Correlation of Static Balance with Kinesiophobia in Female Patients with Knee Osteoarthritis

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Abstract—**Background: Knee osteoarthritis (KOA) is a common degenerative musculoskeletal disorder affecting middle-aged and elderly individuals, particularly females. It is associated with pain, joint stiffness, muscle weakness, impaired proprioception, reduced balance, and functional limitations. Psychological factors such as kinesiophobia, defined as fear of movement due to pain or re-injury, may further contribute to disability and reduced physical activity in patients with knee osteoarthritis. Understanding the relationship between balance impairment and kinesiophobia may help in planning comprehensive rehabilitation strategies.**

Aim:To determine the correlation between static balance and kinesiophobia in female patients with knee osteoarthritis.

Objectives: To assess static balance using the Berg Balance Scale (BBS). To assess kinesiophobia using the Tampa Scale for Kinesiophobia (TSK-17). To determine the relationship between static balance and kinesiophobia in female patients with knee osteoarthritis.

Methodology: An observational correlational study was conducted among 98 female patients diagnosed with knee osteoarthritis. Participants were selected using convenience sampling based on inclusion and exclusion criteria. Static balance was assessed using the Berg Balance Scale, while kinesiophobia was evaluated using the Tampa Scale for Kinesiophobia. Demographic variables including age, BMI, and pain levels were recorded. Statistical analysis was performed using SPSS version 25. Descriptive statistics, Pearson correlation coefficient, and regression analysis were used for data analysis.

Results: The mean age of participants was 59.15 ± 6.63 years, and the mean BMI was 28.16 ± 3.02 kg/m². The mean Berg Balance Scale score was 39.76 ± 5.14, whereas the mean Tampa Scale for Kinesiophobia score was 44.49 ± 4.09. Pearson correlation analysis demonstrated a statistically significant negative correlation between static balance and kinesiophobia ($r = -0.73$, $p < 0.001$), indicating that patients with poorer balance exhibited higher fear of movement.

Conclusion: The present study concluded that there is a significant negative correlation between static balance and kinesiophobia in female patients with knee osteoarthritis. Reduced balance was associated with increased fear of movement. These findings highlight the importance of addressing both physical and psychological factors during physiotherapy rehabilitation to improve functional outcomes and quality of life in patients with knee osteoarthritis.

Index Terms—**Knee Osteoarthritis, Static Balance, Kinesiophobia, Berg Balance Scale, Tampa Scale for Kinesiophobia, Physiotherapy.**

I. INTRODUCTION

Osteoarthritis (OA) is one of the most common chronic degenerative joint disorders and a major cause of pain, disability, and reduced quality of life among older adults worldwide. It is characterized by progressive degeneration of articular cartilage, subchondral bone remodeling, osteophyte formation, synovial inflammation, and narrowing of joint space. Among all joints affected by osteoarthritis, the knee joint is most commonly involved because it bears body weight during functional activities such as standing, walking, stair climbing, and squatting[1].

Knee osteoarthritis (KOA) is a multifactorial disorder influenced by age, obesity, gender, occupation, trauma, genetics, hormonal changes, and biomechanical stress. Epidemiological studies have shown that women are more frequently affected than men, particularly after menopause, due to hormonal influences, decreased muscle strength, altered biomechanics, and increased body mass index[2]. Knee OA significantly affects physical, psychological, and social well-being and contributes greatly to global disability[3].

Clinically, knee osteoarthritis presents with pain, joint stiffness, swelling, crepitus, reduced range of motion, muscle weakness, and functional limitations. Patients often experience difficulty in performing activities of daily living such as walking, standing from sitting, climbing stairs, and maintaining balance. As the disease progresses, structural degeneration within the joint and surrounding musculature leads to impaired physical performance and reduced independence[4]. Balance is an essential component of functional mobility and postural stability. It is defined as the ability to maintain the body's center of gravity within the base of support during static and dynamic activities. Balance control requires proper integration of visual, vestibular, and somatosensory inputs along with efficient neuromuscular responses. Any impairment in these systems can lead to postural instability and increased risk of falls[5].

Therefore, assessment of both physical and psychological impairments is essential in patients with knee osteoarthritis. Although previous studies have independently examined balance deficits and kinesiophobia, limited evidence exists regarding the correlation between static balance and kinesiophobia specifically in female patients with knee osteoarthritis. Understanding this relationship may help physiotherapists design targeted rehabilitation programs aimed at improving balance, reducing fear of movement, and enhancing functional independence and quality of life.

Hence, the present study was undertaken to determine the correlation between static balance and kinesiophobia in female patients with knee osteoarthritis.

