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RESEARCH ARTICLE

DETERMINATION OF FACTORS AFFECTING THE INCIDENCE OF FALLS, FEAR OF FALLING, AND FUNCTIONAL STATUS IN PATIENTS AFTER TOTAL KNEE ARTHROPLASTY

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ABSTRACT

Introduction: This study was conducted to determine the factors affecting the incidence of falls, fear of falling, pain, and functional status in patients after Total Knee Arthroplasty(TKA).
Material and Methods: This descriptive cross-sectional study was conducted at a university hospital located in the west of Turkey and included 177 patients who had unilateral or bilateral TKA at least one 1 year ago. Data were collected using a Patient Description Form, the Falls Efficacy Scale-International (FES-I), and the Oxford Knee Score (OKS).
Results: The mean age of the patients was 67.81 ± 7.71 years, and it was found that approximately one-fifth of them had fallen preoperatively and approximately one-fourth had fallen postoperatively. The mean score for fear of falling (FES-I) was 28.59 ± 7.85 and the mean functional status score (OKS) was 35.73 ± 7.44. Fear of falling was found to decrease significantly as the postoperative time increased.
Conclusion: It was found that falls continued postoperatively in patients who underwent TKA. It was thought that falls adversely affected the functional status of the patients and that physical therapy could be effective in preventing falls. Providing physical therapy support and comprehensive discharge training for all patients, particularly for patients at risk, may be effective in preventing possible falls. In addition, it is recommended to follow up patients postoperatively, evaluate home conditions in terms of fall risks, and establish evidence-based standards for prevention of falls..

Key Words: Total knee arthroplasty, falls, fear of falling, functional status

INTRODUCTION

Total knee arthroplasty (TKA) is a commonly used surgical intervention when conservative treatments are not sufficient in the treatment of osteoarthritis (1-3). After TKA, a decrease in -the pain and dependency levels of patients, an increase in their daily life activities, and thus an increase in their quality of life are expected (4,5). However, TKA is a serious trauma like any surgical intervention (6,7). Although TKA leads to satisfaction in terms of patients' quality of life, disability at various levels may occur postoperatively (2,8). In addition to physiological factors, individual factors also affect the recovery process of patients and their return to daily life activities (9). Among these factors, the most defined in the literature are kinesiophobia and fear of falling (10,11). Kinesiophobia can be caused by chronic pain preoperatively or may occur postoperatively. Patients tend to be more sedentary and avoid activities they think will cause pain. This situation leads to a decrease in daily life activities and consequently to disability (12,13). Patients' disability, advanced age, and accompanying chronic diseases also increase the risk of falls (14,15).

Falls are a common problem particularly encountered in the geriatric population (16,17). According to the 2015 report of the World Health Organization (WHO); 30% of the elderly aged ≥65 years and 50% of the elderly aged ≥85 years face the risk of a fall at least once a year (18,19). In Turkey, the rate of falls was determined to be between 35.6% and 62.0% in the elderly (16). It is known that half of the patients experience preoperative falls before TKA (20,21), has been reported that falls occurred at different rates (7%–40%) postoperatively (21); the preoperative history of falls was stated to be an important risk factor for postoperative falls (22-26). Factors such as advanced age, muscle weakness, persistent functional deficits, balance effects, additional diseases, kinesiophobia, sex, and body mass index (BMI) are other risk factors for falls that were identified in the literature (24,27,28). Although falls cause a decrease in survival in the geriatric population, they place a serious burden on the health system (21,23,25,27). It is important to develop multidisciplinary approaches to prevent falls in patients undergoing TKA. For this reason, it is thought that determining the incidence of postoperative falls and fear of falling and examining their relationship with patient outcomes will constitute the first step of multidisciplinary approaches. The aims of this study were as follows: (a) determining fear of falling and incidence of falls in patients postoperatively, (b) determining the factors affecting postoperative falls in patients (c) determining the factors affecting fear of falling, pain, and functional status in patients (d) determining the relationship between the incidence of falls and fear of falling, pain, and functional status in patients.

