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## RESEARCH

# THE RELATIONSHIP BETWEEN FEAR AVOIDANCE BELIEFS AND PHYSICAL DISABILITY IN PATIENTS WITH SYMPTOMATIC KNEE OSTEOARTHRITIS

## ABSTRACT

**Introduction:** The aim of this clinical study was to investigate the relationship between fear avoidance beliefs and physical disability in patients with symptomatic knee osteoarthritis.

**Materials and Method:** A total of 195 patients with knee osteoarthritis were included in this cross-sectional study. Osteoarthritis severity was determined radiologically with the use of Kellgren-Lawrence staging approach. The 'Knee Injury and Osteoarthritis Outcome Score (KOOS)' was used to determine pain severity, symptoms, function in daily living, sports/recreation activities, and knee-related 'Quality of Life (QoL)'. All patients were evaluated by the 'Fear Avoidance Beliefs Questionnaire physical activity (FABQpa)' survey.

**Results:** Within the study group, 129 patients (78.7%) were female. The mean age was 62.6 (54–81) years. The mean body mass index was 30.17 (18.75 - 44.06) kg/m<sup>2</sup>. The mean disease duration was 4.32 (1–15) years. Knee osteoarthritis was bilateral in 130 patients (66.7%). The radiological severity of knee osteoarthritis rated at stage II or III was 82.2%. The mean FABQpa rating was 17.17 ± 6.21 and 61% had a FABQpa score > 15. The mean KOOS on pain severity, symptoms, function in daily living, sport/recreation activities, and knee-related QoL scores were 65.15, 51.17, 58.29, 32.69 and 35.9, respectively. Significant correlations were found between FABQpa and KOOS pain, symptoms, function in daily living, sport/recreation activities, and knee-related QoL (p-values were 0.001 for all domains of FABQ).

**Conclusion:** In this study, more than half of the patients with knee osteoarthritis had elevated fear avoidance beliefs. Moreover, fear avoidance beliefs on physical activity had significant relationships with pain, symptoms, functional disability and QoL.

**Keywords:** Fear; Osteoarthritis, Knee; Arthralgia

## INTRODUCTION

Knee osteoarthritis (OA) is a complex disease characterized by pain, functional limitations and disability, is a common disease over the age of 50 years. Pain usually develops due to osteoarthritic changes in the joints. This initially occurs with movement due to its mechanical nature, and there is no pain at rest. As OA gains chronicity over time, the frequency of pain increases and becomes continuous, and neuropathic pain symptoms may begin to occur (1).

Fear and avoidance behavior may be related to the chronicity of musculoskeletal pain (2). A vicious cycle may occur between pain and fear-avoidance behavior. If people with chronic pain due to lower extremity OA are not informed about avoidance behavior, this clinical cascade may develop and become harmful (3). Pain and anxiety are the other factors related to decreased physical activity levels in patients with lower extremity OA (4). Additionally, there is strong evidence that fear and avoidance behavior may cause muscle weakness and functional limitations in patients with knee OA (4). On the other hand, evidence about muscle weakness caused by avoidance of activities due to pain and psychological disorders is lacking.

Avoidance of activities may lead to decreased knee extensor muscle strength (5). Chronic pain is also a condition that affects lifestyle (6), and patients with chronic pain usually avoid activities that increase pain. In addition, it is thought that fear and avoidance behavior caused by pain play a role in the chronicity of the problem, at least in some patients (2, 7). Fear caused by pain is usually accompanied by decreased physical function and disability (2). Fear, catastrophizing and depression have been reported to be associated with pain and disability in patients with chronic low back pain (7, 8). Chronic low back pain is a condition that causes disability, work absenteeism and loss of strength, and high health costs. For this reason, studies on fear avoidance beliefs have primarily been conducted in people with low back pain. Gheldof et al. concluded

that initial pain intensity was a determinant of the development of pain-related fear and disability (9). It has been suggested that fear avoidance beliefs are predictors of pain and disability in another study (10). Several other researchers have posited that there is a relationship between fear avoidance beliefs, decreased physical activity and disability in patients with chronic low back pain. (11). In previous studies, the correlation between fear avoidance beliefs and pain and disability were investigated mostly in patients with chronic low back pain (9–11). However, there are a few studies that investigated the relationship among fear avoidance level, pain intensity and functional status in patients with knee OA (12–14). It is thought that pain or instability due to OA may cause fear of movement and eventually increased disability in older adults (15).

