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PAIN AND FUNCTION IN KNEE OSTEOARTHRITIS: ASSESSING THE INFLUENCE OF PAIN PERCEPTION ON PHYSICAL FUNCTION

Sagar Kumar[*1], Ajay Dherwani[2], Sidra Tul Saba[3], Sidra Malik[4], Ramsha[5], Maham Manan[6], Anjiya Tharani[7], Farzeen Ali[8]

*[*1]Department of Physiotherapy, Senior Physiotherapist, Ziauddin Hospital, Karachi, Pakistan*
[2]Department of Physiotherapy, Lecturer II / Physiotherapist II, Liaquat National Hospital, Karachi, Pakistan
[3]Department of Physiotherapy, Physiotherapist, IHRI, Karachi, Pakistan
[4]Department of Physiotherapy, Physiotherapist, Ziauddin Hospital, Karachi, Pakistan
[5]Department of Physiotherapy, Lecturer, Sohail University, Karachi, Pakistan
[6,7]Department of Physiotherapy, Lecturer / Physiotherapist, Liaquat National Hospital, Karachi, Pakistan
[8]Department of Physiotherapy, Physiotherapist, Liaquat National Hospital, Karachi, Pakistan

[*1]sagarsawlani660@gmail.com, [2]ajay.dherwani@gmail.com, [3]sidrasoomro100@gmail.com, [4]22sidramalik@gmail.com, [5]ramshazahid2710@gmail.com, [6]mahum.shaikh.0709@gmail.com, [7]tharanianjiya@gmail.com, [8]farzeen_ali@live.com

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Corresponding Author: *

Abstract

Background: *Knee osteoarthritis (OA) is a degenerative joint disease commonly affecting middle-aged and older adults, leading to pain and functional decline. Pain perception is a significant factor in the progression of functional impairment in knee OA patients. This study aimed to explore the relationship between pain perception and functional decline in individuals with knee OA.*

Methods: *A cross-sectional study was conducted with 120 participants diagnosed with knee OA. Pain perception was assessed using the Visual Analog Scale (VAS) and the Short Form McGill Pain Questionnaire (SF-MPQ). Functional decline was measured through the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Timed Up and Go Test (TUG), and 6-Minute Walk Test (6MWT). Psychological factors were evaluated using the Hospital Anxiety and Depression Scale (HADS). Data were analyzed using correlation and regression analyses.*

Results: *The study found significant positive correlations between pain perception (VAS) and functional decline, including mobility and endurance measures (TUG and 6MWT) ($r = 0.55–0.63$, $p < 0.001$). Anxiety, as measured by HADS, was also associated with functional outcomes ($r = 0.45$, $p = 0.002$). Multiple regression analysis revealed that pain perception, anxiety, and BMI were significant predictors of functional decline. Females and older adults reported higher pain levels and worse functional performance compared to males and younger adults.*

Conclusion: *Pain perception significantly impacts functional decline in knee OA patients. Psychological factors and demographic characteristics, such as gender*

and age, further contribute to functional impairment. These findings highlight the need for multidisciplinary interventions addressing pain, mental health, and lifestyle factors in managing knee OA. Future research should explore long-term interventions to improve patient outcomes.

INTRODUCTION

Knee osteoarthritis (OA) is one of the most prevalent musculoskeletal disorders, affecting millions worldwide. It is characterized by degeneration of articular cartilage, joint inflammation, and structural changes that result in chronic pain, stiffness, and reduced mobility (Arden et al., 2021). Pain is the hallmark symptom of knee OA and is often the primary reason patients seek medical care. The perception of pain is not solely dependent on the severity of structural damage; rather, it is influenced by a complex interplay of biological, psychological, and social factors (Bliddal et al., 2024). Pain perception plays a pivotal role in determining an individual's functional status and quality of life. As knee OA progresses, pain can lead to avoidance of physical activity, muscle weakness, and further joint dysfunction, perpetuating a cycle of disability (Hall et al., 2022).

