygiene problem*	53 (14.6)	
Dirty	18 (4.9)	

	Smelly	34 (9.3)
	Humidity problem	211 (58)
	Damp	36 (9.9)
	Dry	175 (48.1)
	Nail problems*	300 (82.4)
	Thickened	194 (53.3)
	Onychomycosis	91 (25.0)
	Onychodystrophy	46 (12.6)
	Inward Wreck	31 (8.5)
	Round Cut	197 (54.1)
	Neglected	48 (13.2)
Orthopedic Problems	Yes	254 (69.8)
	No	110 (30.2)
	Appearance problems*	110 (30.2)
	Amputation	2 (0.5)
	Hallux Valgus	75 (20.6)
	Hallux Rigidus	30 (8.2)
	Claw/Hammer Finger	43 (11.8)
	Flat Foot	10 (2.7)
Circulation Problems	No	180 (49.5)
	Yes	184 (50.5)
	Temperature	98 (26.9)
	Cold	44 (12.1)
	Hot	54 (14.8)
	Color*	41 (14.9)
	Cyanosis	11 (3.0)
	Redness	29 (8.0)
	Pulse	77 (21.2)
	Weak	77 (21.2)
	Edema	61 (16.8)
	Across the foot	61 (16.8)
Sensory Problems	No	210 (57.7)
	Yes	154 (42.3)
	Sensory/Feel*	111 (30.5)
	Burning	63 (17.3)
	Numbness	50 (13.7)
	Tingling	45 (12.4)
	Loss of feeling	17 (4.7)
	Pain	85 (23.4)
	Yes	85 (23.4)

\*Multiple response

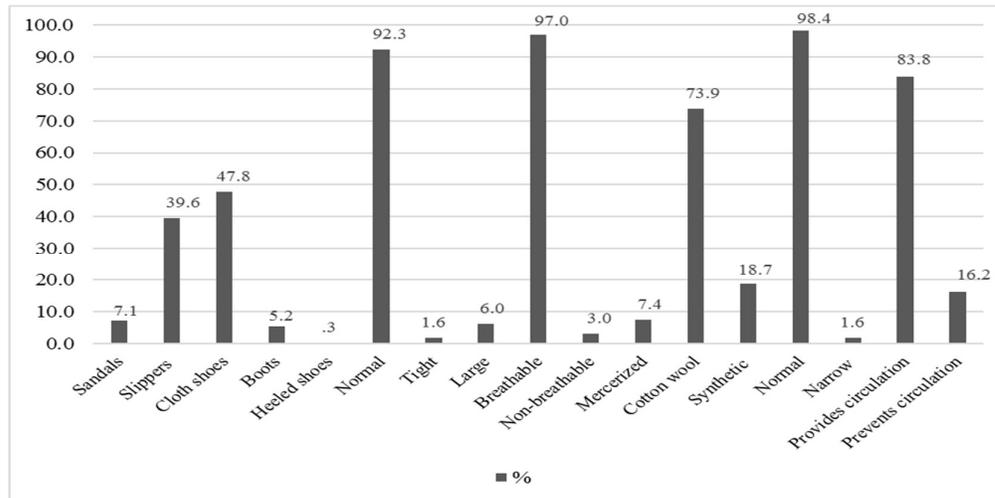


Figure 1. Distribution of findings on the evaluation of materials worn on the feet

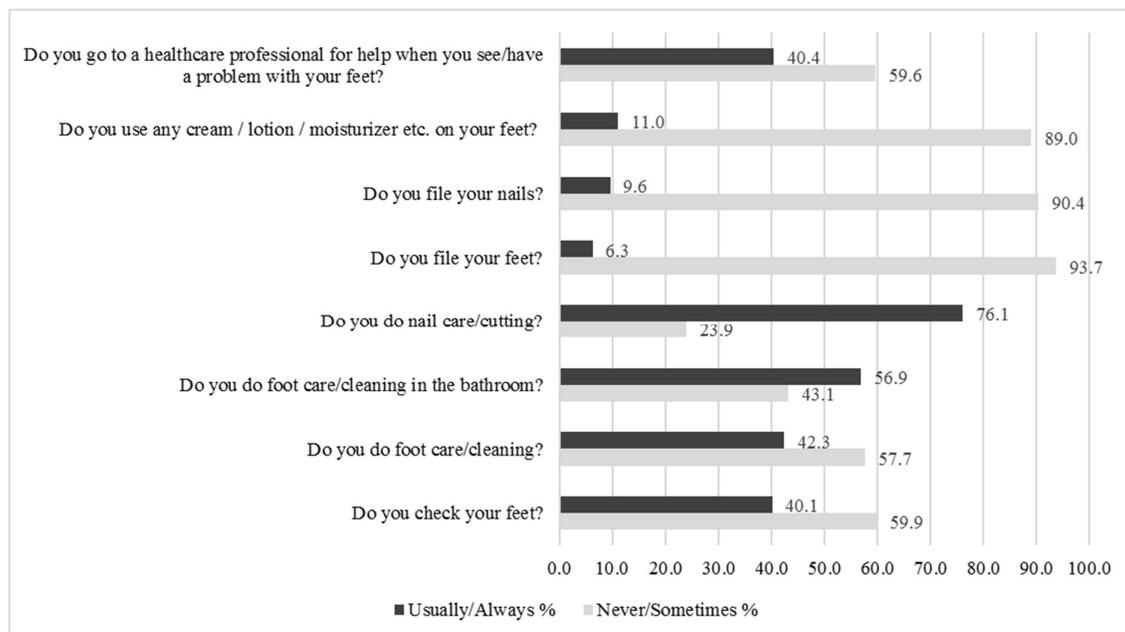


Figure 2. Distribution of findings related to foot health self-care skills of older individuals

