Araştırma Makalesi/ Research Article

Determining The Factors Affecting Fear of Movement in Patients Undergoing Total Knee Replacement

Total Diz Protezi Ameliyatı Geçiren Hastalarda Hareket Korkusunun ve Etkileyen Faktörlerin Belirlenmesi

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ABSTRACT

Objective: Total knee replacement (TKR) negatively affects the recovery process because TKR patients avoid movement and have difficulty meeting their needs. Therefore, the aim of this study is to determine the level of fear of movement and affecting factors in patients undergoing total knee replacement surgery according to the surgery period.

Methods: The sample consisted of 150 TKR patients at a university hospital. Data were collected by using a questionnaire including sociodemographic characteristics developed by the researcher, Lysholm Knee Scoring Scale, Barthel Daily Living Activities Index, Numeric Rating Scale and Tampa Kinesiophobia Scale. Data were collected three times using the Tampa Scale of Kinesiophobia (TSK) (1) before surgery, (2) one day after surgery, and (3) three weeks after discharge. The data were analyzed using independent samples t-test, analysis of variance (ANOVA), Tukey, Tamhane, Mann-Whitney U, Kruskal-Wallis H tests, and Bonferroni correction. The statistical significance level of the study is indicated as p<0.05.

Results: Participants had a mean TSK score of 44.05±6.24, 45.54±7.05, and 42.79±8.15 before surgery, one day after surgery, and three weeks after discharge, respectively. Most participants needed help with their activities of daily living after surgery (89.3%). More than three-quarters of the participants avoided movement due to postoperative pain (78.7%). Participants who did not exercise after discharge (1,99±1,66) had higher pain levels (p=0,010) than those who did (1,32±1,38). Participants who exercised regularly (38,12±7,58) had less fear of movement (p=0,000) than those who did not (45,90±6,97).

Conclusion: Post-TKR pain and fear of movement cause patients to avoid moving, which negatively affects the recovery process. Patients who exercise regularly recover more quickly. Therefore, it is important to identify the factors affecting fear of movement in TKR patients.
Keywords: Total knee replacement, movement, activities of daily living, pain, orthopedic nursing

ÖZ

Amaç: Total diz protezi ameliyatı sonrası ağrı, hastanın hareketten kaçınmasına ve bireysel ihtiyaçlarını karşılayamamasına neden olarak iyileşmeyi olumsuz etkiler. Bu nedenle bu çalışmanın amacı total diz protezi ameliyatı geçiren hastalarda hareket korkusu düzeyinin ve etkileyen faktörlerin ameliyat dönemlerine göre belirlenmesidir.

Yöntem: Araştırmanın örneklemine bir üniversite hastanesinde ilk kez total diz protezi ameliyatı geçirmiş 150 hasta alınmıştır. Verilerin toplanmasında araştırmacı tarafından geliştirilen tanımlayıcı özellikleri içeren soru formu, Lysholm Diz Skorlama Ölçeği, Barthel Günlük Yaşam Aktiviteleri İndeksi, Sayısal Kıyaslama Ölçeği ve Tampa Kinezyofobi Ölçeği kullanılmıştır. Veriler ameliyat öncesi, ameliyat sonrası birinci günde ve taburculuk sonrası üçüncü haftada toplanmıştır. İstatistiksel analizde Independent Sample-t, ANOVA, Tukey, Tamhane, Mann-Whitney U, Kruskal-Wallis H testleri ve Bonferroni düzeltmesi kullanılmıştır. Çalışmanın anlamlılık derecesi p<0,05 ile belirtilmiştir.

Bulgular: Çalışmaya katılan hastaların yaş ortalamasının 65,92±9,40 (yıl) ve %55,3'ünün kadın olduğu tespit edilmiştir. Hastaların Tampa Kinezyofobi Ölçeği puan ortalamaları ameliyat öncesi (44,05±6,24), ameliyat sonrası birinci günde (45,54±7,05) ve taburculuk sonrası üçüncü haftada (42,79±8,15) yüksek bulunmuştur. Hastaların %89,3'ünün ameliyat sonrası günlük yaşam aktivitelerinde yardıma ihtiyaç duyduğu, %78,7'sinin ameliyat sonrası ağrı nedeniyle hareketten kaçındıkları bulunmuştur. Taburculuk sonrası dönemde egzersiz yapmayan hastaların ağrı düzeylerinin (1,99±1,66) yapanlara (1,32±1,38) göre daha yüksek olduğu (p=0,010), düzenli egzersiz yapan hastaların hareket korkusu düzeylerinin (38,12±7,58) yapmayan hastalara (45,90±6,97) göre daha düşük olduğu saptanmıştır (p=0,000).