Understanding the relationship between pain perception and functional decline in knee OA patients is crucial for developing effective therapeutic strategies (Sharma, 2021). This study seeks to explore how pain impacts functional abilities, considering both physical and psychological aspects, to provide insights that could guide tailored rehabilitation interventions.

Knee OA is a leading cause of disability in adults, particularly in those aged 50 years and older. The condition imposes a significant burden on healthcare systems and reduces individuals' quality of life due to its progressive nature. Pain perception in knee OA is a multifaceted phenomenon, influenced by nociceptive inputs from joint structures, central sensitization mechanisms, and psychological factors such as anxiety and depression.

Functional decline, defined as the reduction in an individual's ability to perform daily activities, is a critical outcome of knee OA. Activities such as walking, climbing stairs, and standing for extended periods become challenging due to pain, joint instability, and muscle weakness (Dainese et al., 2022). Studies have shown that pain intensity correlates with decreased physical activity levels, further exacerbating functional limitations and increasing the risk of comorbidities like cardiovascular disease and obesity (Øiestad et al., 2022).

Despite advances in understanding knee OA, gaps remain in fully elucidating the dynamic relationship between pain perception and functional decline. Identifying this relationship is essential for implementing targeted interventions aimed at breaking the cycle of pain and disability (Pereira et al., 2022).

Knee OA is a progressive disease that significantly impacts an individual's mobility and quality of life. While pain perception is recognized as a primary factor influencing functional abilities, the extent to which it contributes to functional decline remains underexplored (Messier et al., 2021). Many patients with knee OA experience severe pain despite relatively mild radiographic evidence of joint damage, suggesting that factors beyond structural changes influence outcomes.

The lack of clarity on how pain perception interacts with functional limitations poses challenges in clinical decision-making and rehabilitation planning. Understanding this relationship could enable healthcare providers to develop holistic, patient-centered approaches to managing knee OA, ultimately reducing the burden of the disease.

Objectives

To investigate the relationship between pain perception and functional decline in patients with knee osteoarthritis.

1. To assess the severity of pain perception in patients with knee OA using validated pain scales.
2. To evaluate functional abilities in knee OA patients through performance-based tests and self-reported questionnaires.

3. To determine the correlation between pain perception and functional decline in knee OA patients.
4. To explore the role of psychological factors, such as anxiety and depression, in moderating the relationship between pain and function.

Significance of the Study

This study holds significant implications for clinical practice and public health:

1. **Improved Patient Outcomes:** By understanding the relationship between pain perception and functional decline, healthcare providers can develop tailored interventions that address both pain and physical limitations, enhancing patients' quality of life.

2. **Rehabilitation Strategies:** The findings may inform the design of comprehensive rehabilitation programs that integrate physical therapy with psychological support to optimize outcomes for knee OA patients.

3. **Public Health Impact:** Addressing functional decline in knee OA patients can reduce healthcare costs associated with advanced disability and improve population-level mobility and independence.

4. **Research Contribution:** The study adds to the growing body of literature on the biopsychosocial model of pain, providing insights into the multifaceted nature of knee OA.

Literature Review

Knee osteoarthritis (OA) is a degenerative joint disease and a major cause of pain, disability, and reduced quality of life worldwide. Pain perception and functional decline are critical components in understanding the impact of knee OA on patients. This literature review explores existing research on pain perception mechanisms, functional impairment, and their interrelationship in individuals with knee OA, providing a foundation for further investigation into these phenomena.

Pain is the most prevalent and debilitating symptom of knee OA. It is a complex phenomenon influenced by nociceptive, neuropathic, and psychosocial factors. Nociceptive pain in knee OA arises from mechanical stress and inflammation affecting joint structures, such as cartilage, subchondral bone, synovium, and ligaments. Joint damage activates nociceptors, transmitting pain signals to the central nervous system. However, studies indicate that structural joint changes on imaging, such as cartilage loss or osteophyte formation, do not always correlate with pain severity, highlighting the multifactorial nature of pain perception (Cueva et al., 2022).

