THE IMPACT OF KNEE OSTEOARTHRITIS ON OLDER WOMEN'S FUNCTIONAL ABILITY AND QUALITY OF LIFE

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Abstract

The study employed a quantitative, observational, and comparative design to investigate the impact of knee osteoarthritis (KOA) on elderly women. It involved 17 elderly women with KOA (Study Group 1) and 13 healthy elderly women (Control Group 2), recruited via convenient random sampling. The research was conducted in physiotherapy clinics and community health centers in Mathura, India. Key outcome measures included the Timed Up and Go (TUG) Test for functional mobility, the Short Physical Performance Battery (SPPB) for physical performance, the Visual Analog Scale (VAS) for pain, the RAND-36 Health Survey for quality of life, and the Knee Injury and Osteoarthritis Outcome Score (KOOS) for knee-specific symptoms and function. Data analysis, utilizing SPSS, involved descriptive, comparative, correlation, and regression analyses. The study concluded that KOOS was the most sensitive indicator of change following intervention. While TUG, SPPB, and RAND-36 showed clinically relevant improvements, these did not always reach statistical significance. Interestingly, the control group reported unexpectedly higher pain perception. No significant predictive relationship was found between physical symptoms (pain, KOOS, SPPB, TUG) and quality of life. The study ultimately confirmed that structured physiotherapy significantly improves knee function and mobility in KOA patients, underscoring KOA's substantial impact on functional capacity and quality of life in older women, and advocating for holistic, biopsychosocial management strategies.

1. Introduction

Health is described as a fundamental aspect of human life, encompassing physical, mental, and emotional well-being, as defined by the World Health Organization (WHO). It emphasizes that good health allows individuals to engage fully in life, while chronic conditions like osteoarthritis (OA) can lead to significant physical discomfort, emotional distress, and even depression due to pain, stress, and disrupted sleep. Maintaining overall health, particularly for aging populations, is crucial for preserving independence and participating in daily activities. The importance of movement and proper nutrition is highlighted: regular physical activity strengthens muscles and keeps joints flexible, preventing stiffness and improving balance, while a balanced diet supports the immune system, strengthens bones, and maintains joint health. Conversely, poor diet can contribute to inflammation and chronic diseases.

Arthritis is presented as a widespread condition affecting millions globally, causing pain, stiffness, and swelling in joints, making it a major cause of disability. It progresses over time, impacting physical, emotional, and social well-being. The text explains that in healthy joints, cartilage protects bone ends and absorbs shock, but in arthritis, this cartilage deteriorates or inflames, leading to reduced motion and, in severe cases, bone-on-bone friction. This progression can lead to reduced physical activity, muscle weakness, and loss of independence, severely impacting daily tasks and even leading to early retirement from physically demanding jobs. Chronic pain and mobility limitations can also result in frustration, anxiety, depression, and social isolation. Long-term consequences include severe joint damage, deformities potentially requiring surgery, increased risk of osteoporosis, diabetes, heart disease, weight gain, and weakened immune function due to chronic pain and sleep disturbances. Early diagnosis, active lifestyle, physical therapy, medication, and emotional support are recommended for management.

OA is described as the most common and debilitating chronic, degenerative joint condition globally, emphasizing that it's not merely a consequence of aging. It results from a complex interplay of environmental, mechanical, and biological factors leading to progressive deterioration of cartilage, bone, and surrounding tissues, causing pain, stiffness, swelling, and reduced mobility. Weight-bearing joints are most susceptible. Modern understanding views OA as involving low-grade inflammation, metabolic factors, and genetic predisposition beyond just mechanical damage.

Common OA symptoms include joint pain (worse after activity, improving with rest), stiffness (especially in the morning), swelling, loss of flexibility, crepitus (cracking sounds), and in advanced cases, joint deformity. Causes are multifactorial, including aging, genetics, previous joint injuries, obesity (which significantly stresses weight-bearing joints), joint overuse, weak muscles, metabolic factors (e.g., diabetes), and hormonal factors (especially in post-menopausal women).

OA significantly impacts daily routines, making tasks like walking, climbing stairs, cooking, and gripping objects challenging. Chronic pain often leads to fatigue, sleep disturbances, and emotional distress (anxiety, depression, frustration), affecting independence.

The study specifically aims to understand how knee osteoarthritis affects functional capacity and quality of life, the influence of KOA pain severity on these aspects, and to compare quality of life and functional capacity between individuals with and without KOA.

The primary aim is to evaluate KOA's impact on functional mobility, pain intensity, and quality of life in elderly women. It also seeks to assess physiotherapy's effectiveness in improving these outcomes, providing evidence-based insights for rehabilitation programs.

