

Kinesiophobia and its association with balance and mobility in patients with Knee Osteoarthritis

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Abstract

Objective: The purpose of this study was to find out the relationship of kinesiophobia/fear-avoidance beliefs with balance and mobility in patients with knee osteoarthritis.

Materials and Methods: This cross-sectional analytical study was conducted from January 2019 to June 2019. A total of 64 knee osteoarthritis patients (both male and female) between the ages of 40-60 years were included in this study. Diagnosed knee osteoarthritis patients of both genders with age 40 years and above having Kallgren Lawrence Classification Grade I, II, and III were included in this study. A fear-avoidance belief questionnaire was used to identify kinesiophobia/fear-avoidance belief. The Step-up test and Functional Reach test were used to measure balance and the timed up and go test was used to measure mobility. Kolmogorov-Smirnov test was applied to find out the normal distribution. The relationship between fear-avoidance belief and balance and mobility was examined using Spearman's test of correlation.

Results: The results of this study depicted that there was a weak negative correlation between kinesiophobia and balance ($r = -0.259$, $P = 0.039$) showing that with increasing kinesiophobia, there is a decrease in balance while there was a weak correlation between kinesiophobia and mobility. ($r = 0.26$, $P = 0.841$).

Conclusion: Balance and mobility are negatively affected by kinesiophobia in patients with knee osteoarthritis. Thus, kinesiophobia is an important psychological construct to be considered in the assessment and treatment of knee osteoarthritic patients to decrease balance-related impairments and reduce the fall risk.

Keywords: Balance, Fear-avoidance belief, Kinesiophobia, Knee osteoarthritis, Mobility.

Introduction

Osteoarthritis (OA) is a degenerative and progressive joint disease that is chiefly responsible for causing problems in weight-bearing joints such as the hip, knee, and ankle. Knee osteoarthritis is associated with a high prevalence of lower limb disability.¹ Pain and other symptoms of osteoarthritis may have a profound effect on the quality of life affecting both physical function and psychological parameters.²

According to epidemiological research, knee osteoarthritis had a global prevalence of 3.8%. Furthermore, the prevalence was higher in females as compared to males. The prevalence of knee osteoarthritis is reported as 5.78% and 10.20% in India and Bangladesh, respectively.⁴ According to a study, 28% of the urban and 25% rural population of Pakistan have been affected by knee osteoarthritis.⁵

Knee osteoarthritis can be diagnosed clinically or radiologically. Kallgren Lawrence classification based on knee radiographs is the clinical tool commonly used for the diagnosis and grading of this disease. Each radiograph is assigned a grade ranging from 0 to 4 which correlates with the increasing severity of knee osteoarthritis.⁶

Pain, muscle weakness, and joint stiffness, which are symptoms of knee osteoarthritis can lead to a decrease in mobility and impairment in quality of life.⁷ Damage to the articular cartilage may cause a decrease in quadriceps strength and activation and proprioceptive impairments in knee osteoarthritis patients. Due to these impairments, this patient population is more prone to balance issues and risk of falls.^{8,9} In recent years, evidence has suggested the important role of psychological variables like fear-avoidance beliefs and kinesiophobia in explaining disability and pain experienced by osteoarthritis patients.^{10,11}

There is growing evidence supporting the relationship between pain-related fear and physical function in chronic musculoskeletal pain conditions.¹² Fear of pain and injury are considered as one of the important components in explaining disability among patients having musculoskeletal conditions.¹³

Various studies have found that fear of movement adversely affects the quality of life in different conditions such as low back pain, chronic fatigue syndrome, non-traumatic arm, neck, and shoulder complaints and is strongly associated with self-reported knee function in patients with knee osteoarthritis.¹⁴ Since knee osteoarthritis is a leading cause of pain and functional limitations in adults worldwide it is crucial to clearly understand all factors

contributing to the severity of this condition, be it biological or psychological. Thus, this study aims to find out whether kinesiophobia/fear-avoidance belief is associated with balance and mobility in patients with knee osteoarthritis.

