**RESEARCH PAPER**

# To Analyse the Influence of Kinesiophobia on Pain and Physical Function Among Total Knee Replacement – An Observational Study

Bhargavi.M[1], Geetha Hari Priya G.A[2]*, Dr.Antony Leo Aseer[3] and Dr. Subbiah.K[4]

[1]*Post Graduate student, Sri Ramachandra Institute of Higher Education and Research, Chennai.*
[2]**Assistant Professor, Faculty of Physiotherapy, Sri Ramachandra Institute of Higher Education and Research, Chennai;**
[3]*Faculty of Physiotherapy, Professor and principal, Faculty of Physiotherapy, Sri Ramachandra Institute of Higher Education and Research, Chennai.*
[4]*Associate professor and HOD, Faculty of Physiotherapy, Sri Ramachandra Institute of Higher Education and Research, Chennai.*
*Corresponding Author*
[2]**geethaharipriya@sriramachandra.edu.in*

***Received: 28th Feb, 2026; Revised: 6th March 2026; Accepted: 7th April, 2026; Available Online: 20th April, 2026***

**ABSTRACT**
Total knee replacement (TKR), is performed on patients with severe knee pain in order to restore function and reduce discomfort. Kinesiophobia is an excessive, irrational and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or reinjury. Hence, this study aims to find the influence of fear of movement on knee pain, ROM and functions in TKR.The study has 50 subjects were recruited in this study who had undergone TKR 3 months post operatively. The occurrence of fear of movement was measured using the Tampa Scale of Kinesiophobia (TSK). Patients underwent assessment 3 months after TKR surgery. Flexion, function, and pain (NPRS) outcome measures were used. kinesiophobia was found to be not related to pain and flexion after 3 months of TKR follow up and subjects had a negative corelation p (<0.05) in physical function related to kinesiophobia following post-operative TKR after 3 months. This study concluded that shows the fear of movement had no correlation with pain and flexion but negatively correlated with physical functions in subjects who underwent TKR after 3 months of post-operative follow-up.

**Keywords**: *Fear of movement, Functions, Pain, Range of motion, Total Knee Replacement*
**How to cite this article:** Bhargavi M, Priya GAH, Aseer AL, Subbiah K. To Analyse the Influence of Kinesiophobia on Pain and Physical Function Among Total Knee Replacement – An Observational Study. Int J Drug Deliv Technol. 2026;16(39s): 172-177. DOI: 10.25258/ijddt.16.39s.19
**Source of support:** Nil.
**Conflict of interest:** None

## INTRODUCTION

Knee osteoarthritis is a degenerative joint disease that can be a primary cause of pain and dysfunction in the middle and elderly population. It is characterized by stiffness and discomfort of the joints (1)(2) .The prevalence of OA is increasing globally and India it is estimated to be around 28.7% (2)(3).During the past few decades, significant efforts have been made by the World Health Organization (WHO), the International League Against Rheumatism, and worldwide experts in osteoarthritis has conducted several population-based epidemiological studies of knee osteoarthritis worldwide (5).Osteoarthritis had affected 528 million people globally in 2019, up 113% from 1990. This figure was reported by WHO. 60% of those with osteoarthritis are women, and about 73% of those with the condition are over 55 years (5). Since the mediaeval ages, women consequently are more likely than males to be affected by OA knee, and this tendency has been observed (NICE, 2008) (6). In India people who have undergone total knee replacement (TKR) is 5lakhs and many studies shows prevalence that Total Knee Replacement in India is 90-95%. The number of total knee replacements is predicted to increase as the average age of the population increases, emphasizing the accompanying future economic burden (1)(7)(8). TKR has therefore shown to have consistent, long-lasting, positive outcomes in these patients in terms of reduced pain and enhanced quality of life overall. Patients who have undergone total knee replacement are rehabilitated using a systematic exercise routine devised particularly for the Indian population, which has been demonstrated to be helpful in improving their functional status (9).The degree of daily functioning is only partially predicted by the severity of pain and physical and structural impairment. A significant role is played by psychological factors in the emergence, maintenance, and aggravation of chronic musculoskeletal disorders. Self-limitation and fear of activities that are thought to aggravate or cause pain are factors linked to the presence of pain (11).Fear associated with pain is referred to by several names. Later, Kori, Miller, and Todd