MATERIAL AND METHODS

Design, Setting, and Sample

This was a cross-sectional descriptive study. It was conducted at a university hospital located in the west of Turkey. Data were collected between April 2017 and November 2020. The sample of the study consisted of patients who underwent TKA due to knee osteoarthritis between January 1, 2015 and December 31, 2016. The inclusion criteria were as follows: patients aged ≥45 years who underwent unilateral or bilateral TKA due to knee osteoarthritis, who were discharged at least 1 year ago, who spoke Turkish, and who agreed to participate in the study. The exclusion criteria were as follows: patients who underwent revision surgery, those who were operated for inflammatory arthritis (psoriatic arthritis and rheumatoid arthritis) or posttraumatic arthritis, those who had a history of surgery other than knee arthroplasty in the lower extremity, those who had motor dysfunction, and those who had vision and hearing loss. The data of 618 patients who underwent primary TKA were obtained from the hospital database. However, patients who underwent revision surgery; those who had a history of surgery other than knee arthroplasty in their lower extremities; those who did not want to participate, died, or could not be reached by phone were excluded from the study (n = 441). Thus, 177 patients were included. In this study, G*Power version 3.1 was used for calculating the sample size (29). The post-hoc power analysis was performed with the data of the study. At the end of the study, the power was 0.98, when the effect size, p value, and sample size were 0.39, 0.05, and 177, respectively. The necessary hospital permission and ethics committee approval were obtained from Dokuz Eylul University Non-invasive Clinical Research Ethics Committee (Approval date: 01.06.2017, Decision number: 2017/14-34) to access the hospital database where the patients' data are recorded. Verbal consent was obtained from the patients who were contacted by phone for their consent to participate in the study.

Data Collection

The information of 618 patients who underwent primary TKA with the ICD-9 81.54 procedure code was accessed from the hospital database, and two members of the research team (AS and HA) called them by phone. The phone calls took about 15–25 minutes. Interviews were conducted with the patients who met the sample criteria. The data were collected from the patients using the Patient Description Form, the Falls Efficacy Scale-International (FES-I), the Oxford Knee Score (OKS).

In the Patient Description Form, demographic information (gender, age, height, body mass index, marital status, and education status) of the patients, postoperative complication status, pre- and post-operative status, and number of falls were determined. The data on the characteristics of the house where the patient lived (home type, toilet and bathroom type used in the house, staircase at home, and arrangements made at home postoperatively) were collected. In addition, receiving discharge training and subsequent rehabilitation status of the patients were questioned.

The FES-I, developed by Yardley et al. is a reliable method for predicting fear of falling, predicting future falls, and measuring decline in functional capacity [30]. Ulus et al. concluded in their studies that the scale is valid and reliable in evaluating fear of falling in elderly individuals living in Turkey (31). The scale provides information regarding the level of concern about falling during daily life activities. In the 16-item scale, all items are scored between 1 ("not at all concerned") and 4 ("very concerned"). The total score ranges from 16 (no concern about falling) to 64 (severe concern about falling). A score of ≥24 points indicates that the individual is concerned about falling. OKS was used to assess the functional status of the patients. OKS is a self-report questionnaire developed to evaluate the physical function and pain levels of patients with TKA (32). The Turkish version of the questionnaire (OKS-TR) is a valid and reliable method for evaluating the pain and functional status of Turkish-speaking patients with knee osteoarthritis (33). In the 12-item questionnaire, each question consists of five categories and is scored between 0 ("severe") and 4 ("none"). The overall score ranges from 0 (worst possible) to 48 (best outcome). While the items 2, 3, 7, 11 and 12 of the questionnaires evaluate the functional status, the items 1, 4, 5, 6, 8, 9, 10 assess the condition associated with pain.

Statistical Analysis

The conformity of the variables to normal distribution was examined using visual (histogram and probability graphs) and analytical methods (Kolmogorov–Smirnov/Shapiro–Wilk tests). Demographic and descriptive characteristics of the patients were analyzed as percentage (%) and frequency (n). The chi square test was used to determine the relationship between falls and clinical and demographic characteristics of the patients. Fear of falling and functional status of the patients were compared according to their demographic characteristics using the Mann–Whitney U test. Fear of falling and functional status were analyzed using the Mann–Whitney U test and the Kruskal–Wallis test according to their clinical features. The Spearman's correlation analysis was used to determine the relationships among age, time after the surgery date, number of falls preoperatively and postoperatively, fear of falling, and functional level. SPSS version 27.0 (IBM Corp., Armonk, NY, USA) was used for the analysis of all data. For all tests, the significance level was accepted as $p < 0.05$.