Sonuç: Total diz protezi ameliyatı sonrası ağrı ve hareket korkusu hastaların hareket etmekten kaçınmalarına neden olmakta ve taburculuk sonrası iyileşmeyi olumsuz etkilemektedir. Egzersiz yapan hastalarda iyileşme daha hızlı gerçekleşmektedir. Bu nedenle total diz protezi ameliyatı sürecinde hareket korkusunun ve etkileyen faktörlerin belirlenmesi önemlidir.
Anahtar Kelimeler: Total diz replasmanı, hareket korkusu, günlük yaşam aktiviteleri, ağrı, ortopedi hemşireliği

Introduction

The world's older population continues to grow at an unprecedented rate, increasing the incidence of musculoskeletal diseases (Prince et al., 2015; Tieland et al., 2018). Osteoarthritis (OA) is one of the most common musculoskeletal diseases in the elderly (Arismunandar, 2015; Jansen and Haddad, 2013). Osteoarthritis is most common in the knee joint due to obesity and changes in social activities (Brown, 2013). Patients undergo total knee replacement (TKR) if they do not respond to medical treatment and physical therapy (Liddle et al., 2013).

Total knee replacement is one of the most common reconstructive surgical procedures in orthopedics (Kremers et al., 2015). More and more people experience loss of function in the knee, resulting in a rise in demand for surgery and rehabilitation. More than ninety thousand people (91.258) underwent TKR in England in 2016 (National Joint Registry, 2018). In a report published in America, it was reported that 4.7 million people underwent TKR surgery in 2010 (Kremers et al., 2015). According to a report published by the OECD (2019), it was stated that knee replacement surgeries in OECD countries doubled between 2000 and 2016. In the same report, it was determined that 135.4 out of every 100,000 individuals in OECD countries had knee replacement surgery in 2016 (OECD, 2019).

Total knee replacement is a surgical procedure to improve the health and quality of life of patients who experience irreversible damage to the joint that causes pain and loss of function (Pollock et al., 2016). However, total knee replacement surgery has adverse physical, psychological, and social impacts in the preoperative and postoperative period (Gunaratne et al., 2017). Total knee replacement surgery causes pain, impaired physical movement, altered self-image, and inadequate self-care (Damar and Bilik, 2014). Patients may experience moderate to severe pain after surgery (Aso et al., 2019). In the postoperative period, moderate knee pain is observed in 30% of patients and severe knee pain in 60% (Seo et al., 2017). It is even known that some patients postpone surgery due to fear of pain (Gaffney et al., 2017). Postoperative problems can be a heavy burden for 30% of patients (Wade et al., 2012).

Health outcomes after total knee replacement are affected by demographic (age, gender, bodyweight, etc.) and psychological factors (mental problems, perceived pain, fear-avoidance behaviors, negative personality traits) (Hirakawa et al., 2014). Risk factors need to be identified before surgery to reduce postoperative adverse effects during rehabilitation (Flanigan et al., 2015). The inhibition of pain is affected by how severe the pain is, how the patient perceives their pain, and how they adapt to it (Burns et al., 2015; Høvik et al., 2016). Therefore, nurses are responsible for recognizing how patients interpret their pain and preventing the development of pain-based fear of movement.

One of the primary objectives of nursing care is to increase patient adherence and independence in the postoperative period. Patients experience pain, anxiety, fear of movement, and decreased joint movements after TKR, resulting in reduced self-care skills (Nakahara et al., 2015). Patients may experience fear of movement, anxiety, and depression before surgery, but those symptoms gradually worsen in the early postoperative period and continue until the twelfth month. During the postoperative recovery period, patients may become less independent than expected due to pain and fear of movement (De Vroey et al., 2020). It should be determined how much fear patients experience in the early postoperative period, as this may lead to negative surgical outcomes (Filardo et al., 2016; Hirakawa et al., 2014; Monticone et al., 2013).

Total knee replacement patients with high pain levels also have a fear of movement so much so that it prevents them from returning to their preoperative activity level (Brown et al., 2020; Doury-Pancout et al., 2015; Kocic et al., 2014). How patients perceive their activity levels determines how much activity they perform. Patients with high perceived activity experience less fear of movement (Deniz et al., 2017). In other words, fear of movement causes inactivity, making patients more dependent than they should be.