Central sensitization refers to the amplification of pain signals within the central nervous system, leading to heightened pain sensitivity. Studies by Mohajer et al. (2022) found that many knee OA patients exhibit hyperalgesia and allodynia, suggesting altered pain processing mechanisms. This phenomenon contributes to discrepancies between the severity of joint damage and reported pain intensity. Psychological factors, including anxiety, depression, and catastrophizing, significantly influence pain perception. A study by Liu et al. (2022) demonstrated that higher levels of psychological distress were associated with increased pain intensity in knee OA patients. Fear of movement (kinesiophobia) further perpetuates pain and disability, creating a vicious cycle.

The biopsychosocial model provides a holistic framework for understanding pain in knee OA. It emphasizes the interplay between biological (e.g., joint damage), psychological (e.g., fear, mood disorders), and social (e.g., support systems) factors in shaping pain experiences (Wang & Ma, 2022). This model highlights the need for multidimensional assessment and management of pain in knee OA.

Functional decline in knee OA is characterized by reduced mobility, strength, and ability to perform daily activities. It is a major determinant of disability and loss of independence in affected individuals. Functional decline in knee OA results from a combination of joint stiffness, muscle weakness, and altered biomechanics. Quadriceps weakness, a hallmark of knee OA, significantly impairs mobility and stability (Langworthy et al., 2024). Changes in gait patterns, such as reduced stride length and slower walking speed, are common compensatory mechanisms.

Difficulty in ADLs, such as climbing stairs, walking, and standing, is frequently reported by knee OA

patients. A study by Ozeki et al. (2022) identified pain as the primary factor limiting ADLs, followed by joint stiffness and instability. This functional impairment often leads to reduced physical activity, further exacerbating muscle weakness and joint dysfunction. Functional decline in knee OA is progressive and multifactorial. Early stages are characterized by mild impairments, but as the disease advances, limitations become more severe, often resulting in the need for assistive devices or joint replacement surgery Xie et al. (2021). Functional decline is also associated with an increased risk of comorbidities, such as obesity, diabetes, and cardiovascular disease, due to reduced physical activity (Uivaraseanu et al., 2022).

The interplay between pain perception and functional decline is well-documented but remains incompletely understood. Pain is a key determinant of functional impairment, influencing mobility, strength, and participation in physical activity. Pain intensity has been shown to predict functional limitations in knee OA. A longitudinal study by Brophy and Fillingham (2022) demonstrated that patients with higher baseline pain levels experienced greater declines in physical function over time. Pain interferes with voluntary muscle activation, contributing to weakness and joint instability. Central sensitization amplifies pain perception, leading to increased functional impairment. Studies by Tsokanos et al. (2021) found that patients with heightened pain sensitivity exhibited greater difficulties in ADLs, independent of radiographic disease severity. This suggests that central mechanisms play a critical role in functional outcomes.

Fear-avoidance behaviors, driven by pain-related fear, contribute to functional decline in knee OA. Individuals may avoid physical activity due to fear of exacerbating pain or joint damage, leading to deconditioning and further disability (Lv et al., 2021). Addressing these psychological factors is essential for improving functional outcomes.

Psychological distress exacerbates the impact of pain on functional decline. Depression and anxiety are associated with poorer physical performance and increased disability in knee OA patients (Primorac et al., 2021). Interventions targeting mental health may indirectly improve physical function (Hasan et al., 2024).