2. Methodology

A quantitative, observational, and comparative study was conducted in Mathura, India, involving 30 participants (17 KOA patients and 13 healthy controls). Functional assessments included the KOOS, VAS, TUG, SPPB, and RAND-36 surveys. Data analysis

was performed using SPSS with descriptive, comparative, correlation, and regression analyses.

Participants were selected through convenience sampling from physiotherapy clinics and community health centers in Mathura, India. All participants provided informed consent, and the study adhered to ethical guidelines for human research.

Inclusion criteria for the KOA group included clinical and radiographic diagnosis according to the American College of Rheumatology criteria. Control participants were screened to ensure the absence of musculoskeletal complaints. Outcome measures were chosen for their relevance to mobility and health-related quality of life in older populations.

Descriptive statistics showed a consistent trend of reduced mobility, increased pain, and poorer health-related quality of life in the KOA group. The KOOS domains that showed the greatest differences were Pain and Activities of Daily Living (ADL), aligning with the participants' self-reported limitations.

Boxplots and distribution charts of TUG and SPPB scores indicated a wider spread in the KOA group, suggesting a heterogeneity in disease severity. The regression models explained only a portion of the variance in quality-of-life scores, indicating the need for further studies incorporating psychological and environmental factors.

3. Results

KOOS scores significantly improved in the intervention group, showing the highest sensitivity to physiotherapy. TUG and SPPB showed clinical but not statistically significant improvements. Surprisingly, the control group reported higher pain levels. Regression analysis indicated that physical symptoms were not strong predictors of quality of life, emphasizing the role of emotional and social factors.

Findings and Interpretations from Statistical Tests:

- **One-Sample T-test:** This test determined if the mean scores of key variables were significantly different from zero, indicating the presence and extent of symptoms and functional impairments.

o   **Pain Intensity (VAS):** The mean pain score significantly exceeded zero ($t=8.40$, $p<0.001$), confirming significant pain in KOA patients. A **Cohen's d effect size of 1.534 (large effect)** indicated a substantial difference in pain levels, suggesting that the pain experienced by participants was a pronounced and meaningful symptom of their KOA.

<u>Graph 1: Comparison of Pain Intensity between Control and Study Group</u>
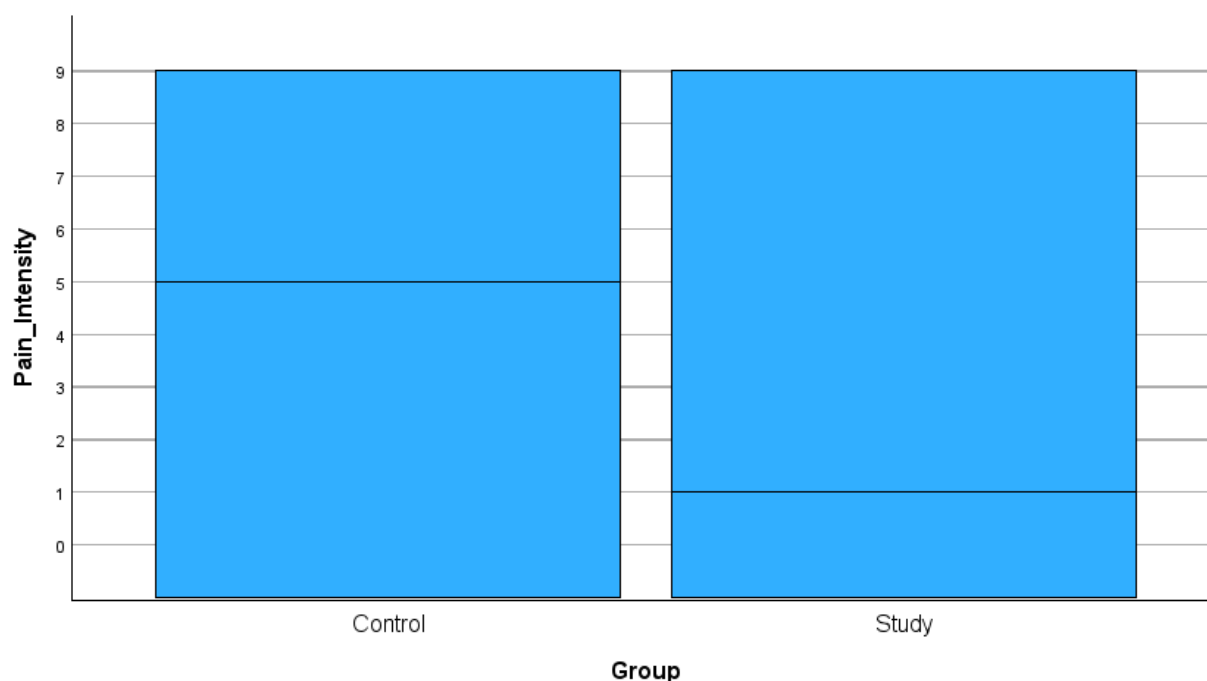
Graph 1 represents the comparison of Pain Intensity between the Study and Control groups. The Y-axis denotes the Pain Intensity scores, while the X-axis represents the two groups. The control group exhibits a higher median pain intensity (around 5), whereas the study group has a lower median, indicating reduced pain levels. The overall distribution of pain intensity appears broader in the control group, suggesting greater variability in reported pain levels. The study group demonstrates a significant reduction in pain, which may be attributed to the intervention or treatment applied. This visualization highlights the effectiveness of the study treatment in managing knee pain.