Reasons such as the level of knowledge about post-discharge exercises in patients undergoing TKR surgery, comorbidities, development of complications, social support resources and lack of guidance from healthcare providers are personal and environmental factors that affect the rate of exercise and movement (Bakaa et al., 2022). Studies also show that pain after knee surgery is an important problem that prevents rapid recovery (Kolettas et al., 2015; Wade et al., 2012). Pain-based fear may occur along with severe pain. This fear can lead to avoidance behaviors and hypersensitivity, especially to bodily sensations such as touch and movement. Fear of movement (kinesiophobia) is an indicator of a negative adaptation process that

causes avoidance of physical activity (Doury-Panchout et al., 2015). This fear may predispose to the development of some complications after surgery, as it can lead to behaviors that can lead to illness and subsequently create a vicious cycle between pain and immobility (Monticone et al., 2013). According to the results of research conducted by Witvrouw et al. (2009) and Doury–Panchout et al. (2015) on patients who underwent TKR surgery, it was determined that fear of movement played a negative role in the postoperative recovery process and prolonged the hospital stay. In the study conducted by Filardo et al. (2016), it was determined that fear of movement is an important issue that will affect the final results after TKR and the success of the surgery. Patients with osteoarthritis (OA) undergo TKR surgery to help improve knee function and range of motion. However, dependence due to pain and fear of movement negatively affects the knee function because the patient fails to stick to exercises, making them more and more dependent after surgery. In the light of this information, factors affecting surgical outcomes and quality of care (pain, fear of movement, level of independence and functional capacity of the knee joint) should be determined and nursing interventions should be implemented accordingly. However, there is no research addressing those factors together. Therefore, the aim of this study is to determine the level of fear of movement and affecting factors in patients undergoing total knee replacement surgery according to the surgery period.

Research Questions

• What are the patients' fear of movement levels before and after TKR surgery and after discharge?

• What are the factors affecting the fear of movement levels of patients undergoing TKR surgery?

Methods

This was a descriptive study conducted at the orthopedics and traumatology clinic of a university hospital in Turkey. One hundred and thirty-four patients were contacted. A power analysis was performed on the Tampa Scale of Kinesiophobia. The results showed that a sample of 147 would be large enough to detect significant differences (a power of 80% and an error rate of 5%). Therefore, the sample consisted of 150 patients who met the inclusion criteria between October 2018 and March 2019

Inclusion criteria;
• Undergoing TKR for the first time
• No communication problems

Data Collection Tools

Data were collected using a patient question form, the Lysholm Knee Scoring Scale, the Barthel Index of Activities of Daily Living, the Numerical Rating Scale for Pain (NRS Pain), and the Tampa Scale of Kinesiophobia. The data were collected three times: (1) before surgery, (2) one day after surgery, and (3) three weeks after discharge.

Patient Question Form

The Patient Question Form was based on a literature review conducted by the researchers (Kocic et al., 2015; Olsson et al., 2016; Doury-Panchout et al., 2015). Three academics checked the form for relevance and comprehensibility. It was revised based on their feedback. The form consisted of 21 multiple-choice and six open-ended questions about demographic characteristics (age, gender, education, employment, etc.), dependence on others for activities of daily living, challenges of mobilization, using supporting materials and tools, and pain.

Lysholm Knee Scoring Scale

The Lysholm Knee Scoring Scale (LKSS) was developed by Tegner and Lysholm (1985) and adapted to Turkish by Çelik, Coşkunsu, and Kılıçoğlu (2013). The questionnaire is used to evaluate knee functions subjectively. The total score ranges from 0 to 100. Higher scores indicate better outcomes (95-100 = excellent; 84-94 = good; 65-83 = moderate; 64 ≤ poor). The Turkish version of the questionnaire has a Cronbach's alpha (α) of 0.68 and test-retest reliability of 0.82 (Çelik et al., 2013). In the present study, the questionnaire had a Cronbach's alpha of 0.76.

Barthel Index of Activities of Daily Living

The Barthel Index of Activities of Daily Living (BIADL) was developed by Barthel and Mahoney (1965) and adapted to Turkish by Küçükdeveci et al. (2000). The instrument is used to measure performance in activities of daily living. It can be used for bedridden or stroke patients and orthopedics and traumatology patients (Koç et al., 2012). The total score ranges from 0 to 100 (0-20 = total dependency; 21-60 = severe dependency; 61-90 = moderate dependency; 91-99 = slight dependency; 100 = total independence). The Turkish version of the BIADL has a Cronbach's alpha of 0.93, which was 0.78 in the present study.

Numerical Rating Scale

A Numerical Rating Scale is used to translate concepts into numerical data. Pain is one of those concepts. In a Numerical Rating Scale (NRS), the patient is asked to circle the number between 0 (no pain at all) and 100 (the worst pain ever possible) that best describes the intensity of pain they experience at that moment. The Numerical Rating Scale is a reliable and feasible instrument to assess pain (Hawker et al., 2011).