This study was formulated due to the limited number of studies about the relationship between fear avoidance and disability in people with knee OA. The primary aim of this study was to determine the fear avoidance beliefs in patients with symptomatic knee OA and to investigate its relationship with physical disability.

## METHODS

This cross-sectional study included 195 symptomatic patients with ages > 50 years who had knee OA, which was determined according to American College of Rheumatology's criteria. The study was conducted between 01.06.2021–31.10.2021. The study population consisted of patients attending the outpatient clinics of Istanbul PMR Training Hospital. Non-ambulatory persons, patients with lower extremity problems other than knee OA or other neurological diseases that could affect walking, those with lower extremity arthroplasty, and those with cooperation disorders were excluded from the study. Pain intensity was measured using a 10 cm horizontal visual analogue scale (VAS). The radiological severity of knee OA was evaluated using the Kellgren-Lawrence grading system (16). All patients



were evaluated using the Knee Injury and Osteoarthritis Outcome Score (KOOS) (17) and the Fear Avoidance Beliefs Questionnaire (FABQ) (18).

### **Knee Injury and Osteoarthritis Outcome Score (KOOS)**

KOOS is a 42-item self-assessment questionnaire that investigates knee-related status in various conditions, including OA (19). It has five domains: pain severity, other symptoms, function in daily living (ADL), function in sport and recreation (Sport/Rec), and knee-related quality of life (QoL). KOOS contains knee-related QoL and sport and recreation areas in addition to that of WOMAC domains. Each item has a score between 0–4, and the total score is assessed on a scale between 0–100. Lower scores indicate severe knee-related problems, whereas higher scores indicate better results in terms of pain, other symptoms, ADL, Sport/Rec, and QoL. The Turkish version of KOOS has been validated and is a reliable tool for assessing patients with knee OA (19).

### **Fear Avoidance Beliefs Questionnaire (FABQ)**

The FABQ is useful for showing fear of pain and avoidance of physical activity in clinical practice (18). The FABQ has two domains. The first domain contains seven work-related items with a maximum score of 42, and the second one has 4 items about physical activity (FABQpa) with a maximum score of 24. These domains have specific scores, with higher scores indicating a higher level of fear avoidance beliefs. The validity and reliability of the FABQ-Turkish version was studied in patients with low back pain (20).

In this study, the FABQpa was used because most participants were unemployed. After the waist region word was changed to knee related words in the questions, a pilot study was conducted on 20 subjects to measure the internal validity of FABQpa-Turkish version in patients with knee OA.

FABQpa was applied twice within a 42-hour mean interval for the test–retest study. During this period, no treatment was administered to patients. Cronbach's alpha value was used for the internal consistency analysis. Cronbach's alpha value  $> 0.80$  is interpreted as good, values between  $0.80$ – $0.70$  are considered moderate, and values  $< 0.70$  suggest low internal consistency.

The approval of the ethics committee was obtained for this study (Kanuni Sultan Süleyman EAH; KAEK/2021.05.175). Written informed consent was obtained from the patients who volunteered to participate in the study. The study was also conducted in conformity with the principles of the Declaration of Helsinki.

### **Statistical Analysis**

Based on previous work by Scopaz et al. (13), the sample size was estimated. This allowed 190 patients for a correlation coefficient of FABQ  $r = 0.202$ , given an alpha value of 0.05, to provide 80% power. This was measured with the use of the Med Calc statistical software.

The basic psychometric analysis of the internal consistency of each self-report was assessed with Cronbach's alpha value. We examined descriptive statistics to assess outliers and data distributions. Then, we calculated bivariate correlation coefficients to determine associations among physical function variables, VAS pain and demographic variables. Pearson's correlation coefficients were used between normally distributed continuous variables, and Spearman's rho coefficients were used for categorical and non-normally distributed continuous variables. The linear regression analysis was chosen to analyze the contribution of independent variables to the FABQpa score. Statistical significance was determined using an alpha level of 0.05. SPSS statistical software version 10.0 was used for these measurements.