**Author for Correspondence: geethaharipriya@sriramachandra.edu.in*

introduced the term "Kinesiophobia" and extended the concepts of fear avoidance to physical movement and chronic pain (11). Kinesiophobia, is defined as an "excessive, irrational, and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or reinjury".[10]Kinesiophobia results in depression, incapacity, and disuse. More pain, more disability, and an increased fear of pain are all part of a vicious cycle. Levels of kinesiophobia are inversely correlated with quality of life in relation to health. An increased level of kinesiophobia results in more difficulty carrying out activity of daily living (ADLs), suggesting that institutionalization of the elderly may be necessary (13). The "fear avoidance" model describes how behavioral, emotional, and cognitive aspects influence pain responses.As per the Fear of Movement theoretical framework, patients may choose to confront or avoid their fear in order to deal with their fear of movement. Active exercise, a reduction in fear, and a faster recovery are the results of confrontation. On the other hand, avoiding situations can lead to kinesiophobia, which can have detrimental effects on one's health and result in inactivity and disability (14). Patients with kinesiophobia believe that movement leads to re-injury and increased pain, hence kinesiophobia is a risk factor for chronic pain. It is pointed out that persons who suffer from fear of movement might develop a certain pattern of behavior termed fear-avoidance because they avoid particular movements and activities (15). Fear-avoidance behavior, over time, can result in functional loss and impairment. Up to 25% of all knee arthroplasty patients experience fear of movement. Previous study has also revealed that 60% of the increase in pain score may be attributed to the presence of kinesiophobia (15)(16). Studies reveal that kinesiophobia has a negative link with exercise and physical activity in individuals recovering from total knee arthroplasty (TKA), as well as in other groups (16). For patients with chronic pain, the Tampa scale for kinesiophobia (TSK) was used to measure their fear of movement and (re)injury. This psychometric measure is both valid and reliable, with a high degree of internal consistency (13). Researchers have examined the association between kinesiophobia and pain in a variety of populations, but relatively little has been done on the elderly. An examination of the literature finds variations in the relationship between pain and kinesiophobia (13).

## METHODS AND MATERIALS:

### Study design:

The Observational study was approved by the Institutional Ethics Committee for students' projects, Sri Ramachandra Institute of Higher Education and Research (REF: CSP\23\OCT\138\860). This study was registered in Clinical Trial Registry – India (REF\2024\02\079393). This study is a Observational study in this study setting and duration as TKR planned patients who had been admitted in G-Block, Sri Ramachandra Hospital (SRH), Chennai from Orthopedic department were recruited. The study process was started in OCTOBER, 2023 and completed by APRIL, 2024.The participants were obtained signature in the written informed consent form and verbal explanation was given about the study. The sampling design is used as Purposive sampling method. The sample size has 50 samples were included in the study based on the formula mentioned below as N-denotes sample size, Z-denotes level of confidence, p-denotes prevalence, d-denotes precision.

Formula: $n = \frac{Z^2 p (1-p)}{d^2}$

The period of study has 6 Months. In this selection of criteria were included based on inclusion criteria as All patients who underwent unilateral TKR 3 months post operatively, both genders included, Age range between 50 to 75 years and exclusion criteria as patients with other knee injuries and soft tissue injury, Lower limb fractures, Cognitive impairment, History of previous lower limb surgery, Neurological conditions involving lower extremity, Cardiopulmonary diseases. The Study Characteristics had observational research used purposive sampling to choose respondents. The research included both male and female patients who had unilateral TKR at Sri Ramachandra Hospital. Individuals with 3 months after surgery with fear of movement were assessed using the Tampa Scale of Kinesiophobia (TSK). Later pain, flexion (ROM) of knee joint, KOOS scale and a 6-minute walk test (6MWT) were measured and documented. The baseline data were taken which includes the following. The outcome measures were used by Primary Outcomes are Tampa Scale of Kinesiophobia (TSK), Knee Injury and Osetoarthritis Outcome Score (KOOS) and Secondary outcomes are Numerical Pain Rating Scale (NPRS), Knee flexion Range of Motion, 6-Minute Walk Test (6MWT) and instrument are used in range of motion assessed by Universal goniometer. Search method for identifying the published relevant studies from online computerized databases such as PubMed central, Cocharne, Pedro, Google scholar from the year between 2015 to 2024 using keywords: Kinesiophobia, Knee Osteoarthritis, Physical function and Pain, Total knee Replacement. Boolean search "and", "or" between key words was used. Selection criteria were included by randomized control trials, systematic reviews, observational studies, case studies, and experimental studies were written in English language. Studies focused on medical intervention, articles and journals which are not in English and articles which had only abstract and reviews were excluded. The research will be limited to studies published only in English. Articles were chosen based on the research questions and followed by the criteria.