Tampa Scale of Kinesiophobia

The Tampa Scale of Kinesiophobia (TSK) was used to assess participants' fear of movement. It is a 17-item checklist used to determine acute and chronic low back pain, fibromyalgia and musculoskeletal injuries, and neck extension injuries due to whiplash. The items are scored on a four-point Likert-type scale (1 = Strongly disagree to 4 = Strongly agree). The total score ranges from 17 to 68. Higher scores indicate higher levels of fear. Researchers recommend using the total score (Woby et al., 2005; Steven et al., 2012). Miller et al. (1991) developed the TSK but did not publish it. Vlaeyen et al. (1995) published the scale by courtesy of the developers. Yılmaz Yakut et al., (2011) adapted the scale to Turkish and found the test-retest reliability as 0.81. However, they did not calculate its Cronbach's alpha. In a study where the validity and reliability of the scale was conducted in Chinese, the Cronbach alpha was found to be 0.88 (Cai et al., 2019), which was 0.79 in the present study.

Pilot Study

A pilot study was conducted with ten patients treated at the orthopedics and traumatology clinic between October 3 and December 21, 2018. The pilot study was performed to check the patient question form for relevance and intelligibility. No modification was made to the form based on the pilot test results. The participants of the pilot test were included in the sample of the main study.

Data Collection

The sample consisted of 150 TKR patients at the orthopedics and traumatology clinic between October 2018 - March 2019. All scales and the patient question form were administered three times. The first data collection took place before surgery when each participant was admitted to the clinic. Patients generally have surgery on the day or the day after admission. The second data collection took place on the day after surgery in the clinic after the participant was mobilized for the first time. Patients are generally discharged 4-5 days after surgery and visit the polyclinic for consultation three weeks after discharge. The third data collection took place 15-21 days after discharge when the participant visited the polyclinic for consultation. All data were collected by the first investigator in the orthopedics and traumatology clinic. The researcher who collected the data is a master's student in the department of surgical nursing. The questions in the data collection tools were read to the patients and they were asked to answer them. Each interview was conducted outside of treatment hours in a quiet place with no distractions after the participant was informed of the research purpose and procedure. Data collection took 15-25 minutes.

Data Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS, IMB, version 24) at a significance level of 0.05. Frequency tables and descriptive statistics were used to interpret the findings. Normality was tested. For the normally distributed data, an independent t-test (t-table value) was used for two independent groups, while an Analysis of Variance (ANOVA) (F-table value) was used for more than two groups. Tukey or Tamhane (depending on the homogeneity of variances) was used for post-hoc comparisons.

For the non-normally distributed data, the Mann Whitney-U test (Z-table value) was used for two independent groups, while the Kruskal Wallis test (χ2-table value) was used for more than two groups. Bonferroni correction was used for post-hoc comparisons.

Results
Demographic Data of Patients

Participants had a mean age of 65.92±9.40 years. Less than half the participants were between the ages of 61 and 70 (42.7%). More than half the participants were women (55.3%). More than a quarter of the participants were overweight (34.7%). More than half the participants were married (69.3%). About six out of ten participants had had surgery before (56.7%). More than half the participants had a chronic disease (64%). Four out of ten participants had hypertension (41.6).

Pain, Independence, Knee Score and Fear of Movement Levels of Patients According to Surgery Periods

Participants had the lowest mean LKSS score before surgery (47.12±16.86).

Table 1. Scale scores in three periods (n=150)

Scale Scores	Before surgery (1)		One day after surgery(2)		Three weeks after discharge(3)		Statistical analysis	
	$\overline{X} \pm$ S.D.	Median [IQR]	$\overline{X} \pm$ S.D.	Median [IQR]	$\overline{X} \pm$ S.D.	Median [IQR]	χ^2	p
LKSS *	47.12±16.86	47.0 [25.0]	54.45±16.99	55.0 [20.3]	80.49±15.75	83.0 [17.3]	206.389	**0.001** [1-2.3] [2-3]
BIADL **	85.67±16.93	95.0 [25.0]	54.00±23.66	55.0 [36.3]	88.43±13.24	90.0 [15.0]	161.792	**0.001** [2-1.3]
NRS ***	3.41±2.82	2.5 [5.0]	4.76±2.57	5.0 [4.0]	1.72±1.58	1.0 [3.0]	142.111	**0.001** [1-2.3] [2-3]
TSK ****	44.05±6.24	44.0 [9.0]	45.54±7.05	45.0 [8.0]	42.79±8.15	44.0 [10.0]	33.992	**0.001** [2-1.3]