Materials and Methods

This cross-sectional analytical study was conducted on patients with knee osteoarthritis using non-probability purposive sampling, from January to June 2019. Ethical approval was taken from the ethical review committee (FF/FUMC/215-2 Phy/19). Both male and female patients with age 40 years and above having grade I, II, or III osteoarthritis according to Kallgren Lawrence classification were included. Patients with grade IV osteoarthritis (as they already experience marked movement limitations), mental disability, neuromuscular conditions, and unhealed fracture were excluded from this study. Informed consent was taken from all participants who met the inclusion criteria. Tools that were used in this study were the Fear Avoidance belief Questionnaire (FABQ), Step up test, Functional Reach Test (FRT), Timed up and go test (TUG), and 360-degree turn test. All these tools are open access which requires no formal permission. FABQ is used for quantifying pain-related fears and beliefs in individuals. A higher score indicates a greater level of fear-avoidance belief. The test-retest reliability was high (ICC: 0.92).^{15,16} TUG was used for assessing mobility. Timed up and go test has good reliability in patients with knee osteoarthritis with intra rater reliability of 0.93 and inter-rater reliability of 0.96.¹⁷ The patient was asked to get up from the chair, walk for a distance of three meters marked beforehand, turn around, walk back to a chair and sit while which the time was noted. FRT has good reliability for patients with knee osteoarthritis. This test was used to assess anticipatory and dynamic balance.¹⁸ This test was performed by asking the patient to reach forward ahead of normal arm length without raising or moving their feet, starting from the start point of the measuring tape. The patient stood with feet parallel near the wall with the wrist in a neutral position, elbow extended, and shoulder flexed to 90 degrees. The average of three reach distances was noted. The participants in the step test were directed to maintain balance on one leg while stepping with the contralateral limb on and off a 15-cm step as quickly as possible. This test was performed with shoes off and without hand support. For the participants, the test was performed whilst standing

on the osteoarthritic limb. For the assessment of dynamic balance, a 360-degree turn test was used. The patient was required to turn in a complete circle while the number of steps and time took was recorded starting from a mark at the initial point. The test was administered both in a clockwise and anticlockwise direction. The test has a cutoff value of greater than 3.8 sec which shows increased dependency. This test has the value of ICC=0.92.¹⁹ Data was analyzed using IBM SPSS version 21.0 and Microsoft Excel 2014. Kolmogorov-Smirnov test was applied to assess the normal distribution of data. Spearman test was applied to determine the correlation of fear-avoidance belief with balance and mobility. The confidence interval was taken at 95 % with a level of significance set as <0.05.

Results

Kolmogorov-Smirnov test was applied to assess the normal distribution of data. Population age, numeric pain rating scale, duration of pain, body mass index, and step test of left limb were normally distributed. Whereas fear avoidance belief questionnaire (FABQ), timed up and go test (TUG), functional reach test (FRT), 360-degree turn test, and step test were not normally distributed.

This study consisted of 64 knee osteoarthritic patients among whom 10.9% were males and 89.1% were female. The average value of age taken in years was 50 ± 9 . The average BMI value was 25.36 ± 8 . Duration of pain taken in weeks had a median of 96 ± 143 . Pain intensity was measured using the Numeric Pain Rating Scale and average values were recorded as 6 ± 2 .

The average score for FABQ was 72 ± 2 . Higher scores indicated a greater level of fear-avoidance belief. Timed up and go test and Functional Reach Test had average values of 14.36 ± 4 and 7.35 ± 3 , respectively. Greater values of TUG indicated increased impairment in mobility and lower scores of FRT indicated an increased problem with balance. Average values for all the following variables were measured in seconds: 360-degree turn test clockwise (4.7 ± 2), 360-degree turn test anti-clockwise (5 ± 2), Step test right limb (6.5 ± 2.7), step test left limb (7 ± 3). There were generally increased levels of balance impairment as shown by the increased time taken to complete these tests indicated as shown in Table 1.

Table 1: Median and Interquartile Values of Outcome Measurement Tools

Measure	Median \pm IQR
FABQ	72 ± 2

FRT	7.35 ± 3
360 degree turn test(clockwise)	4.7 ± 2
360 degree turn test(anti-clockwise)	5 ± 2
Step test (right leg)	6.5 ± 2.7
Step test (left leg)	7 ± 3
TUG	14.36 ± 4

Pain Intensity has a significant positive correlation with FAB which signifies that the greater the pain intensity experienced by the patient greater will be his/her fear-avoidance belief. Balance was assessed using Functional Reach Test, 360-degree turn test, and Step test. A weak negative correlation was observed between FAB and FRT ($p=0.03$, $r=-0.259$). Balance of the right leg measured through step test had a significant correlation with FAB ($p=0.02$, $r=-0.290$) while the balance of the left leg had no significant correlation with FAB ($p=0.1$, $r=-0.67$). FAB had weak negative correlation with 360 degree turn test clockwise ($p=0.65$, $r=0.057$) and anticlockwise ($p=0.22$, $r=0.154$). These results signify that with higher levels of fear-avoidance belief, there was increased balance impairment. A weak positive correlation was found between TUG and FAB which indicates that mobility was negatively affected at higher levels of fear-avoidance belief ($p=0.84$, $r=0.26$) as depicted in Table 2.