**Table 4. Comparison of foot care behavior scale according to sociodemographic characteristics**

		Mean±SD	Median (Min- Max)	t	p
Residence	Community-dwelling (n=257)	47.4 ± 9.9	46 (26 - 75)	U= 12.129	0.07
	Nursing home (n=107)	45.9 ± 10.4	43 (28 - 71)		
Age	60-74 (n=237)	47.5 ± 10	46 (28 - 75)	$\chi^2 =$ 4.20	0.12
	75-84 (n=99)	46 ± 10	44 (26 - 75)		
	85 and above (n=28)	45.2 ± 11.1	43 (29 - 71)		
Education status	Illiterate (n=63)	44.6 ± 9.4	42 (32 - 73) <sup>cd</sup>	$\chi^2 = 33.8$	<b>p&lt;0.001</b>
	Literate (n=61)	42.9 ± 8.7	42 (26 - 67) <sup>c</sup>		
	Primary school/secondary school (n=178)	47.4 ± 9.9	46 (26 - 75) <sup>bd</sup>		
	High School (n=30)	53.2 ± 10.1	51.5 (32 - 75) <sup>a</sup>		
	University (n=32)	50.9 ± 10.3	48.5 (36 - 72) <sup>ab</sup>		
Activity status	Active (n=132)	46.6 ± 9	45 (29 - 75)	U= 15.230	0.93
	Sedentary (n=232)	47.1 ± 10.7	45 (26 - 75)		
Regular exercise	Yes (n=74)	50.4 ± 10.3	49 (29 - 75)	t= 3.31	<b>0.01</b>
	No (n=290)	46.1 ± 9.8	44 (26 - 75)		
Gender	Female (n=192)	46.4 ± 10.1	44 (26 - 75)	U= 17.741	0.22
	Male (n=142)	47.6 ± 10	45 (26 - 75)		

Chronic disease	Yes (n=273)	46.5 ± 9.9	45 (26 - 75)	U= 13.190	0.37
	No (n=91)	48.2 ± 10.6	45 (28 - 73)		
Continuous drug use	Yes (n=276)	47.1 ± 10.3	45 (26 - 75)	U= 11.792	0.68
	No (n=88)	46.5 ± 9.3	45 (28 - 70)		
Smoking	Yes (n=51)	47.4 ± 10.6	44 (28 - 75)	U= 7.913	0.92
	No (n=313)	46.9 ± 10	45 (26 - 75)		
Alcohol use	Yes (n=9)	49.3 ± 9.6	47 (41 - 69)	U= 1.361	0.44
	No (n=354)	46.9 ± 10.1	45 (26 - 75)		
Body mass index	Underweight (n=46)	46.4 ± 8.4	45.5 (35 - 71)	$\chi^2=1.54$	0.46
	Normal (n=178)	47.8 ± 10.9	45 (26 - 75)		
	Overweight/Obese (n=140)	46 ± 9.4	44.5 (28 - 75)		

$\chi^2$ : Kruskal–Wallis test statistics a-d: There is no difference between groups with the same letter for each measurement (Dunn test) t: Independent Samples t test statistics U: Mann–Whitney U test

## Discussion

Foot health problems are among the most overlooked and neglected problems in the older population. In addition to evaluating the footwear, foot health is a comprehensive issue that includes foot examination, self-care skills of the individual, knowledge level and care behaviors. Therefore, the aim of this study was to identify foot health problems, foot care information and behaviors by evaluating community-dwelling older and nursing home residents together.

In their systematic review, Stolt et al. (2010) identified foot health problems as foot structural deformities, skin problems, nail problems and foot pain. López-López et al. (2015) reported that 88% of older individuals had foot problems. In the present study, most common foot health problems in older individuals were dermatological problems (93.7%), orthopedic problems (32.2%), circulation problems (50.5%), and sensory problems (42.3%).