*Lysholm Knee Scoring Scale, **Barthel Index of Activities of Daily Living, ***Numerical Rating Scale, ****Tampa Scale of Kinesiophobi*

They had a significantly higher mean LKSS score three weeks after discharge (80.49±15.75) than the day after surgery (54.45±16.99). They had the lowest mean BIADL score the day after surgery (54.00±23.66). They had the highest NRS score day after surgery (4.76±2.57). They had a significantly lower mean NRS score three weeks after discharge (1.72±1.58) than the before surgery (3.41±2.82). They had the highest mean TSK score the day after surgery (45.54±7.05) (p<0.05) (Table 1).

Distribution of Pain, Independence, Knee Score and Fear of Movement Levels by Demographic Characteristics

Though not shown in table, participants over 70 years of age had significantly lower mean LKSS (day after surgery:47,02±16,68, after discharge: 75,35±14,30) and BIADL (day after surgery: 43,13±23,56, after discharge: 83,02±15,15) scores than other age groups. Participants with no surgical experience had a significantly higher mean NRS score in all periods (before surgery: 4,29±2,93, the day after surgery: 5,43±2,56, three weeks after discharge: 2,06±1,62) than those who had surgery before (p<0.05).

Participants over 70 years of age had a higher mean TSK score (day after surgery: 48,13±6,35, after discharge: 45,25±7,44) than other age groups. Single participants (day after surgery: 47,52±6,48, after discharge: 44,91±7,64) had a higher mean TSK score than their married counterparts (day after surgery: 44,66±7,14, after discharge: 41,85±8,22). Literate participants had a higher mean TSK score (day after surgery: 48,73±5,62) than those with higher degrees. Participants living with relatives in addition to their spouses and children had a higher mean TSK score than others after surgery and discharge (the day after surgery: 46.93±4.63, three weeks after discharge: 45.30±7.61) (p<0.05) (Table 2).

Distribution of Fear of Movement Levels by Activities of Daily Living

Participants who need for assistance in performing activities of daily living had a higher mean TSK score before surgery (45.80±6.01) and three weeks after discharge (45.11±8.13) than those who were not (before surgery:42.57±6.08, after discharge: 39.83±7.20). Participants who used walking aids had a higher mean TSK score before surgery (47.03±6.11) and three weeks after discharge (45.81±7.95) than those who did not (before surgery: 41.71±5.30, after discharge: 39.84±7.25). Participants who avoided performing activities of daily living due to pain had a higher mean TSK score before surgery (46.24±7.04) and three weeks after discharge (45.87±8.03) than those who did not (before surgery: 41.90±5.39, after discharge: 40.47±7.05). Participants who had not felt healthy recently had a higher mean TSK score in all periods (before surgery: 46.07±6.24, day after surgery: 47.15±6.65, after discharge: 48.06±7.86) than those who had (before surgery: 41.42±5.20, day after surgery: 42.22±6.74, after discharge: 40.38±7.10).

Participants who avoided movement due to pain had a higher mean TSK score in all periods (before surgery: 45.17±6.31, day after surgery: 46.24±7.04, after discharge: 45.87±8.03) than those who did not (before surgery: 41.69±5.42, day after surgery: 42.97±6.55, after discharge: 39.44±6.90). Participants who did not exercise had a higher mean TSK score (day after surgery: 46.20±6.94, after discharge: 45.90±6.97) than those who did (day after surgery: 43.29±7.06, after discharge: 38.12±7.58) (p<0.05) (Table 3).

Table 2. Distribution of TSK scores by demographic characteristics (n:150)