### Description of Study Procedure:

The procedure of study is an observational study in which subjects were recruited by purposive sampling after fulfilling the eligibility criteria. The subjects were explained about the study and informed consent was obtained prior to the study.

The individuals of 3 months post-operative TKR were assessed and the following outcome was noted and documented.

- The TSK questionnaire used to evaluate kinesiophobia among TKR clients after surgery.
- Pain was measured by using NPRS score range among post-operative TKR participants.
- Flexion ROM (Range of Motion) of the affected knee joint is recorded.
- 6-minute walk test was recorded.
- KOOS questionnaire to evaluate functional activities during post operative period.

Tampa scale of kinesiophobia (TSK) questionnaire is self-reported questionnaire with 17-items. It uses a 4-point Likert scale (strongly disagree-disagree-Agree-strongly agree). The four items of (4,8,12 and16) reverse worded statements of values and reverse scored. Total range of scoring from 17 to 68, the lowest 17 means no or negligible kinesiophobia and higher score indicate an increasing kinesiophobia. If scores are above 37, they are generally indicating the high degree of fear of movement in kinesiophobia. The TSK scores classify the high degree and low degree of fear of movement. The knee injury and osteoarthritis outcome score (KOOS) are a self-reported questionnaire to measure the patient's opinion about the health, symptoms, and functionality of their knee. It has 42-item questionnaire, including 5 subscales: symptoms, pain, ADLs, sports/recreation, and quality of life. This questionnaire evaluates patient's short- and long-term results, including knee injuries. In this outcome used to the TKR patients with after the retrospectively at 3 months of TKR patients to be assessed it. Maximum score is a patient can achieve is 100, indicating no knee problems and minimum score is zero, indicating severe knee problems and pain using NPRS score ranging from (0=no pain and 10+worst imaginable pain) using post-opeartive TKR at 3 months.ROM (Range of motion) measured by using goniometer instrument in a supine lying position. Patients are asked to perform active knee flexion in the supine position in patients followed by post-operative TKR then patients' secondary outcome was evaluated by using a 6-minute walk test. Patients were instructed to walk for six minutes, during which time and distance were measured in meters. All the outcome measures were taken, tabulated and documented. The Statistical Analysis data was collected from 50 subjects. The collected data were analyzed with SPSS software statistics. Descriptive statistics and percentage analysis were used for categorical data, whereas mean and standard deviation were utilized for continuous variables. The relationship between Kinesiophobia on pain, knee flexion, KOOS and six-minute walk test were analyzed by using the Pearson's correlation. Linear regression was used to analyze the relationship of kinesiophobia between KOOS and six-minute walk test. The statistical tests were considered significant when the p value is less than 0.05.

**STATISTICS ANALYSIS:**

The data was collected from 50 subjects. The collected data were analyzed with SPSS software statistics. Descriptive statistics and percentage analysis were used for categorical data, whereas mean and standard deviation were utilized for continuous variables. The relationship between Kinesiophobia on pain, knee flexion, KOOS and six-minute walk test were analyzed by using the Pearson's correlation. Linear regression was used to analyze the relationship of kinesiophobia between KOOS and six-minute walk test. The statistical tests were considered significant when the p value is less than 0.05

**RESULTS:**

**Table 1:** Demographic details

| Variables | Mean ± SD |
|---|---|
| Age | 63.6 ± 11.27 |
| Gender | Male (13)- 26% ; Female (37)-74% |
| Side of total knee replacement (TKR) | Right (29) – 58% ; Left (21) - 42% |
| BMI | 25.7 ± 2.89 |
| Comoridities | |
| SHTN (13) | 26% |
| T2DM (8) | 16% |
| SHTN, T2DM (14) | 28% |

*SHTN- Short Term Hypertension, T2DM- Type2 diabetes mellitus, BMI-Body mass index*

**Table 2:** Association between kinesiophobia on pain and physical function

| Variables | R | p-value |
|---|---|---|
| TSK-NPRS | 0.13 | 0.34 |
| TSK-ROM (Knee flexion) | 0.03 | 0.82 |
| TSK-KOOS | - 0.60 | 0.00* |
| TSK-6MWT | - 0.28 | 0.04* |