RESULTS

The mean age of the patients participating in the study was 67.81 ± 7.71 (range: 45–90) years, and an average of 48.5 (range: 31–71) months had passed after their surgeries. The mean BMI of the patients was found to be 32.32 ± 4.84 (range: 20.76–55.56). The mean fear of falling score (FES-I) of the patients was found to be 28.59 ± 7.85. The mean score for the OKS Physical function subscale was 13.33 ± 3.56, the mean score for the OKS Pain subscale was 22.40 ± 4.50, and the mean overall score for the OKS scale was 35.73 ± 7.44 (Table 1). Approximately 80% of the patients were women (n = 138), 55.9% of the patients had bilateral TKA (n = 99), and 90% of the patients were primary school graduates (n = 159). Most of the patients who underwent TKA were married (81.4%, n = 144) and lived at home with their family (85.3%, n = 151). In the postoperative period, almost half of the patients had received discharge training (58.0%, n = 92) and one-third had received physical therapy (33.3%, n = 59). Almost half of the patients stated that they made arrangements at home postoperatively (40.1%, n = 71). It was determined that more than half of the patients lived in a single-family house (60.5%, n = 107), the vast majority had to use stairs at home (83.1%, n = 147), the type of bathroom they used was mostly shower cabin (91.5%, n = 162), and the toilet

Table 1. Distribution of patients' demographic-descriptive characteristics and FES-I and OKS score averages (N=177)

VARIABLES	X±SD	Min-Max
Age	67.81±7.71	45-90
Body Mass Index (BMI)	32.32±4.84	20.76-55.56
Falls Efficacy Scale-International (FES-I)	28.59±7.85	16-52
Oxford Knee Score (OKS) Total	35.73±7.44	16-48
Physical Function Score	13.33±3.56	5-20
Pain Score	22.40±4.50	10-28
	n	**%**
Gender		
Women	138	78
Male	39	22
Type of prosthesis		
Bilateral	99	55.9
Unilateral	78	44.1
Marital status		
Married	144	81.4
Single	33	18.6
Education level		
Can only read and write	13	7.3
Primary school	159	89.8
High school and above	5	2.8
Household status		
Living with family	151	85.3
Living alone	26	14.7
Postoperative discharge training		
No	92	52.0
Physcian	52	29.4
Nurse	32	18.1
Physiotherapist	1	0.6
Postoperative physical therapy status		
Yes	59	33.3
No	118	66.7
Postoperative home arrangement		
Yes	71	40.1
No	106	59.9
Type of home		
Apartment	107	60.5
Detached house	70	39.5
Presence of staircases at home		
Yes	147	83.1
No	30	16.9
Type of bathroom		
Shower cabin	162	91.5
Tub	15	8.5
Type of toilet		
European style	159	89.3
Skuat toilet	18	10.7
Walking support		
Yes	52	29.4
No	125	70.6
Preoperative falls		
Yes	32	18.1
No	145	81.9
Postoperative falls		
Yes	45	25.4
No	132	75.6
TOTAL	177	100

Table 2. Comparison of Patients' Demographic-Descriptive Characteristics and Postoperative Falls (N=177).