Demographic Characteristics	n	Tampa Scale of Kinesiophobia					
		Before surgery		One day after surgery		Three weeks after discharge	
		$\bar{X} \pm S.D.$	Median [IQR]	$\bar{X} \pm S.D.$	Median [IQR]	$\bar{X} \pm S.D.$	Median [IQR]
Age (years)							
<60[1]	38	44.34±5.18	45.0 [7.0]	44.00±6.86	45.0 [8.3]	39.84±7.39	40.5 [11.0]
60-70[2]	64	43.94±6.49	43.0 [7.8]	44.52±7.23	44.0 [8.8]	42.69±8.59	42.5 [11.0]
>70[3]	48	43.98±6.76	45.0 [10.8]	48.13±6.35	48.0 [9.5]	45.25±7.44	45.5 [8.0]
Statistical Analysis*		F=0.054, p=0.947		χ^2=9.633, **p=0.008 - [2-3]**		F=4.926, **p=0.008 - [1-3]**	
Marital Status							
Single	46	43.50±6.70	43.0 [8.5]	47.52±6.48	46.5 [8.0]	44.91±7.64	44.0 [10.3]
Married	104	44.30±6.04	44.5 [8.0]	44.66±7.14	45.0 [8.8]	41.85±8.22	42.5 [11.0]
Statistical Analysis*		t=-0.721, p=0.472		Z=-2.194, **p=0.028**		Z=-2.061, **p=0.039**	
Education (degree)							
Literate[1]	40	44.73±6.36	45.0 [8.8]	48.73±5.62	48.5 [7.8]	45.63±6.23	46.0 [8.0]
Primary school[2]	31	44.06±6.55	43.0 [11.0]	43.58±7.17	43.0 [6.0]	42.03±7.20	42.0 [11.0]
Middle school[3]	29	43.10±4.25	43.0 [6.5]	44.79±5.35	45.0 [9.0]	42.79±9.42	43.0 [11.5]
High school[4]	33	45.27±7.60	45.0 [8.0]	45.52±8.98	46.0 [11.0]	41.91±9.42	42.0 [11.5]
Bachelo's or higher[5]	17	41.71±4.97	41.0 [8.5]	42.94±6.09	42.0 [6.0]	39.18±7.56	38.0 [10.5]
Statistical Analysis*		F=1.208, p=0.310		χ^2=18.882, **p=0.001 - [1-2.5]**		F=2.286, p=0.063	
Living arrangement							
Alone[1]	22	45.05±6.63	45.0 [11.0]	48.23±8.62	47.0 [11.3]	45.00±7.53	45.0 [11.8]
Spouse[2]	70	44.56±6.40	45.0 [8.3]	45.51±7.35	45.0 [9.3]	42.36±8.55	42.5 [11.0]
Spose and children[3]	31	42.84±4.63	43.0 [6.0]	42.48±5.95	43.0 [8.0]	40.00±7.35	42.0 [10.0]
Relatives[4]	27	43.33±7.09	45.0 [11.0]	46.93±4.63	47.5 [6.0]	45.30±7.61	46.0 [11.0]
Statistical Analysis*		F=0.847, p=0.470		F=3.527, **p=0.017 - [3-4]**		χ^2=7.914, **p=0.048 - [3-4]**	

Independent Sample-t test (t-table value); ANOVA test (F-table value); Mann-Whitney U test (Z-table value); Kruskal-Wallis H test (χ^2-table value)

Participants who exercised had higher LKSS (85,27±10,15) and BIADL (91,92±10,09) and lower NRS scores (1,32±1,38) three weeks after discharge than those who did not (LKSS: 77,30±17,94, BIADL: 86,11±14,57, NRS: 1,99±1,66) (p<0.05).

Comparison of Fear of Movement Levels to Pain, Independence, Knee Score Levels

The higher the NRS scores, the higher the TSK scores before surgery (p:0.007) and three weeks after discharge (p:0.001). TSK scores were weakly and negatively correlated with LKSS and NRS scores in all periods (p:0.001). The higher the LKSS and NRS scores, the higher the TSK scores in all periods. BIADL scores were weakly and negatively

correlated with TSK scores before surgery surgery (p:0.001)
and three weeks after discharge (p:0.001). In other words, participants with higher levels of pain had higher fear of movement, whereas those with higher knee joint functional capacity and independence had lower fear of movement (p<0.05) (Table 4).

Discussion

The aging population, obesity, and changes in social activity increase the prevalence of OA (Brown, 2013). Total knee replacement is a standard option for OA treatment (Liddle et al., 2013).

However, the surgery sometimes results in pain, impaired physical movement, and poor self-care (Damar and Bilik, 2014). Patients with post-TKR pain have difficulty adapting to the new situation and have a fear of movement.

Doury–Panchout et al. (2015) report that the fear of movement after TKR surgery adversely affects the recovery process and results in prolonged hospitalization.