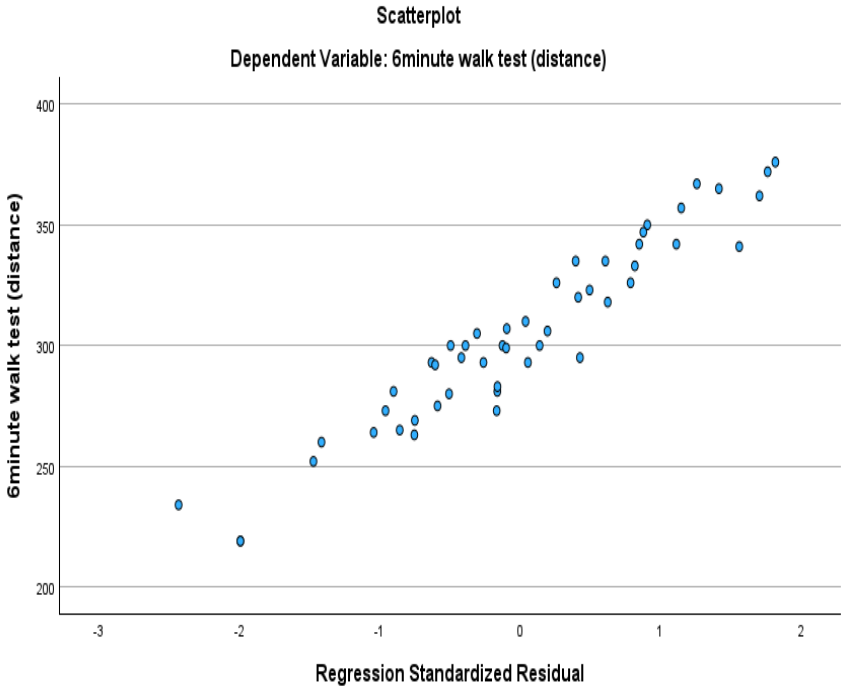
*TSK-Tampa scale of Kinesiophobia, NPRS-Numeric pain rating scale, ROM-Range of motion, KOOS-Knee injury and osteoarthritis outcome score and 6MWT-6 Six-minute Walk Test.*

**Denotes statistically significantly difference p≤0.05, r denotes regression.*

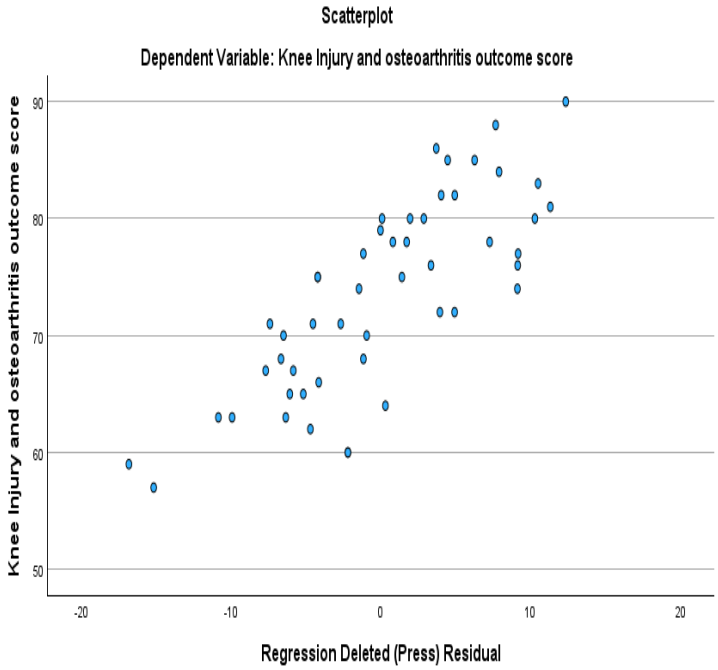
**Table 3:** Linear regression analysis for TSK-6MWT AND TSK-KOOS

| Variables | r square | B | t-value | p-value |
|---|---|---|---|---|
| TSK-6MWT | 0.083 | -1.95 | -2.08 | 0.00* |
| TSK-KOOS | 0.370 | -.900 | -5.31 | 0.00* |

*TSK-Tampa scale of Kinesiophobia, KOOS- Knee injury and osteoarthritis outcome score and 6MWT- 6 Six-minute Walk test.* *B denotes unstandardized coefficients., *Denotes statistically significantly difference p≤0.05.*