Effective management of pain and functional decline in knee OA requires a comprehensive, multidisciplinary approach:

1. **Physical Therapy:** Exercise programs focusing on strength, flexibility, and aerobic fitness are cornerstone interventions for improving pain and function (Gohir et al., 2021).
2. **Pain Management:** Pharmacological and non-pharmacological interventions, such as analgesics, intra-articular injections, and cognitive-behavioral therapy, are commonly used to address pain (Colombini et al., 2023).
3. **Education and Self-Management:** Patient education on pain management, joint protection, and activity modification empowers individuals to take an active role in their care (Tan et al., 2022).
4. **Psychological Support:** Addressing psychological factors, such as fear-avoidance and depression, is critical for improving both pain perception and functional outcomes (Siddiq et al., 2022).

The relationship between pain perception and functional decline in knee OA is complex, involving interactions between biological, psychological, and social factors. While pain is a major driver of functional impairment, central sensitization, fear-avoidance behaviors, and psychological distress further exacerbate disability. Understanding these mechanisms is essential for developing holistic, patient-centered interventions that address both pain and function. Future research should focus on multidimensional approaches to assessment and management, bridging existing gaps to improve outcomes for individuals with knee OA.

Methodology

Study Design

This study will employ a **cross-sectional design** to investigate the relationship between pain perception and functional decline in patients with knee osteoarthritis. Data will be collected through self-reported questionnaires and performance-based assessments.

Study Setting

The study will be conducted in a clinical setting, such as the outpatient department of a tertiary care hospital or a rehabilitation center, specializing in musculoskeletal disorders. The setting will ensure access to patients diagnosed with knee osteoarthritis and provide appropriate facilities for physical assessments.

Population and Sample Size

Target Population

The target population includes adults aged 40–70 years diagnosed with knee osteoarthritis based on clinical criteria or radiographic evidence (Kellgren-Lawrence Grade 2 or higher). Participants must report chronic knee pain for at least six months.

Inclusion Criteria

1. Adults aged 40–70 years.
2. Diagnosed with knee osteoarthritis by a physician or radiologist.
3. Experiencing chronic knee pain for six months or more.
4. Able to provide informed consent and participate in assessments.

Exclusion Criteria

1. History of knee surgery or joint replacement.
2. Neurological or systemic conditions affecting mobility (e.g., stroke, rheumatoid arthritis).
3. Use of assistive devices other than for knee OA.
4. Cognitive impairments preventing accurate self-reporting.

Sample Size Calculation

Sample Size

The sample size is calculated using the formula for cross-sectional studies:

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Where:

- Z = 1.96 (for 95% confidence level)
- PPP = Estimated prevalence of postural abnormalities (assumed at 50% for maximum variability)
- d = Margin of error (5%)

Substituting values:

$$n = \frac{Z^2 P(1-P)}{d^2} = \frac{(1.96)^2 \times 0.5 \times (1-0.5)}{0.5^2} = 384.16$$

Sampling Technique

A **convenience sampling** method will be used to recruit participants from the selected study site. Eligible participants will be identified during routine clinical visits and invited to participate in the study.

Measurement Tools

1. Pain Perception

- **Visual Analog Scale (VAS):** A 10 cm scale where participants mark their perceived pain intensity, ranging from "no pain" to "worst pain imaginable."
- **Short Form of the McGill Pain Questionnaire (SF-MPQ):** Measures the sensory and affective dimensions of pain.

2. Functional Decline

- **Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC):** A validated tool assessing pain, stiffness, and physical function in knee OA patients.
- **Timed Up and Go Test (TUG):** A performance-based test measuring mobility and functional ability. Participants are timed while rising from a chair, walking 3 meters, turning, and returning to sit.
- **6-Minute Walk Test (6MWT):** Assesses endurance by measuring the distance a participant can walk in six minutes.

3. Psychological Factors

- **Hospital Anxiety and Depression Scale (HADS):** Evaluates anxiety and depression, which may influence pain perception and functional outcomes.

Data Collection Procedure

1. Eligible participants will be screened during routine clinic visits.
2. Participants will provide written informed consent before enrollment.
3. Pain perception and psychological data will be collected through self-reported questionnaires administered in a quiet, private setting.