## RESULTS

Demographic and clinical characteristics are summarized in Tables 1 and 2. Within the study group, 79 percent of the patients were female. The mean body mass index score was above 30 kg/m<sup>2</sup>. Within the study group, 97 patients (49.7%) were obese. Radiographic knee OA severity rating was Kell-

gren-Lawrence grade 2 or 3 in 82.2% of cases. Cronbach's alpha value was 0.80 for the FABQpa domain. The mean FABQpa score was 17.17 ± 6.21. Among the 119 patients (61%) with symptomatic knee OA, FABQpa scores were > 15.

Bivariate correlations revealed significant correlations between FABQpa and KOOS pain, other

**Table 1.** Demographics and clinical characteristics of the study group.

		Min	Max	Mean	Std. Deviation
Age (years)		54.0	81.0	62.67	4.57
Gender, n, % (Male/female)				41 / 154 21 / 79 %	
BMI (kg/m <sup>2</sup> )		18.75	44.06	30.07	4.69
<b>Symptomatic knee</b> Right/left (n, %) Bilateral				42/23 (21.5/11.8 %) 130 (66.7%)	
<b>Disease duration</b> (years)		1	15	4.32	3.03
Current smokers	71.6%				
<b>Kellgren-Lawrence</b> 1 2 3 4	% 0 43 39.2 17.8				

**Table 2.** KOOS, FABQpa and VAS values

	Minimum	Maximum	Mean	Std. Deviation
KOOS symptoms	14.29	100	65.15	22.32
KOOS pain	0.00	97.22	51.17	22.71
KOOS ADL	5.88	100.00	58.29	21.34
KOOS Sports/Rec	0.00	100.00	32.69	28.04
KOOS QoL	0.00	93.75	35.91	21.52
VAS pain	2.00	9.00	5.36	1.51
FABQpa	3.00	78.00	17.17	6.21

KOOS: Knee Injury and Osteoarthritis Outcome Scale, FABQpa: Fear Avoidance Beliefs physical activity, VAS: Visual analogue scale



symptoms, ADL, function in Sport/Recreation, and knee-related QoL scores (Table 3).

The results of the linear regression analysis revealed that FABQpa scores were significantly associated with worse functional status, as indicated by higher KOOS scores for all subgroups ( $p = 0.001$ ;  $R^2 = 0.155$ ) (Table 4).

## DISCUSSION

In our study, we have observed that fear avoidance beliefs, as measured by FABQpa, demonstrated a significant relationship with pain and other symptoms, physical disability, sports and recreational activities and QoL in patients with painful knee OA. Previous research has found that fear avoidance might be related to the increasing number of affected joints, symptom severity and debility associated with co-morbidities in older adults with symptomatic OA. However, the literature discussing this issue is scarce (15).

Knee OA is a painful condition that causes functional loss in daily activities. Nowadays, most authors believe that not only the disease activity itself but also mental status and fear avoidance beliefs contribute to physical limitations in knee OA (12–14, 21–24). In a previous study, significant correlations were reported between fear avoidance beliefs and either pain or disability, as measured by the Western Ontario and McMaster Universities Osteoarthritis

Index (WOMAC) in knee OA (12). Kılınc et al. have reported a significant relationship between fear of movement by using the TAMPa questionnaire and physical activity level (14). Bhatt et al. have concluded that fear avoidance beliefs correlated positively with pain and negatively with functional status in knee OA (21).

Previously, fear of movement has been found to be related to pain as measured by the Pain Beliefs Questionnaire and functional status assessed by using WOMAC in patients with knee OA (22). In another study, the authors have concluded that 85.7% of patients with knee OA had a high level of kinesiophobia using the TAMPa, whereas they had lower physical activity status as evaluated by WOMAC (23). Aydemir et al. have stated that knee extensor and flexor muscle strength have effects on physical functions; on the other hand, fear of movement indirectly influences muscle strength around the knee in knee OA (13). Moreover, fear avoidance of activity was reported as one of the determinants of future activity limitation in addition to depression, anxiety, pain severity, long disease duration, decreased muscle strength, joint stability and joint range of motion in knee OA (14).