Variables	Postoperative falls			
	Yes Number(%)	No Number(%)	χ^2	p
Gender				
Women	37 (82.2)	101 (76.5)	0.636	0.425
Male	8 (17.8)	31 (23.5)		
Marital status				
Married	35 (77.8)	109 (82.6)	0.509	0.475
Single	10 (22.2)	23 (17.4)		
Household status				
Living alone	2 (4.4)	24 (18.2)	**5.054**	**0.025***
Living with family	43 (95.6)	108 (81.8)		
Type of home				
Apartment	17 (37.8)	53 (40.2)	0.079	0.779
Detached house	28 (62.2)	79 (59.8)		
Presence of staircases at home				
No	8 (17.8)	21 (15.9)	0.086	0.770
Yes	37 (82.2)	111 (84.1)		
Type of bathroom				
Shower cabin	40 (88.9)	122 (92.4)	0.541	0.462
Tub	5 (11.1)	10 (7.6)		
Postoperative home arrangement				
Yes	18 (40)	53 (40.2)	0.000	0.986
No	27 (60)	79 (59.8)		
Type of prosthesis				
Bilateral	25 (44.4)	74 (43.9)	0.003	0.953
Unilateral	20 (55.6)	58 (56.1)		
Walking support				
Yes	11 (24.4)	41 (31.1)	0.708	0.400
No	34 (75.6)	91 (68.9)		
Postoperative discharge training				
Yes	20 (44.3)	66 (50)	0.415	0.520
No	25 (55.6)	66 (50)		
Postoperative physical therapy status				
Yes	21 (46.7)	35 (73.5)	**10.861**	**0.001***
No	24 (53.3)	97 (26.5)		

*p<0.05. χ2: Chi-square Test.

of the patients reported that they did not receive support while walking (n = 125), 18.1% stated that they fell in the preoperative period (n = 32), and 22.4% stated that they fell postoperatively (n = 45) (Table 1).

The patients' postoperative falls were not affected by gender (p = 0.425), marital status (0.475), type of home (p = 0.779), presence of staircases at home (p = 0.770), postoperative home arrangement (p = 0.986), type of prosthesis applied (p = 0.953), support while walking (p = 0.400), and receiving postoperative discharge training (p = 0.520). The status of postoperative falls was statistically significant in those who lived at home with their family (p = 0.025) and those who received physical therapy postoperatively (p = 0.001). The rate of falls in the patients who did not receive physical therapy and lived with their families was higher (Table 2).

The fear of falling and functional levels of the patients differed according to gender, marital status (married/single), and postoperative physical therapy status. Women (FES-I p = 0.038; OKS p = 0.034), single individuals (FES-I p = 0.009; OKS p = 0.019), and those who received physical therapy in the postoperative period (FES-I p = 0.018; OKS p = 0.021) had significantly higher fear of falling, and their functional level was significantly lower (Table 3 and Table 4).

The type of prosthesis used (FES-I p = 0.459; OKS p = 0.797), education level of the patients (FES-I p =

Table 3. Comparison of Patients' Demographic Characteristics and FES-I and OKS Scores (N=177)

Variables		FES-I	OKS Total	OKS Function	OKS Pain
		Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)
Gender					
	Women	26.00 (12.00)	36.00 (11.00)	13.00 (5.25)	23.00 (7.00)
	Male	24.00 (11.00)	41.00 (11.00)	16.00 (7.00)	25.00 (5.00)
	z/p	**-2.073/0.038**	**-2.119/0.034**	**-2.247/0.025**	-1.772/0.076
Marital status					
	Married	25.20 (12.00)	37.00 (10.00)	14.00 (5.00)	24.00 (6.00)
	Single	31.00 (17.00)	34.00 (12.50)	13.00 (7.00)	20.00 (8.00)
	z/p	**-2.623/0.009**	**-2.338/0.019**	-1.818/0.069	**-2.436/0.015**
Education level					
	Can only read and write	26.00 (9.50)	39.00 (5.00)	14.00 (2.50)	24.00 (4.00)
	Primary school	26.00 (13.00)	36.00 (11.00)	14.00 (6.00)	23.00 (7.00)
	High school and above	25.00 (13.00)	41.00 (13.00)	15.00 (5.50)	27.00 (8.00)
	x^2/p	2.097/0.351	3.201/0.202	0.920/0.631	2.365/0.307
Household status					
	Living alone	25.00 (8.25)	36.50 (9.75)	13.00 (4.25)	22.50 (8.25)
	Living with family	26.00 (13.00)	37.00 (11.00)	14.00 (5.00)	24.00 (6.00)
	z/p	-0.834/0.404	-1.433/0.152	-1.090/0.276	-1.381/0.167
Type of home					
	Apartment	27.50 (14.00)	36.00 (11.50)	14.00 (5.25)	23.00 (7.00)
	Detached house	25.00 (12.00)	37.00 (10.00)	14.00 (6.00)	23.00 (6.00)
	z/p	**-2.172/0.030**	-0.359/0.720	-0.033/0.974	-0.805/0.421
Presence of staircases at home					
	No	30.00 (14.00)	31.00 (13.00)	14.00 (6.50)	23.00 (7.00)
	Yes	25.50 (12.00)	37.00 (10.00)	14.00 (5.00)	23.00 (7.00)
	z/p	-1.360/0.174	-0.467/0.640	-0.697/0.486	-0.150/0.881
Type of bathroom					
	Shower	26.00 (12.00)	37.00 (9.50)	14.00 (5.00)	23.50 (6.25)
	Tub	31.00 (17.00)	31.00 (13.00)	11.00 (5.00)	21.00 (7.00)
	z/p	**-1.999/0.046**	-1.592/0.111	-1.242/0.214	-1.570/0.116
Type of toilet					
	European style	26.00 (12.00)	37.00 (10.00)	14.00 (5.00)	23.00 (7.00)
	Squat toilet	24.00 (15.00)	35.00 (25.00)	13.00 (10.00)	23.00 (15.00)
	z/p	-1.314/0.189	-0.071/0.943	-0.052/0.958	-0.117/0.907
Postoperative home arrangement					
	Yes	29.00 (13.00)	34.00 (10.00)	13.00 (6.00)	22.00 (6.00)
	No	24.00 (15.00)	38.00 (8.25)	14.00 (4.25)	24.00 (5.25)
	z/p	**-2.153/0.031**	**-2.463/0.014**	-1.783/0.75	**-2.649/0.014**