4. Functional assessments (TUG, 6MWT) will be performed under the supervision of a trained physical therapist in a designated area to ensure safety and accuracy.
5. Data will be anonymized and recorded in a secure database for analysis.

Data Analysis

1. Descriptive Statistics:

- **Demographic Data:** Age, gender, body mass index (BMI), and duration of knee OA will be summarized using means, medians, and proportions.
- **Pain and Function Scores:** VAS, WOMAC, TUG, and 6MWT scores will be reported as means with standard deviations.

2. Correlation Analysis:

- **Pearson's or Spearman's Correlation Coefficient:** Used to analyze the relationship between pain perception (VAS, SF-MPQ scores) and functional decline (WOMAC, TUG, 6MWT scores).

3. Regression Analysis:

- **Multiple Linear Regression:** To explore the predictive value of pain perception and psychological factors (HADS scores) on functional outcomes.

4. Subgroup Analysis:

- Comparisons will be made between age groups, gender, and severity levels of knee OA to identify potential differences in pain-function relationships.

5. Statistical Software:

- Data analysis will be conducted using SPSS (version 26.0) or a similar statistical program. A p-value of <0.05 will be considered statistically significant.

Ethical Considerations

This study will adhere to ethical standards, including informed consent, participant confidentiality, and ethical review board approval. Participants will have the right to withdraw from the study at any point without consequence. All procedures will be designed to minimize physical or psychological discomfort.

Results

Variable	Mean ± SD	Frequency (%)
Age (years)	58.4 ± 8.7	
Gender		
- Male		154 (40%)
- Female		230 (60%)
BMI (kg/m²)	28.6 ± 4.2	
- Normal weight (<25)		96 (25%)
- Overweight (25–29.9)		173 (45%)
- Obese (≥30)		115 (30%)
Duration of Symptoms (years)	5.2 ± 2.8	
- <5 years		135 (35%)
- ≥5 years		249 (65%)

Table 1: Demographic Characteristics of Participants

This table summarizes the demographic and clinical characteristics of the study participants. The mean age of the participants was 58.4 years, with a standard deviation of 8.7 years, indicating a sample predominantly composed of middle-aged and older adults. The sample included a higher proportion of females (230 participants, 60%) compared to males (154 participants, 40%).

The average Body Mass Index (BMI) was 28.6 kg/m² (±4.2), categorizing the majority of the participants as either overweight or obese. Specifically, 25% of the participants were within the normal weight range

(<25 kg/m²), 45% were overweight (25–29.9 kg/m²), and 30% were obese (≥30 kg/m²).

Regarding the duration of symptoms, the participants reported an average of 5.2 years (±2.8) of experiencing knee osteoarthritis symptoms. A significant proportion (65%) had symptoms lasting 5 years or more, while 35% had symptoms for less than 5 years.

This data highlights the chronic nature of knee osteoarthritis in the study population, with a higher representation of females, a significant prevalence of overweight and obesity, and a notable duration of symptoms exceeding five years for most participants. These findings provide a contextual foundation for understanding the interplay between demographic and clinical factors and their potential influence on pain perception and functional decline in knee osteoarthritis.

Measurement Tool	Mean ± SD	Range
Visual Analog Scale (VAS)	6.4 ± 1.5	3–9
WOMAC Scores		
- Pain	14.2 ± 4.3	6–20
- Stiffness	4.6 ± 1.7	2–8
- Physical Function	46.8 ± 12.3	25–68
Timed Up and Go Test (TUG) (seconds)	11.8 ± 3.1	8–20
6-Minute Walk Test (6MWT) (meters)	352 ± 78	200–480
Hospital Anxiety and Depression Scale (HADS)		
- Anxiety	9.3 ± 2.5	
- Depression	8.7 ± 2.3	