Table 3. Distribution of TSK scores by activities of daily living (n=150)

Evaluation Questions	Tampa Scale of Kinesiophobia								
	Before surgery			One day after surgery			Three weeks after discharge		
	$\bar{X} \pm S.D.$	Median [IQR]	Statistical analysis*	$\bar{X} \pm S.D.$	Median [IQR]	Statistical analysis*	$\bar{X} \pm S.D.$	Median [IQR]	Statistical analysis*
Need for assistance in performing activities of daily living									
Yes	45.80±6.01	46.0 [7.0]	t=3.261 p=0.001	45.86±7.14	45.0 [9.0]	Z=-1.540 p=0.124	45.11±8.13	44.5 [10.5]	Z=-3.606 p=0.001
No	42.57±6.08	43.0 [9.0]		42.88±5.77	43.5 [8.5]		39.83±7.20	40.5 [11.0]	
Using walking aids									
Yes	47.03±6.11	47.0 [7.3]	t=5.703 p=0.001	45.54±7.05	45.0 [8.0]	-	45.81±7.95	46.0 [12.3]	Z=-4.107 p=0.001
No	41.71±5.30	42.0 [7.0]		-	-		39.84±7.25	41.0 [11.0]	
Feeling healthy lately									
Yes	41.42±5.20	41.0 [8.0]	Z=-4.386 p=0.001	42.22±6.74	42.0 [7.5]	Z=-3.975 p=0.001	40.38±7.10	41.0 [11.0]	Z=-5.147 p=0.001
No	46.07±6.24	45.0 [7.0]		47.15±6.65	46.0 [9.0]		48.06±7.86	47.0 [9.0]	
Avoiding movement due to pain									
Yes	45.17±6.31	45.0 [8.3]	t=3.290 p=0.001	46.24±7.04	46.0 [8.3]	Z=-2.628 p=0.009	45.87±8.03	46.0 [8.5]	t=5.237 p=0.001
No	41.69±5.42	42.0 [8.0]		42.97±6.55	42.0 [7.0]		39.44±6.90	39.5 [10.0]	
Avoiding performing activities of daily living due to pain									
Yes	46.09±6.34	46.0 [8.5]	t=4.349 p=0.001	46.35±6.57	46.0 [8.0]	Z=-1.583 p=0.114	47.57±8.23	47.0 [10.0]	Z=-4.846 p=0.001
No	41.90±5.39	42.0 [7.5]		43.77±7.78	45.0 [10.0]		40.47±7.05	41.0 [10.5]	
Doing exercises									
Yes	41.33±6.77	40.5 [12.5]	t=-1.583 p=0.116	43.29±7.06	42.5 [7.8]	Z=-2.214 p=0.027	38.12±7.58	37.5 [10.8]	Z=-5.699 p=0.001
No	44.29±6.16	45.0 [8.0]		46.20±6.94	46.0 [7.8]		45.90±6.97	45.5 [7.0]	

Independent Sample-t-test (t-table value); Mann-Whitney U test (Z-table value)

Tablo 4. Comparison of TSK scores to other scale scores (n=150)

Scales	Before surgery		One day after surgery		Three weeks after discharge	
	r	p	r	p	r	p
NRS**	0.219	**0.007**	0.155	0.058	0.267	**0.001**
LKSS	-0.339	**0.001**	-0.261	**0.001**	-0.442	**0.001**
BIADL***	-0.271	**0.001**	-0.131	0.109	-0.336	**0.001**

* Pearson test; Spearman correlation coefficient, **Numerical Rating Scale, ***Barthel Index of Activities of Daily Living

According to Filardo et al. (2016), post-TKR fear of movement is an important issue that might even affect the success of the surgery. In this study, it was determined that the level of fear of movement was high in TKR patients in the preoperative, postoperative and post-discharge periods, postoperative pain increased the fear of movement, and the knee scores and independence levels of patients with high levels of fear of movement decreased.

A TSK score of >37 (Vlaeyen et al., 1995) or >39 (de Jong et al., 2005) indicates high fear of movement. Our participants had high fear of movement in all periods, but they had higher fear of movement after surgery than before surgery (Table 1). Post-TKR pain and adaptation process lead to high fear of movement (Doury-Pancout et al., 2015; Kocic et al., 2014; Monticone et al., 2013). Patients with post-TKR pain avoid movement because they feel more pain as they move, resulting in irregular exercise and poor health outcomes (Filardo et al., 2016; Hirakawa et al., 2014; Monticone et al., 2013).

Older participants had higher fear of movement than their younger counterparts (Table 2). Functional decline, balance problems, fear of falling, effects of comorbid diseases, etc., increase with age. For some reasons, elderly patients may have greater fear of movement (Damar et al., 2021). Olsson et al., (2016) reported the same result. This is probably because older patients are more sensitive to pain, and therefore, more afraid of moving than younger patients. Participants with social sources of support (spouse, children, etc.) after discharge had a lower fear of movement than those without (Table 2).

In the study conducted by Zang et al., it was determined that single/divorced/widowed patients had higher levels of fear of movement than married/cohabiting patients (Zang et al., 2023). This result suggests that patients who receive little to no

homecare support after discharge are more afraid of moving. Participants with low education had higher fear of movement after surgery than those with high education (Table 2). In the first postoperative mobilization, patients should stick to exercise programs recommended by health professionals for post-mobilization. However, health professionals should consider patients' education levels and answer their questions before recommending those training programs. Otherwise, patients may avoid moving due to unknown anxiety (Deniz et al., 2017).