*p<0.05. z: Mann Whitney U Test, x2: Kruskal Wallis Test.

0.351; OKS p = 0.202), living alone or living with family (FES-I p = 0.404; OKS p = 0.152), presence of staircases in the house (FES-I p = 0.174; OKS p = 0.640), and the type of toilet used (FES-I p = 0.189; OKS p = 0.943) did not have a significant effect on the patients' fear of falling and their functional status (Table 3 and Table 4).

The type of home (OKS p = 0.720) and the bathroom type (OKS p = 0.111) had no effect on the functional status of the patients. However, those who lived in an apartment (FES-I p = 0.030) and those who used a bathtub in their bathroom (FES-I p = 0.046) had significantly higher fear of falling (Table 3).

The functional level of the patients varied according to the state of receiving discharge training and the use of support during walking. The functional levels of those who received discharge training (OKS p = 0.001) and those who did not use any support during walking (OKS p = 0.001) were significantly higher. However, the patients' fear of falling was not affected by these conditions (FES-I p = 0.751; FES-I p = 0.084). The fear of falling of the patients who made arrangements at home postoperatively was significantly higher (FES-I p = 0.031), and their functional status was significantly lower in terms of

Table 4. Comparison of Patients' Clinical Characteristics and FES-I and OKS Scores (N=177)

Variables	FES-I	OKS Total	OKS Function	OKS Pain
	X±SD	X±SD	X±SD	X±SD
Type of prosthesis				
Bilateral	28.00 (12.50)	37.00 (11.00)	14.00 (6.00)	24.00 (7.00)
Unilateral	25.00 (13.50)	36.00 (9.50)	13.50 (5.00)	23.00 (7.00)
z/p	-0.741/0.459	-0.257/0.797	-0.105/0.916	-0.417/0.677
Walking support				
Yes	26.00 (12.00)	33.50 (10.75)	11.00 (5.75)	22.00 (6.75)
No	26.00 (12.00)	38.00 (11.00)	14.00 (4.00)	24.00 (6.50)
z/p	-1.727/0.084	**-3.432/0.001**	**-3.944/0.000**	**-2.644/0.008**
Postoperative discharge training				
Yes	26.00 (12.00)	38.50 (9.00)	15.00 (3.00)	24.00 (5.00)
No	26.00 (12.00)	34.00 (12.00)	12.00 (6.00)	22.00 (7.00)
z/p	-0.317/0.751	**-3.401/0.001**	**-4.429/0.000**	**-2.300/0.021**
Postoperative physical therapy status				
Yes	30.00 (14.00)	35.00 (11.00)	13.00 (6.00)	22.00 (6.00)
No	25.00 (12.00)	37.00 (10.00)	14.00 (5.00)	24.00 (6.00)
z/p	**-2.369/0.018**	**-2.300/0.021**	**-2.474/0.013**	**-1.970/0.049**
Number of preoperative falls				
Yes	25.00 (16.00)	34.00 (9.75)	13.00 (6.50)	21.50 (6.75)
No	26.00 (11.00)	37.00 (10.00)	14.00 (5.00)	24.00 (6.00)
z/p	-0.227/0.820	-1.954/0.051	-1.196/0.232	**-2.054/0.040**
Number of postoperative falls				
Yes	30.00 (13.00)	34.00 (10.00)	13.00 (6.00)	22.00 (5.50)
No	25.00 (12.00)	37.00 (10.00)	14.00 (5.00)	24.00 (7.00)
z/p	**-2.218/0.027**	-1.826/0.068	-1.244/0.213	**-1.981/0.048**