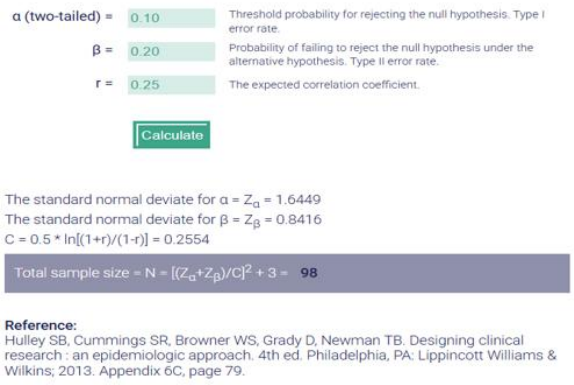
II. METHODOLOGY

Study Design: An Observational study design

Study Participant: The study will include subjects diagnosed by Knee Osteoarthritis.

Ethical Clearance: Ethical uthorization of this study was taken

Sample Size



Sample Technique: convenience sampling

Selection Criteria

Inclusion Criteria:

Adults aged 40-80 years.

Diagnosed with knee or hip osteoarthritis (confirmed by clinical diagnosis and radiological findings)

Willingness to participate in the study

Exclusion Criteria:

Patients with neurological disorders, vestibular disorders, or other conditions affecting balance

Patients with cognitive impairments that could interfere with the assessment

Those unable to provide informed consent

Psychogenic disorders: Physical fatigue, depression, frustration.

Study duration:

The study was conducted from 2024 – 2026

III. DATA ANALYSIS

Statistical Package for Social Sciences (SPSS version 22.0, IBM Corporation, USA) was used to analyses the data.

The data was checked for normality using the Shapiro-Wilk test.

Descriptive statistics will be used to summarize the data.

Correlation analysis (e.g., Pearson's or Spearman's correlation) will be performed to examine the relationship between balance scores and kinesiophobia levels.

Regression analysis will be conducted to explore the influence of balance dysfunction on kinesiophobia.

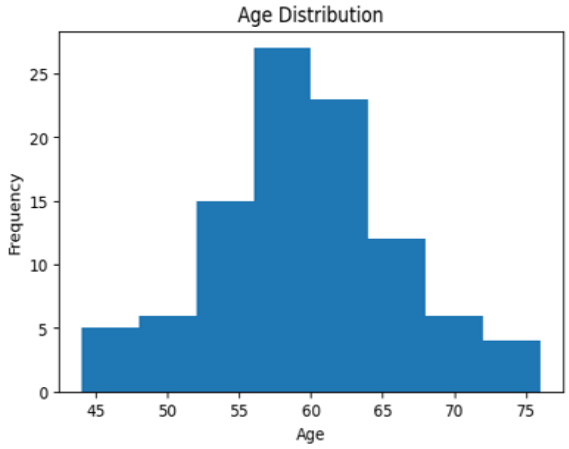
The confidence interval was set as 95% and significance level at 0.05. The data will be considered significant if $p < 0.05$.

IV. RESULTS

Table 5.1: Demographic Data

Variable	Mean ± SD
Age	59.15 ± 6.63
BMI	28.16 ± 3.02
Pain	6.44 ± 1.12

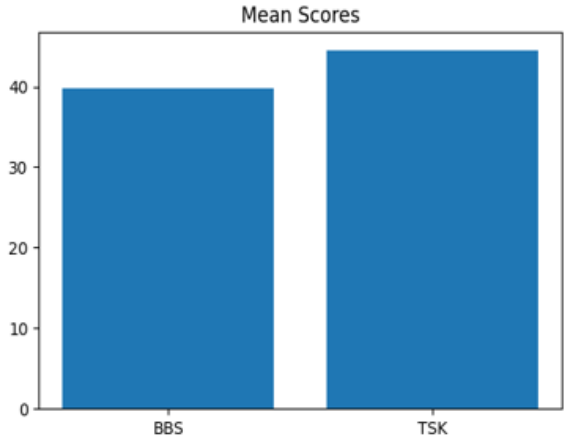
Interpretation: Participants were predominantly overweight middle-aged females with moderate pain levels.



Graph 5.1: Age distribution of participants

Table 5.2: Table showing mean score of Berg Balance Scale and Tampa Scale of kinesiophobia

Outcome Measure	Mean ± SD
Berg Balance Scale	39.76 ± 5.14
Tampa Scale	44.49 ± 4.09

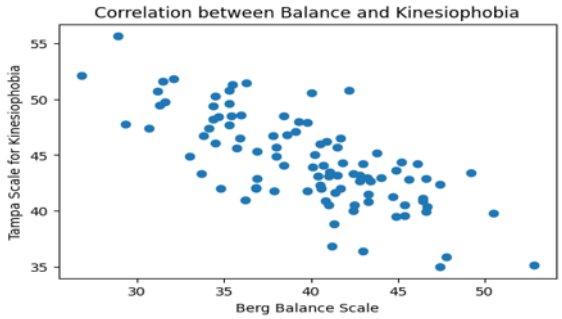


Graph 5.2: Bar Diagram showing mean score of Berg Balance Scale and Tampa Scale of kinesiophobia

Table 5.3: Table showing correlation analysis between berg balance scale and Tampa Scale

Variables	Correlation (r)	p-value
BBS vs TSK	-0.73	<0.001

Interpretation: There was a statistically significant negative correlation between balance and Kinesiophobia in OA knee patients.