Table 2: Pain and Function Scores

This table provides a summary of the clinical and psychological assessment results for the participants. The average pain intensity, measured by the Visual Analog Scale (VAS), was 6.4 ± 1.5, with a range of 3–9, indicating moderate to severe pain levels among the participants. WOMAC scores revealed an average pain subscore of 14.2 ± 4.3 (range 6–20), stiffness of 4.6 ± 1.7 (range 2–8), and physical function impairment of 46.8 ± 12.3 (range 25–68), reflecting significant functional limitations. Mobility tests demonstrated that participants took an average of 11.8 ± 3.1 seconds to complete the Timed Up and Go Test (TUG), with a range of 8–20 seconds, and covered an average distance of 352 ± 78 meters (range 200–480 meters) in the 6-Minute Walk Test (6MWT), showing reduced mobility and endurance. Psychological evaluations using the Hospital Anxiety and Depression Scale (HADS) revealed mean anxiety and depression scores of 9.3 ± 2.5 and 8.7 ± 2.3, respectively, suggesting moderate levels of psychological distress. These results highlight the multifaceted impact of knee osteoarthritis, encompassing pain, stiffness, physical limitations, and psychological challenges, which collectively contribute to reduced quality of life.

Variables	Correlation Coefficient (r)	p-value
VAS vs. WOMAC (Physical Function)	0.58	<0.001
VAS vs. TUG	0.63	<0.001
VAS vs. 6MWT	-0.55	<0.001
SF-MPQ (Sensory) vs. TUG	0.6	<0.001
HADS (Anxiety) vs. TUG	0.45	0.002

Table 3: Correlations

This table illustrates the correlation between pain, anxiety, and functional outcomes in knee osteoarthritis patients. A moderate positive correlation ($r = 0.58$, $p < 0.001$) was found between VAS and WOMAC Physical Function, indicating that higher pain levels are associated with greater functional impairment. Similarly, a strong positive correlation ($r = 0.63$, $p < 0.001$) was observed between VAS and TUG, suggesting that increased

pain perception significantly impairs mobility. Conversely, VAS showed a moderate negative correlation with 6MWT ($r = -0.55$, $p < 0.001$), indicating that higher pain levels correspond to reduced physical endurance. Additionally, the SF-MPQ (Sensory) score demonstrated a strong positive correlation with TUG ($r = 0.6$, $p < 0.001$), reinforcing the link between sensory pain intensity and impaired mobility. Finally, HADS Anxiety scores were moderately correlated with TUG ($r = 0.45$, $p = 0.002$), highlighting the role of anxiety in further limiting physical function. These findings underscore the interconnection between pain perception, psychological factors, and functional decline in knee osteoarthritis.

Predictor Variable	β (Standardized Coefficient)	p-value
Visual Analog Scale (VAS)	0.42	<0.001
HADS (Anxiety)	0.31	0.01
BMI	0.22	0.03
HADS (Depression)	0.18	0.07

Table 4: Regression Analysis

This table summarizes the results of a regression analysis examining the predictors of functional decline in knee osteoarthritis patients. The Visual Analog Scale (VAS) emerged as the strongest predictor, with a standardized coefficient (β) of 0.42 ($p < 0.001$), indicating that higher pain intensity is significantly associated with greater functional impairment. Anxiety, measured by the Hospital Anxiety and Depression Scale (HADS), also significantly contributed to functional decline ($\beta = 0.31$, $p = 0.01$), highlighting the impact of psychological distress on physical performance. Body Mass Index (BMI) was another significant predictor ($\beta = 0.22$, $p = 0.03$), suggesting that higher BMI exacerbates functional limitations. Although depression (HADS Depression) showed a positive association with functional decline ($\beta = 0.18$), it did not reach statistical significance ($p = 0.07$). These findings emphasize the multifactorial nature of functional decline in knee osteoarthritis, with pain perception, psychological factors, and obesity playing key roles in influencing patient outcomes.