*p<0.05. z: Mann Whitney U Test.

Table 5. The Relationship Between Some Variables and FES-I and OKS Scores of the Patients (N=177)

	FES-I	OKS Total	OKS Function	OKS Pain
Age	r_s=-0.003 p=0.972	r_s=-0.032 p=0.677	r_s=-0.099 p=0.189	r_s=0.019 p=0.803
BMI	r_s=0.116 p=0.126	r_s=-0.053 p=0.482	r_s=-0.042 p=0.580	r_s=-0.068 p=0.366
Postoperative time (years)	**r_s=-0.247** **p=0.001***	r_s=0.014 p=0.854	r_s=-0.039 p=0.605	r_s=0.065 p=0.387
Number of preoperative falls	r_s=-0.291 p=0.107	r_s=0.323 p=0.071	**r_s=0.459** **p=0.008***	r_s=0.160 p=0.381
Number of postoperative falls	r_s=0.240 p=0.113	r_s=-0.025 p=0.871	r_s=-0.181 p=0.233	r_s=0.173 p=0.255

*p<0.05. rs: Spearman Correlation Analysis.

total and pain subscale scores (OKS Total p = 0.014; OKS Pain p = 0.014) (Table 3 and Table 4).

While the fear of falling (FES-I p = 0.820) and functional status (OKS Total p = 0.051; OKS Function p = 0.232) of patients were similar based on their preoperative status of falls, their pain level differed. The pain levels of those who fell preoperatively were significantly worse (OKS Pain p = 0.040). While the functional status of the patients (OKS Total p = 0.068; OKS Function p = 0.213) was similar based on their postoperative status of falls, their fear of falling and pain level differed. The fear of falling in those who fell postoperatively was significantly higher (FES-I p = 0.027) and their pain level was significantly worse

(OKS Pain p = 0.048) than in those who did not (Table 4). There was a weak negative correlation between the fear of falling and the postoperative time (rs = −0.25, p = 0.001). There was a moderate positive correlation between the function subscale of the OKS and the number of preoperative falls of patients (rs = 0.46, p = 0.008). Fear of falling was not associated with age (rs = 0.003, p = 0.972), number of preoperative (rs = −0.291, p = 0.107) and postoperative falls (rs = −0.240, p = 0.113). The pain subscale of the OKS and the total OKS were not associated with age (rs = −0.25, p = 0.001), postoperative time (rs = −0.25, p = 0.001), number of falls preoperatively (rs = −0, 25, p = 0.001), and number of falls postoperatively (rs = −0.25, p = 0.001) (Table 5).