Table 2: Cross-tabulation of FAB with Pain, Balance, and Mobility

Variables	R	p
FABQ x Pain Intensity	0.397	0.001
FAB x FRT	-0.259	0.039
FAB x step test(right leg)	-0.290	0.02
FAB x step test(left leg)	-0.167	0.19
FAB x 360 degree turn test(clockwise)	0.057	0.656
FAB x 360 degree turn test(Anti-clockwise)	0.154	0.225
FAB x TUG	0.26	0.841

Discussion

The present study was designed to build an understanding of the relationship of kinesiophobia and fear-avoidance beliefs with balance and mobility in subjects with knee OA. The findings of this study increase the knowledge about the impact of psychosocial factors in patients with knee OA. Current evidence has shown the influence of psychosocial factors on pain and function in patients with OA.^{12,20-22}

The results in the present study support the proposed hypothesis and show that fear-avoidance beliefs were negatively correlated with mobility data. The fear-avoidance model proposes that pain perception is primarily influenced by pain-related fear and pain catastrophizing.²³ High levels of pain-related fear and pain catastrophizing are associated with an avoidance behavioural response, which is believed to be a precursor to developing a chronic disability.²³ The present study found a high degree of fear-avoidance beliefs in patients with osteoarthritis of the knee as shown by an average score of 72 ± 2 on the fear-avoidance belief questionnaire. This notion is in agreement with numerous other studies which had similar findings not only in populations of osteoarthritis but also in other musculoskeletal pain disorders such as low back pain, neck pain, and fibromyalgia.^{7,24,25}

In a sample of 254 patients, Heuts et al.¹² observed that pain was associated with higher levels of fear of movement and lower levels of daily functioning. The findings of our study showed that pain intensity had a positive moderate correlation with fear-avoidance belief (PA). This finding is supported by the results of a study, conducted on knee osteoarthritic patients, which also established a moderate correlation between pain severity and fear-avoidance belief.⁷

Moreover, in another study, fear of movement explained 40% of functional impairment.¹² In addition, Somers et al.²¹ showed that the fear of pain explains 7% of psychological disability and 5% of the gait disturbance. A systematic review showed that fear of falling was associated with at least one fall, older age, and the female gender.²⁶ The influence of fear of pain on functional alterations in other chronic conditions, such as back pain, has also been described.²⁷

Other studies have also found that fear-related pain is significantly associated with functional limitations¹² and with the ability to walk at a normal, intermediate, or high speed.²¹ In relation to this finding, Belo et al.²⁸ observed that fear of movement was associated with persistent knee pain. An explanatory cross-sectional survey found out that pain catastrophizing and fear avoidance are negatively correlated with balance in hip and knee osteoarthritic patients. These findings are similar to the findings of this study which also indicated a weak negative correlation between fear of pain and balance.²⁹ Importantly, OA processes can affect proprioception and postural stability, which can also lead to decreased balance, thereby increasing the risk of falling mainly during dynamic activities.^{1,30} In addition, negative psychosocial factors, especially fear

of movement, have an adverse impact on pain and disability in patients with OA.^{12,21,31-33} This fear of movement and avoidance could be acquired over time through repeated painful stimuli.³⁴

From a clinical point of view, the reduction of physical function in patients with OA of the knee can alter proprioception of an asymptomatic knee,³⁵ and a proprioceptive deficit could affect the balance of the patients. According to Knoop et al.,³⁵ proprioception is a modifiable factor, and we must consider that increased physical activity is associated with improved functional performance and reduced disability.³⁶

The current study had barriers in terms of generalizability due to the small sample size as well as the use of non-probability sampling techniques. So, it is recommended that a multicenter study having a larger sample size be carried out. As it is a cross-sectional study it lacks causality of the relationship between study variables. So, in the future, there is a need for experimental or longitudinal studies. It is also recommended that more objective measures of balance and mobility such as dynamic gait analysis or stability balance system may be used in future studies.

Conclusion

Results of this study revealed that a high level of fear-avoidance belief exists among patients with knee osteoarthritis. Moreover, Balance and mobility are negatively affected by fear-avoidance belief in these patients. Thus, kinesiophobia/fear-avoidance belief is an important psychological construct to be considered in the assessment and treatment of knee osteoarthritic patients to decrease balance-related impairments and reduce the fall risk.

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