Graph 5.3: Scatter Diagram showing negative correlation between Balance and Kinesiophobia

V. DISCUSSION

The present observational correlational study was conducted to determine the relationship between static balance and kinesiophobia in female patients with knee osteoarthritis. A total of 98 female participants diagnosed with knee osteoarthritis were included in the study. Static balance was assessed using the Berg Balance Scale (BBS), and kinesiophobia was evaluated using the Tampa Scale for Kinesiophobia (TSK-17).

The results of the present study demonstrated a statistically significant strong negative correlation between static balance and kinesiophobia ($r = -0.73$, $p < 0.001$). The findings indicate that female patients with poorer balance demonstrated higher fear of movement. Thus, reduced balance was associated with increased kinesiophobia in individuals with knee osteoarthritis.

Felson and Zhang reported that advancing age is one of the most significant risk factors associated with the development and progression of knee osteoarthritis[1].

The mean BMI of participants was 28.16 ± 3.02 kg/m², suggesting that most participants were overweight. Increased body weight results in greater mechanical loading across the knee joint and accelerates cartilage degeneration. Obesity has been identified as an important contributing factor for pain, disability, and functional decline in knee osteoarthritis[2].

Hye Jeong Park et al. reported that patients with knee osteoarthritis demonstrated impaired standing balance associated with age and knee malalignment[7]. The findings of the present study are consistent with their observations.

Proprioceptive deficits play an important role in impaired balance among individuals with knee osteoarthritis. Degeneration of joint mechanoreceptors reduces sensory feedback required for postural stability. Muscle weakness around the knee joint further compromises joint stabilization and balance control. Pain may also inhibit normal muscle activation patterns, resulting in altered gait and instability[3].

The mean Tampa Scale for Kinesiophobia score in the present study was 44.49 ± 4.09, indicating high levels of fear of movement among participants. Patients with chronic pain conditions often avoid movement due to fear of pain aggravation or injury. This fear avoidance behavior may lead to reduced physical activity, muscular deconditioning, joint stiffness, and worsening disability[10].

The findings of the present study are consistent with the study conducted by Selçuk and Karakoyun, who observed high levels of kinesiophobia among patients with knee osteoarthritis and reported that higher fear of movement was associated with lower physical activity levels, greater pain, increased disability, and poorer quality of life.[14] Similarly, Lozano-Meca et al. demonstrated a moderate association between kinesiophobia and disability in patients with knee osteoarthritis[15].

The present study demonstrated a strong negative correlation between balance and kinesiophobia. Participants with poorer balance scores showed greater fear of movement. One possible explanation for this relationship is that individuals with impaired balance may experience increased fear of falling during movement and functional activities. Consequently, they may avoid physical activity to prevent pain, instability, or falls. Reduced activity levels further contribute to muscle weakness and worsening balance impairment, thereby creating a vicious cycle of disability. Therefore, both physical and psychological factors should be addressed during rehabilitation of patients with knee osteoarthritis.

Balance training, proprioceptive exercises, strengthening programs, aerobic conditioning, and patient education may help improve postural stability and reduce fear of movement. Adhama et al. reported that kinesthesia, balance, and agility exercise programs improved physical function in individuals with knee osteoarthritis[16]. In addition, cognitive behavioral approaches and pain education strategies may help reduce fear avoidance beliefs and improve rehabilitation participation.

The present study highlights the importance of comprehensive physiotherapy assessment including evaluation of both balance impairment and psychological factors such as kinesiophobia. Early identification of fear of movement may help physiotherapists design individualized rehabilitation programs that improve physical function, reduce disability, and enhance quality of life.

However, the present study has certain limitations. Only female participants were included, limiting generalization of findings to males. Convenience sampling was used, which may introduce selection bias. Furthermore, the cross-sectional design of the study does not establish causality between balance impairment and kinesiophobia.

Future studies should include larger sample sizes, both genders, and longitudinal or interventional designs to further explore the relationship between balance and kinesiophobia in knee osteoarthritis.

VI. CONCLUSION

The present study concluded that there is a significant negative correlation between static balance and kinesiophobia in female patients with knee osteoarthritis. Reduced balance was associated with increased fear of movement. These findings highlight the importance of addressing both physical and psychological factors during physiotherapy rehabilitation to improve functional outcomes and quality of life in patients with knee osteoarthritis.

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