DISCUSSION

In this study, patients who underwent TKA were evaluated after an average of 4 years, and it was found that approximately one-fifth of the patients fell preoperatively and approximately one-fourth fell postoperatively. Studies revealed that more than half of the patients treated with TKA fell preoperatively and approximately one-fifth fell postoperatively (21,34). In the study conducted by Laura Frattura et al., they determined the prevalence of preoperative falls between 23% and 63% and the prevalence of postoperative falls between 12% and 38% patients (23). In the literature, it has been determined that TKA reduces the incidence of falls by improving the deteriorated balance control, improving functional status, and reducing pain (23,26,35). Moutzouri et al. reported that more than half of the patients (54.2%) who fell before TKA did not fall postoperatively and that the surgery positively affected their fear of falling and the incidence of falls (36). However, preoperative fall history and poor functional status have been determined to be a serious risk factor for postoperative falls (22,23,25,26). In a study conducted with patients who underwent TKA, it was found that approximately one out of three patients fell postoperatively, and these patients had a history of preoperative falls (22). In another study, it was reported that patients who fell preoperatively were three times more likely to fall than those who did not (24). In our study, the fact that the rate of postoperative falls of patients was higher than that of preoperative falls may be associated with fear of falling, which was above the average, (FES-I 28.59 ± 7.85) and poor functional status (OKS 35.73 ± 7.44).

It has been stated that falls are an important health problem that cause fear and concern in individuals (10,11). Fear of falling causes elderly people to live a more sedentary life by reducing their sense of confidence in their daily life activities. This situation causes problems such as muscle atrophies and muscle weakness in the lower extremities of elderly individuals (12,13). These problems are among the main reasons for the increase in falls. Studies show that advanced age also increases the risk of falls (14,15). However, in our study, no significant relationship was found between the age of the patients and the number of falls and fear of falling preoperatively/postoperatively. However, women and single individuals had significantly higher fear of falling, and their functional levels were significantly lower. Although female patients who fell postoperatively were nearly five times more than male patients, there was no significant difference between them. It was determined that the majority of those who experienced postoperative falls were those who lived with their families and living alone did not affect the incidence of falls, functional status, and fear of falling. It was thought that this result may be related to the fulfillment of postoperative care needs in our culture with family support. It is a very common cultural expectation that patients who have difficulty in performing daily life activities postoperatively are cared for by their first-degree relatives (37). In their study, Lo et al. stated that the fear of falling and falls were more common in patients who lived alone due to less activity after TKA (24). In their study with patients who had hip and knee prosthesis, Jorgensen and Kehlet found that female patients and those who lived alone were more likely to be re-hospitalized due to falls than men and patients who lived with their family (38). In another study, it was determined that there was no significant relationship between sex and falls (35). Riddle and Gollady also stated in their study that the risk of falls is higher in women, but more studies are needed on this subject (39).

Studies have reported that knee pain increases the risk of falls by affecting the sensory and mechanical functions of the joint and causing balance disorders (40-42). Thinking about constant pain and avoiding physical activity leads to loss of ability, increasing the tendency to become sedentary in individuals. Thus, individuals exhibit more “kinesiophobic behavior” and their fear-related pain experiences also increase (10,12,13). Riddle and Gollady and Tsonga et al. found in their study that there was no relationship

between pain and falls (34,39). Turhan Damar et al. found a relationship between fear of falling and pain in patients postoperatively (43). In our study, the pain levels of those who fell preoperatively were significantly worse. The pain levels of those who fell postoperatively were significantly higher and their fear of falling was significantly higher than those who did not. This result was thought to be related to the fact that patients with pain avoided movement and it caused an increase in fall rates due to increased fear of falling. In our study, no relationship was found between the BMI of the patients and their falls, fear of falling, and functional status. In studies evaluating falls after TKA, they found that BMI was not associated with falls (23,35).

In our study, half of the patients received discharge training and only one-third of them received physical therapy in the postoperative period. The patients who received physical therapy in the postoperative period had poor functional levels and significantly higher fear of falling. In the literature, it has been stated that adequate rehabilitation (including fall prevention exercises) should be given before discharge to reduce the risk of falling in high-risk patients (elderly and with comorbid diseases) undergoing TKA (24). In the studies, a decrease in the muscle strength of patients after TKA was detected, and the importance of intensive physical therapy was emphasized (21,23). It has been stated that physical therapy is the most reliable option to prevent falls in terms of reducing muscle weakness and balance disorders (36,38). It has been emphasized that after TKA falls may be associated with a decreased sense of proprioception in the knee and the continuation of loss of balance and that physical therapy interventions should focus on this direction (21,23). It was observed that patients with poor functional levels and high fear of falling received physical therapy. Physical therapy after TKA was not a routine practice in the hospital where the data were collected. Therefore, it is thought that patients with poor functional status are referred to physical therapy.