Lai et al. (2014) reported that 81% of older individuals had at least one foot problem. The most common problems were corns (45%), hallux deformity (37%), dystrophic nail (27%) and onychomycosis (24%). Note that 45% of individuals had foot pain and 61% were aware of their foot problems (Lai et al., 2014). Kaoulla et al. (2011) evaluated 104 community-dwelling older individuals and reported that the most commonly reported foot problem was difficulty in identifying comfortable shoes (38%) and hyperkeratotic lesions (29%). The study reported that only 13% of individuals underwent podiatrics treatment and 40% required more assistance to take care of their feet (Kaoulla et al., 2011). Stolt et al. (2012) investigated nursing home residents and reported that foot care was a problem for many older individuals; the most common problems were edema, dry skin, thickened and colorless toenails and hallux valgus. Stolt et al. (2010) reported that the most common foot deformity (9-69%) was hallux valgus. Another study reported that frequency of hallux valgus was

~74% (Menz & Lord 2001; Rodríguez-Sanz et al., 2018). Dufour et al. (2014) reported that foot problems were positively correlated with increasing age and increased foot pain was negatively correlated with the body mass index and the use of heels in women. In the present study, hallux valgus was considered an orthopedic problem and was identified as the most common problem. Studies state that hallux rigidus is the most common form of arthritis in the foot, affects 1 in 40 people over 50 years of age and is more common in women (Lam et al., 2017; Galois et al., 2020). Frequency of hallux rigidus was determined as 8.2% in this study. This condition was determined only as a result of physical examination and it is considered that the frequency will change if radiological evaluation is performed.

In a systematic review by Stolt et al. (2010), common foot health problems in older individuals were reported as dry skin, hyperkeratosis, and calluses. The prevalence of dry skin in older individuals varies between 14% and 98%, tinea pedis affects 13% and 16% of older people, calluses is seen in 18%–58% and plantar skin thickening – hyperkeratosis – is seen in 23%–77% of the individuals. Edema in the feet ranges from 7% to 26%. Nail problems are seen in 22%–94% of older individuals and the most commonly reported nail problem is the thickening of toenails (28%–65%). Another nail problem is onychomycosis and its frequency ranges between 8% and 59% (Stolt et al., 2010). In the present study, dry skin, edema, tinea pedis, and nail problems were common and the results were consistent with the literature.

It is reported that with increasing age, the frequency of foot problems increases, and ~80% of these problems are caused by improper shoe wear (Tobin, 2017). Moreover, Ikpeze et al. noted that foot pathologies affect the vast majority of older individuals, and inappropriate shoes are one of the main underlying causes (Ikpeze et al., 2015). Menz & Morris (2005) stated that most individuals wear tight shoes, and problems related to shoes are more prominent in women. In the same study, it was determined that wearing tight shoes is associated with calluses in the toes, hallux valgus deformity, and foot pain and finger deformity. Furthermore, it was reported that wearing shoes with a heel height of >25 mm is associated with hallux valgus and plantar calluses in women. It was found that wearing inappropriate shoes is common in older individuals, and it is

strongly associated with foot pathology and foot pain (Menz & Morris, 2005). López-López et al. (2015) reported that 83% of older individuals wore inappropriate shoes. In the present study, although the shoes size (Figure 1) and the materials worn on the feet (Figure 1) were appropriate, it is considered that the foot problems experienced in the past are associated with use of inappropriate shoes.

Palomo-López et al. (2017) reported that only 12% of older individuals check their feet daily. In the same study, the foot assessment of older individuals revealed deformation of toes in 12%, hyperkeratotic lesion in 61%, and bunions in 19% of the individuals. It was also reported that 67% of these individuals used inappropriate footwear. Inappropriate footwear, loss of sensation in feet and insufficient foot health controls were the primary causes of foot lesions. The study reported that foot care and verifications are extremely important to prevent the occurrence of foot lesions, pain, infections and deformities and maintain foot health (Palomo-López et al., 2017). In the present study, similar to the literature, older individuals did not perform regular foot checks and poor foot care.

When the literature was reviewed, it was found that studies related to foot health mostly focused on patients with diabetes and older individuals were neglected. In a study on individuals diagnosed with diabetes registered in primary health care services, the foot self-care behaviors and knowledge were poor, the predictors of foot self-care behaviors were determined to be age, education status, diabetes distress, family support and knowledge (Sari et al., 2020). In another study, it was determined that predictors of foot care were knowledge of foot care, disease perception, and beliefs (Indrayana et al., 2019). In the present study, foot care behaviors were better in those with high educational status and regular exercise ( $p > 0.05$ ). It is seen that foot care behavior is an important issue and needs to be focused on in all older individuals with or without diabetes.

**Limitations and strengths of research:** This research can only be generalized to the sample studied. Another limitation is the use of purposeful sampling method for Family Health Centers. The main strengths of the study are the relatively large sample size and the inclusion of individuals living in both the community and the nursing home. In addition to foot examination, a

comprehensive assessment of individual knowledge levels, self-care skills and foot care behaviors was made, which can be considered as another strength of this study.

**Conclusion:** Foot care knowledge of older individuals is insufficient and foot health is a neglected issue. It is important for nurses to identify and prevent foot problems in community-dwelling older individuals and nursing home residents, enable older individuals to acquire and implement foot care behaviors and increase awareness.

It is important to increase awareness of the importance of foot health and encourage older people to perform regular foot checks. Nurses are advised to perform routine foot examinations to improve health in older individuals. In particular, nurses working in institutions such as primary care services and nursing homes are advised to consider foot health problems when performing a comprehensive assessment of older individuals.

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**Data Availability Statement:** The findings of this study can be obtained from the relevant corresponding author upon request.

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