**Graph 1-**linear regression of scatter plot TSK and 6MWT




**Graph 2-** linear regression of scatter plot in TSK and KOOS

*Author for Correspondence: geethaharipriya@sriramachandra.edu.in

## DISCUSSION

The study intended to analyse the influence of kinesiophobia on pain and physical function among TKR patients, and to investigate the fear of movement in post-operative TKR subjects post 3 months. The study results showed that there is a correlation between kinesiophobia and KOOS and 6MWT has a significant difference in 3 months of post-operative TKR. In the current study, subjects were recruited between the age group of 50-75 years and both genders were included. Compared to male, females had most commonly undergone TKR of about 74% in females and 13% in male. Out of 50 subjects, 58% undergone TKR in right side and 42% in left side. Previous studies analysed the evaluation time points in TKR from 2 to 4 weeks and from 4 weeks to 6 months, in which patients with fear of movement had more pain and lesser range of motion. (Nerhus TK et al., in 2010) (19). In the current study we correlated kinesiophobia with pain, physical function and ROM in post TKR patients at 3rd month of follow up. Tampa scale of kinesiophobia was used in this study to investigate the fear of movement among TKR individuals, and KOOS scale was used to assess physical function. Lingard et al., in 2021 used hospital anxiety depression scale-A (HADS-A) to analyse the psychological distress experienced by TKR individuals at 6 weeks till 6 months post-op period and found that the influence of anxiety seems to be less in the initial follow ups i.e., within 6 weeks (20). But the level of anxiety increased gradually at less than 1 year follow up. The current study exihibits a negative correlation between kinesiophobia and physical function at 3rd month of post-op TKR (20). The study revealed the kinesiophobia has significant correlation between physical function and six-minute walk test at p (<0.05) but there is weak correlation between pain and range of motion (knee flexion ROM) p (>0.05) in 3 months of TKR as in (Table2). Till date no studies have been conducted in South India which correlated kinesiophobia and physical function in post TKR at 3rd month follow up and found that kinesophobia had negative correlation on physical function and functional capacity (6MWT).

## LIMITATION

Less sample size has been used in this research. A larger sample would have given more statistical weightage to the study.In the current study, we have recruited individuals undergone TKR with varied surgical procedure hence influencing on kinesophobia, which resulted in weak correlation with respect to pain post operatively. Hence individuals with similar type of surgical procedures can be recruited for further investigation of kinesophobia on pain.

## CONCLUSION

The study shows that fear of movement had no correlation with pain and flexion range of motion but negatively correlated with physical functions in subjects who underwent TKR after 3 months of post-operative follow-up.

**ACKNOWLEDGMENT:**

No words of gratitude can ever sum up the contribution of my staff members, my family and friends for all their moral support, words of encouragement. I would also like to thank all my seniors and batch-mates for their support and help during the course of my study.

**Conflict of Interest:**

No conflicts of interests

**Ethical Approval:**

The Observational study was approved by the Institutional Ethics Committee for students' projects, Sri Ramachandra Institute of Higher Education and Research (REF: CSP\23\OCT\138\860). This study was registered in Clinical Trial Registry – India REF/2024/03/064799.

**Funding:**

None

## REFERENCES

1. Gemayel AC, Varacallo M. Total Knee Replacement Techniques. 2022 Sep 4. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan–. PMID: 30855796.
2. Kulkarni P, Martson A, Vidya R, Chitnavis S, Harsulkar A. Pathophysiological landscape of osteoarthritis. In 2021. p. 37–90.
3. Singh A, Das S, Chopra A, Danda D, Paul BJ, March L, et al. Burden of osteoarthritis in India and its states, 1990-2019: findings from the Global Burden of disease study 2019. Osteoarthritis Cartilage. 2022 Aug;30(8):1070–8.
4. Iyer, KrishnaMohan. "Knee Osteoarthritis: Clinical Update." *Indian Journal of Orthopaedics*,vol.53,no.4, 2019, p. 581, https://doi.org/10.4103/ortho.ijortho_318_19. Accessed 12 Dec. 2019.
5. Darmawan J. Muirden K.D.WHO-ILAR COPCORD perspectives past, present, and future. J Rheumatol. 2003; 30: 2312-2314
6. Pal CP, Singh P, Chaturvedi S, Pruthi KK, Vij A. Epidemiology of knee osteoarthritis in India and related factors. Indian J Orthop. 2016 Sep;50(5):518–22.
7. Kurtz S, Ong K, Lau E, Mowat F, Halpern M. Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030. J Bone Joint Surg Am 2007;89:780-785
8. Vaidya SV, Jogani AD, Pachore JA, Armstrong R, Vaidya CS. India Joining the World of Hip and Knee Registries: Present Status-A Leap Forward. Indian J Orthop. 2020 Sep 16;55(Suppl 1):46-55. doi: 10.1007/s43465-020-00251-y. PMID: 34122754; PMCID: PMC8149501.
9. Aseer PAL. Content Validation of Total Knee