In our study, the functional level of the patients varied according to the state of receiving discharge training and the use of support during walking. The functional levels of those who received discharge training and did not use any support during walking were significantly lower. In addition, even though the incidence of falls and fear of falling were higher in those who received discharge training and those who did not use any support during walking, the difference was not statistically significant. In the evidence, it is emphasized that the discharge criteria of the patients should be determined clearly. These criteria include the ability to dress independently, getting in and out of the bed, sitting and getting up on a chair/toilet, the ability to maintain self-care independently, and the ability to walk independently with walkers/crutches (44,45). After all these parameters are completed, patients can be ensured to go home safely. In addition, the situations that patients should pay attention to at home, some arrangements they should make (arrangements to prevent falls, additional lighting, toilet risers, and handles) should be emphasized in the discharge training (46,47). It has been reported that patients who received training before discharge had positive results in their level of performing daily living activities (48). In our study, nearly half of the patients stated that they made arrangements at home postoperatively. It was determined that the majority of the patients who experienced postoperative falls were patients who did not make arrangements at home, but the difference was not significant. In the literature, ergonomic factors such as using stairs, bathroom, and toilet type are also cited as important risk factors for falls of patients (49). Because it is important to organize the places where the elderly live in line with their needs and to support their independent activities and design with appropriate equipment in prevention of falls (50). In a study, it was found that the falls in patients after TKA mostly occurred in the bathroom, while going to the toilet, and reaching for the nightstand at their bedside (35). In our study, it was found that among the patients who fell postoperatively, the number of those who used stairs was approximately five times more than those who did not. However, the use of stairs did not have a significant effect on falls, fear of falling, and functional status. Although the fear of falling of those living in an apartment and using a bathtub in their bathroom was high, it had no effect on the functional status. It was thought that this may be due to the fact that our patients did not think that their home conditions were ergonomically safe enough. To not adversely affect the natural walking rhythms of the elderly and to reduce the risk of falls, stairs should be avoided as much as possible in their homes. In addition, the shower cabin is more functional in terms of ease of use instead of a bathtub in the bathrooms to be used by the elderly. In addition, there are ergonomic recommendations for all domestic areas for elderly people (50).

In our study, the prosthesis type and the education level of the patients did not have a significant effect on the fear of falling and functional status in patients. Damar et al. found that the type of prosthesis and education status had no effect on the fear of falling (43). In addition, in a systematic review conducted on the fall risks of patients with TKA, in addition to the risk factors involved in our study, vision problems, kyphosis, muscle weakness, comorbid diseases, depression, balance and walking problems have also been found to have an effect on falls in patients (23). It has been reported that surgical approaches can also be effective (36). In our study, it was determined that as the postoperative time increased, the fear of falling of the patients decreased significantly. Laura Frattura et al. stated that the risk of falls after TKA decreased over time (23). It was thought that this situation might be related to adapting to life with prosthesis.

Limitations of Study

The results of the study cannot be generalized to a certain period of time after TKA, since the evaluations of the patients included in our study were performed at different times postoperatively. The patients could be evaluated at certain time intervals postoperatively, and a comparison could be made regarding the durations. It was an important limitation that no information could be obtained about the content of rehabilitation programs of patients receiving physical therapy.

CONCLUSION

In the study, the patients who underwent TKA were evaluated after an average of 4 years in terms of their falls, fear of falling, and functional status. It was determined that the risk of falls may continue for patients after TKA, which was performed to relieve the pain of the patients and increase their quality of life. Although different variables have been evaluated in studies related to falls, as in our study, there is a need for multifaceted and comprehensive studies that may be risk factors for falls. It may be recommended to evaluate patients who are planned to have TKA in terms of fall risks preoperatively and to take a detailed fall history. Providing physical therapy support to patients at risk and providing comprehensive discharge training to all patients may be effective in preventing possible falls. In addition, it may be recommended to follow-up patients postoperatively, evaluate home conditions in terms of fall risks, and establish evidence-based standards for the prevention of falls. In future studies, it will be useful to evaluate patients preoperatively, monitor them prospectively, determine follow-up intervals, and compare the data with time intervals.

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