Variable	Male (Mean ± SD)	Female (Mean ± SD)	p-value
VAS	6.0 ± 1.6	6.7 ± 1.3	0.02
TUG (seconds)	11.0 ± 2.9	12.4 ± 3.5	0.04
6MWT (meters)	370 ± 80	340 ± 72	0.03

Table 5: Subgroup Analysis by Gender

Variable	40–60 Years (Mean ± SD)	61–70 Years (Mean ± SD)	p-value
VAS	6.1 ± 1.4	6.8 ± 1.6	0.01
TUG (seconds)	11.3 ± 2.8	12.5 ± 3.4	0.02
6MWT (meters)	370 ± 75	335 ± 78	0.01

Table 6: Subgroup Analysis by Age

Discussion

The findings of this study revealed a significant relationship between pain perception and functional decline in patients with knee osteoarthritis (OA). These results align with previous research emphasizing the detrimental effects of pain on physical function in musculoskeletal conditions. For instance, a study by Tschopp et al. (2023) reported a similar correlation between Visual Analog Scale (VAS) scores and functional limitations measured by the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), highlighting pain as a primary contributor to mobility challenges in knee OA patients. Our study supports these findings by demonstrating that pain intensity, measured through VAS, is moderately to strongly correlated with physical function and mobility outcomes such as the Timed Up and Go Test (TUG) and the 6-Minute Walk Test (6MWT) (Keeling et al., 2022).

Psychological factors, such as anxiety and depression, also emerged as significant predictors of functional decline, consistent with the work of Zhou et al. (2023), who reported that anxiety exacerbates the perception of pain, leading to reduced physical activity and increased disability. In our study, the Hospital Anxiety and Depression Scale (HADS) anxiety subscale demonstrated a moderate correlation with TUG scores, reinforcing the bidirectional relationship between psychological distress and functional performance in knee OA patients.

Gender differences observed in this study, with females reporting higher pain levels and poorer functional outcomes than males, also resonate with previous research. For example, Zhou et al. (2023) found that hormonal factors and differences in pain coping mechanisms may contribute to the higher pain sensitivity and disability in women. Similarly, older age groups (61–70 years) exhibited significantly worse functional performance and greater pain compared to younger participants, consistent with studies that identify aging as a risk factor for accelerated cartilage degeneration and reduced mobility.

Although pain was the strongest predictor of functional decline, other factors such as BMI and anxiety also influenced outcomes, suggesting the need for a multidimensional approach to OA management. This aligns with recent evidence advocating for interventions that address physical, psychological, and lifestyle factors in tandem to improve patient outcomes (Sinatti et al., 2022).

In summary, the findings of this study are consistent with and extend existing literature, emphasizing the interplay between pain, psychological factors, and functional decline. These results underscore the importance of individualized, multidisciplinary approaches in managing knee OA to optimize physical function and quality of life.

Conclusion

This study investigated the relationship between pain perception and functional decline in patients with knee osteoarthritis. The results demonstrated that higher pain intensity, as measured by the Visual Analog Scale, was significantly associated with worse functional outcomes, including mobility (Timed Up and Go Test) and physical endurance (6-Minute Walk Test). Psychological factors, particularly anxiety, also emerged as significant contributors to functional decline, highlighting the complex interaction between physical and emotional health in knee OA.

Subgroup analyses revealed that females and older adults reported higher pain levels and poorer functional performance, suggesting that targeted interventions may be needed for these high-risk groups. Additionally, BMI was identified as a significant predictor of functional decline, reinforcing the role of weight management in OA management strategies.

The findings emphasize the need for a holistic approach to knee OA treatment, addressing pain management, psychological support, and lifestyle modifications. Integrating physical therapy, mental health interventions, and weight control into clinical care may improve physical function and quality of life for knee OA patients. Future research should explore longitudinal outcomes and evaluate the effectiveness of multidisciplinary interventions in mitigating the impact of pain on functional decline.

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