**Author for Correspondence: geethaharipriya@sriramachandra.edu.in*

Replacement Rehabilitation Protocol in Indian Population. JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH. 2017;

10. Mari K. E. Lundberg, Jorma Styf & Sven G. Carlsson (2004) A psychometric evaluation of the Tampa Scale for Kinesiophobia from a physiotherapeutic perspective,Physiotherapy Theory & Practice, 20:2, 121-133,
11. Heuts, Peter H.T.G, et al. "Pain-Related Fear and Daily Functioning in Patients with Osteoarthritis."Pain,vol.110,no.1,July2004,pp.228235,https://doi.org/10.1016/j.pain.2004.03.035.
12. Luque-Suarez, Alejandro, et al. "Role of Kinesiophobia on Pain, Disability and Quality of Life in People Suffering from Chronic Musculoskeletal Pain: A Systematic Review."British Journal of Sports Medicine, vol. 53, no. 9, 2019, pp. 554–559, www.ncbi.nlm.nih.gov/pubmed/29666064,https://doi.org/10.1136/bjsports-2017-098673.
13. Desai, Manasi S. and Hemali Shah. "A Study of Kinesiophobia in Elderly with and without Pain*."* Indian Journal of Physiotherapy and Occupational Therapy - An International Journal *(*2020).
14. Kocic M, Stankovic A, Lazovic M, Dimitrijevic L, Stankovic I, Spalevic M, Stojiljkovic P, Milenkovic M, Stojanovic Z, Nikolic D. Influence of fear of movement on total knee arthroplasty outcome. Ann Ital Chir. 2015 Mar-Apr;86(2):148-55. PMID: 25952608.
15. De Vroey H, Claeys K, Shariatmadar K, Weygers I, Vereecke E, Van Damme G, Hallez H, Staes F. High Levels of Kinesiophobia at Discharge from the Hospital May Negatively Affect the Short-Term Functional Outcome of Patients Who Have Undergone Knee Replacement Surgery. J Clin Med. 2020 Mar 9;9(3):738. doi: 10.3390/jcm9030738. PMID: 32182895; PMCID: PMC7141217.
16. Mahajan, Pradnya (2022), "Prevalence of Kinesiophobia and Its Correlation with Physiotherapy in Post-Operative Total Knee Arthroplasty (TKA) Patients - A Cross Sectional Study", Mendeley Data, V1, doi: 10.17632/tftxr3h5fh.1.
17. Güney-Deniz, H., Irem Kınıklı, G., Çağlar, Ö., Atilla, B., & Yüksel, İ. (2017). Does kinesiophobia affect the early functional outcomes following total knee arthroplasty? Physiotherapy Theory and Practice, 33(6), 448–453.
18. Brown OS, Hu L, Demetriou C, Smith TO, Hing CB. The effects of kinesiophobia on outcome following total knee replacement: a systematic review. Arch Orthop Trauma Surg. 2020 Dec;140(12):2057-2070. doi: 10.1007/s00402-020-03582-5. Epub 2020 Aug 24. PMID: 32839826.
19. Nerhus TK, Heir S, Thornes E, Madsen JE, Ekeland A: Time-dependent improvement in functional outcome following LCS rotating platform knee replacement. A prospective longitudinal study in 50 patients. Acta Orthop, 2010; 81(6):727–32.
20. Sharma S, Kumar V, Sood M, Malhotra R. Effect of Preoperative Modifiable Psychological and Behavioural Factors on Early Outcome Following Total Knee Arthroplasty in an Indian Population. Indian J Orthop. 2021 Jan 19;55(4):939-947. doi: 10.1007/s43465-020-00325-x. PMID: 34194651; PMCID: PMC8192610.
21. Burns LC, Ritvo SE, Ferguson MK, Clarke H, Seltzer Z, Katz J. Pain catastrophizing as a risk factor for chronic pain after total knee arthroplasty: a systematic review. J Pain Res. 2015 Jan 5;8:21-32. doi: 10.2147/JPR.S64730. PMID: 25609995; PMCID: PMC4294690.