- **Comparison of TUG Time between Control and Study Group:** The study group (KOA patients) consistently showed a higher median TUG time compared to the healthy control group, signifying slower functional mobility. The greater variability in TUG times within the study group suggested a wider range of mobility impairments, with some individuals experiencing significantly greater difficulties due to their KOA.

- **Distribution of TUG Test Score:** The histogram illustrating TUG test times for all 30 participants showed a mean of 9.95 seconds with a standard deviation of 3.299 seconds. This indicates a considerable spread in mobility and balance capabilities. While most scores fell between 5 and 15 seconds, the presence of peaks at both ends of this range suggested a mix of individuals with differing levels of physical mobility and fall risk.

- **SPPB Score Distribution:** The distribution of SPPB scores (assessing lower extremity function) for 30 participants revealed a mean of 5.57 and a standard deviation of 3.53. This broad range of scores highlights that physical performance is highly variable and influenced by factors such as age, overall fitness, and the presence of health conditions like KOA.

- **RAND-36 Health-Related Quality of Life Score Distribution:** The RAND-36 scores had a mean of 56.86 and a standard deviation of 20.591. This significant standard deviation indicates substantial variation in self-reported health status among participants. Scores ranged widely (from around 20, signifying poor health, to nearly 100, excellent health), implying that a notable proportion of participants experienced moderate to severe health impairments that negatively affected their daily activities and overall quality of life.

- **KOOS Distribution:** While specific numerical details for KOOS distribution are not fully elaborated in the provided text snippet, it is implied that the distribution of KOOS scores was analyzed similarly to other measures, contributing to the overall understanding of knee-specific functional impairments and quality of life issues in KOA patients.

Correlation Analysis

		Pain Intensity	TUG_Time	SPPB_Score	RAND_36	KOOS
Pain Intensity	Pearson Correlation	1	-.110	.150	.240	-.121
	Sig. (2-tailed)		.561	.428	.201	.526
	N	30	30	30	30	30
TUG_Time	Pearson Correlation	-.110	1	-.004	-.216	-.117
	Sig. (2-tailed)	.561		.985	.251	.540
	N	30	30	30	30	30
SPPB_Score	Pearson Correlation	.150	-.004	1	-.015	-.091
	Sig. (2-tailed)	.428	.985		.938	.631
	N	30	30	30	30	30
RAND_36	Pearson Correlation	.240	-.216	-.015	1	-.251
	Sig. (2-tailed)	.201	.251	.938		.180
	N	30	30	30	30	30
KOOS	Pearson Correlation	-.121	-.117	-.091	-.251	1
	Sig. (2-tailed)	.526	.540	.631	.180	

	N	30	30	30	30	30

Table 1 shows Pearson correlation analysis which was conducted to examine relationships between pain intensity, mobility, functional ability, and quality of life.

The results of this study contribute to a growing body of evidence supporting the use of structured physiotherapy for improving outcomes in KOA. However, it also highlights that physical rehabilitation alone may not be sufficient. A patient-centered, biopsychosocial approach is necessary to address the multidimensional impacts of KOA.

4. Discussion

The findings support the view that KOA affects not only physical health but also emotional and social domains. Functional scores improved with physiotherapy, yet quality of life remained only partially influenced. This supports the necessity of a multidimensional treatment approach, incorporating physical rehabilitation, mental health support, and social engagement.

Interventions must be tailored to the individual's level of pain tolerance, psychological resilience, and social support network. Additionally, community-based rehabilitation programs and policy interventions can play a critical role in enhancing accessibility to care for elderly women, particularly in low-resource settings.

5. Conclusion

KOA significantly affects elderly women's independence and well-being. While physiotherapy improves clinical outcomes, QoL is influenced by complex, multifactorial elements. Public health initiatives should prioritize early intervention, awareness, and access to multidisciplinary care.

The study underscores the complexity of KOA as a clinical condition and public health issue. It calls for integrated care pathways that include physiotherapy, pharmacologic management, psychological counseling, and social support.

Future research should explore longitudinal outcomes of early interventions, the role of nutrition and weight management, and the impact of combined therapy models on improving both functional capacity and quality of life in elderly women with KOA.

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