In this study, high fear avoidance levels were correlated with worse functional status and poor QoL in knee OA patients. Previously, inverse correlations were reported between physical function measured by the lower extremity function scale (LEFS) and ei-

**Table 3.** Bivariate correlations between FABQpa and KOOS.

Correlations with FABQpa	r	P
KOOS Symptoms	-.179*	0.015
KOOS Pain	-.231**	0.0002
KOOS ADL	-.312**	0.0001
KOOS Sports/Rec	-.349**	0.0001
KOOS QoL	-.332**	0.0001

**Table 4.** Linear regression model of KOOS.

Model Summary				
Model	Variables	R Square	F	Significance
1	KOOS pain KOOS QoL KOOS ADL KOOS pain KOOS sports	0.155	5.94	0.0001*

\*  $p < 0.001$ ; Independent Variable FABQ-PA

ther fear avoidance beliefs or anxiety levels in patients with knee OA (12). Marshal et al. suggested that fear and depression are important factors that related positively to disability in patients with chronic low back pain (8). Selçuk et al., have reported a similar relationship between depression and kinesiophobia in patients with knee OA (23), while Gunn et al. found that fear avoidance is frequently seen among symptomatic knee OA patients and is inversely correlated with physical status as evaluated by KOOS (24).

An important finding of this study was the increased fear avoidance beliefs in 61% of patients with symptomatic knee OA. FABQpa value  $> 15$  is usually considered as an elevated score (25). The mean FABQpa score in this study was  $17.17 \pm 6.21$ . Scopaz et al. suggested that the mean FABQpa scores were  $10.71 \pm 6.22$  in patients with knee OA. These patients had a mean age of 63.9 years, indicated pain severity as moderate, were 67% female and had a radiological OA severity of grades 3 and 4 in most of the cases (12). Bhatt et al. reported that FABQpa scores were  $15.68 \pm 5.47$  in knee OA patients with a mean age of  $53.28 \pm 6.71$  years (21). Fear avoidance has been suggested as a more important predictor of disability than pain severity and duration in patients with musculoskeletal pain (26).

In this study, Cronbach's alpha value was 0.80 with a good internal consistency reliability for FABQpa. In a previous study, Cronbach's alpha value was found to be 0.75 in patients with knee OA (12).

Moreover, FABQpa correlated significantly with BMI and pain as measured by VAS in this study. In clinical practice, it is generally thought that factors such as OA severity, prolonged illness, high BMI and age are related to pain severity and functional decline in patients with knee OA. However, in a previous longitudinal study, psychological factors were

found to be indicators of better functional status as measured by WOMAC in patients with knee OA (27). It has also been reported that low anxiety levels are associated with better functional level, whereas fear of movement is an indicator of poor function. It is very important to consider the emotional status and fear avoidance beliefs in the treatment approach of patients with knee OA.

This study has several strengths and limitations. To our knowledge, this is the first study in which fear avoidance beliefs evaluated by FABQpa were compared to knee-related pain, symptoms, function in sports and recreation, ADL and knee-related QoL by using KOOS. This paper's best strength is that it is one of the few studies to investigate the relationship between fear avoidance beliefs and functional disability in patients with knee OA. The limitation is that the patients were not followed up due to the cross-sectional study design.

In conclusion, fear avoidance beliefs and physical activity scores were high in most of the patients with symptomatic knee OA. High fear avoidance beliefs and physical activity level were related to pain severity, poor functional status and QoL. Knowing that a high level of fear avoidance beliefs may be associated with severe pain, poor functional status and QoL, we believe that it is beneficial to assess during the planning of an effective treatment in patients with knee OA.

#### **Declaration of Conflicting Interests**

The authors declare no conflicts of interest with respect to the authorship and/or publication of this article.

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