Participants who did not feel healthy were nervous and avoided moving in all periods. Participants who were nervous and avoided moving after discharge were dependent on others for activities of daily living. Participants with high fear of movement had difficulty performing activities of daily living because they avoided moving. Participants engaged in regular exercises had lower fear of movement than those who were not (Table 3). There are studies in the literature reporting that patients' personality affect their fear of movement and fear-avoidance levels (Domenech et al., 2013; Edalatmehr et al., 2019). Participants who were engaged in regular exercise three weeks after discharge had higher knee functional capacity and were more independent in activities of daily living than those who were not. Studies in the literature reporting that regular exercise reduces the level of fear of movement support the results of this study (Bäck et al., 2020; Keessen et al., 2020). These results indicate that compliance with exercise programs positively affects surgical outcomes.

Participants with high NRS scores had more difficulty performing activities of daily living, needed more help in daily life, used walking aids more often, and felt unhealthier than those with low NRS scores. Participants with higher NRS scores also had lower BIADL and LKSS scores. The higher the pain, the higher the fear of movement. The

higher the knee joint functional capacity and the level of independence, the lower the fear of movement (Table 4). This result suggests that patients with high fear of movement feel more pain, are more dependent on others for activities of daily living, and experience delayed recovery in their knee joints. Pain and fear of movement negatively affect each other. Studies in the literature report that patients with less pain after surgery move more (Sullivan et al., 2011; Nakahara et al., 2015; Flanigan et al., 2015). (Sullivan et al., 2011; Nakahara et al., 2015; Flanigan et al., 2015). Patients who avoid moving experience higher levels of pain. Patients avoid moving because they undergo an adaptation process and feel more pain as they move. However, patients move more and more as they experience less pain and get used to living with their prostheses after discharge.

Research shows that pain after knee surgery prevents rapid recovery (Kolettas et al., 2015; Wade et al., 2012). Severe pain causes fear, resulting in avoidance behaviors and oversensitivity to bodily sensations (touch, movement, etc.) (Li et al., 2019). This may cause fear of movement (kinesiophobia), a symptom of a negative adaptation process that leads to avoidance of physical activity (Doury-Panchout et al., 2015). Monticone et al. (2013) argue that postoperative fear causes patients to adopt disease-promoting behaviors and creates a vicious cycle of pain and immobility, paving the way for some complications. Patients respond to fear of movement in two ways: they either embrace the situation or try to avoid it as much as they can. Patients feel less fear when they face their fear. On the other hand, they feel more fear when they avoid it (Olsson et al., 2016). Pain-based avoidance behaviors manifest themselves in two ways: trying to avoid pain or trying to avoid performing activities that cause pain (Rogers and Farris, 2022). Patients who can face pain-inducing situations are likely to feel less pain, get over pain faster, and present less fear and concern about pain and getting hurt (Burns et al., 2015). Doury–Panchout et al. (2015) maintain that postoperative fear of movement exacerbates the recovery process and results in prolonged hospital stay in TKR patients. Filardo et al. (2016) argue that fear of movement is a serious issue that affects surgical outcomes in TKR patients. Pain-based fear of movement negatively affects patients' mental health, prevents them from performing exercises, and slows down the functional recovery process. It is important to measure fear of movement in TKR patients and take it under control to achieve satisfactory health outcomes.

Conclusion and Recommendations

The results show that pain causes TKR patients to experience fear of movement, resulting in decreased knee joint functional capacity, reduced activities of daily living, and reduced independence levels. Therefore, it is recommended that nurses regularly evaluate pain and fear of movement in TKR patients and plan care accordingly, comprehensively inform patients about fear of movement, and develop and implement educational materials and training programs to teach them how to overcome fear of movement. In addition, it is recommended to conduct new research on the factors affecting fear of movement using regression analysis to reflect their impact levels and in a larger sample group.

What did the study add to the literature?
- TKR patients' fear of movement levels are high during all surgical periods.
- Pain after TKR increases patients' fear of movement.

- Patients with high levels of fear of movement after TKR have lower knee scores and levels of performing daily living activities.
- This study is the only known study in the nursing literature in our country that reveals the relationship between fear of movement and pain, level of independence, level of performing daily living activities and knee score.
- It is important to evaluate fear of movement in planning the care and discharge education of TKR patients, and the study results contribute to the literature in this respect.

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