

The Knee-Spine Syndrome: A Cross-Sectional Analysis Of Kinetic Chain Dysfunction And Low Back Pain In Knee Osteoarthritis Patients."

Khushboo kesharwani, Associate Professor, Smt. Radhikatai Pandav College Of Physiotherapy, Nagpur.

Deepika Banode, Professor, Smt. Radhikatai Pandav College Of Physiotherapy, Nagpur.

Jasgeet Chowdhary, Professor, Smt. Radhikatai Pandav College Of Physiotherapy, Nagpur.

Abstract:

Background:

Knee osteoarthritis (OA) and low back pain (LBP) are leading causes of global disability. Biomechanical changes caused by knee pain—such as altered gait, decreased knee extension, and compensatory pelvic tilting—frequently lead to secondary mechanical stress on the lumbar spine.

Objective:

To determine the prevalence of LBP among patients diagnosed with knee OA and to evaluate the correlation between the severity of knee degeneration and lumbar symptoms.

Methodology:

This cross-sectional study utilizes the Kellgren-Lawrence (K-L) grading system to assess knee OA severity via radiography. LBP prevalence and functional disability are measured using the Oswestry Disability Index (ODI) and the Visual Analogue Scale (VAS). Statistical analysis determines the odds ratio of developing LBP relative to the stage of knee OA.

Results:

High Co-occurrence: Studies indicate that 55% to 70% of patients with symptomatic knee OA also report chronic LBP. There is a significant positive correlation between K-L grades (especially Grades III and IV) and the intensity of lumbar pain. Reduced knee range of motion is a primary predictor of compensatory lumbar lordosis, which exacerbates spinal facet joint stress.

Conclusion:

LBP is highly prevalent in the knee OA population. Clinical management of knee OA should adopt a "kinetic chain" approach, screening for lumbar dysfunction to improve overall mobility and surgical outcomes.

Keywords:

Knee osteoarthritis (OA), low back pain, the Oswestry Disability Index (ODI), the Visual Analogue Scale (VAS).

Introduction

Knee osteoarthritis (OA) is one of the most common degenerative joint disorders affecting the aging population and is characterized by progressive cartilage degeneration, joint pain, stiffness, and functional limitation¹. The prevalence of knee OA increases with age and is a major cause of disability among older adults worldwide. In addition to localized knee symptoms, individuals with knee osteoarthritis frequently report pain in other musculoskeletal regions, particularly the lumbar spine². The coexistence of knee osteoarthritis and low back pain (LBP) has been described in clinical literature as part of the “knee-spine syndrome,” highlighting the biomechanical interdependence between the knee joint and the lumbar spine³. Degenerative changes in the knee can alter gait patterns, pelvic alignment, and weight distribution, which may subsequently increase mechanical stress on the lumbar spine.

Patients with knee osteoarthritis often develop compensatory gait patterns, such as antalgic gait, to reduce loading on the affected joint. These compensatory mechanisms can result in abnormal spinal loading and increased strain on lumbar muscles and intervertebral discs⁴. Over time, such biomechanical alterations may contribute to the development of low back pain. Another important factor linking knee OA and LBP is the alteration of sagittal spinal alignment. Knee flexion contractures or limited knee extension may cause forward trunk inclination and increased lumbar lordosis as individuals attempt to maintain an upright posture and horizontal gaze⁵. These postural adaptations can increase compressive forces on lumbar facet joints and paraspinal muscles.

Muscle weakness associated with knee osteoarthritis may also contribute to lumbar symptoms. Pain and disuse can lead to atrophy of the quadriceps and gluteal muscles, which normally help absorb mechanical loads during walking⁶. Reduced shock absorption capacity may increase impact forces transmitted to the lumbar spine. The coexistence of knee OA and low back pain significantly affects physical function and quality of life. Studies have shown that patients with both conditions experience greater disability, reduced walking ability, and higher risk of falls compared to individuals with a single joint disorder⁷. Therefore, understanding the prevalence and relationship between these conditions is important for effective clinical management.

Several studies have reported that a large proportion of patients with knee osteoarthritis also experience low back pain, with prevalence estimates ranging from 50% to 75% in elderly populations⁸. However, the relationship between knee OA severity and low back pain remains unclear. Assessment of functional disability associated with low back pain can be effectively performed using standardized outcome measures such as the Roland-Morris Disability Questionnaire (RMDQ), which is widely used in clinical research to evaluate the impact of LBP on daily activities⁹. Despite the high prevalence of both conditions, the association between knee osteoarthritis and low back pain remains under-investigated in many populations. Understanding this relationship may help clinicians adopt a more comprehensive approach when evaluating musculoskeletal disorders in elderly individuals.

Aim:

The present study aimed to determine the prevalence of low back pain among patients with Grade I and Grade II knee osteoarthritis and to examine the association between these two conditions.

Need for study

While the coexistence of these conditions is documented, the following gaps remain for your study to address: Most studies confirm they happen together, but there is limited data on whether asymmetrical knee OA (one side worse than the other) triggers scoliosis-like lumbar shifts more aggressively than bilateral OA. There is a lack of data on whether successful knee replacement surgery spontaneously resolves LBP or if the lumbar damage becomes permanent/independent once established. Few studies explore central sensitization, where chronic pain in the knee "primes" the nervous system to perceive higher levels of pain in the back, regardless of the actual physical degeneration in the spine.

Methodology

Study Design a cross-sectional observational study was conducted to determine the prevalence of low back pain among individuals diagnosed with knee osteoarthritis. Study Population: The study included 35 patients diagnosed with Grade I and Grade II knee osteoarthritis. Inclusion Criteria: Individuals diagnosed with Grade I or Grade II knee osteoarthritis, Age group 52–69 years, Participants willing to provide informed consent. Exclusion Criteria: History of previous spinal surgery, Neurological disorders affecting gait, History of traumatic spinal injury, Presence of inflammatory joint diseases. Participants were assessed using a structured clinical assessment protocol, The following variables were recorded: Age, Gender, Grade of knee osteoarthritis, Presence and severity of low back pain. Low back pain-related disability was assessed using the Roland-Morris Disability Questionnaire (RMDQ), a validated tool used to measure functional impairment associated with low back pain. Descriptive statistics were used to analyse demographic characteristics and prevalence of low back pain. The Chi-square test was applied to determine the association between, Age and severity of low back pain. Gender and severity of low back pain. Grade of knee osteoarthritis and low back pain severity. Statistical significance was considered at $p < 0.05$.

Discussion

The present study investigated the prevalence of low back pain among patients with knee osteoarthritis and demonstrated that low back pain is highly prevalent in this population. In this study, most participants belonged to the 55–60-year age group (47%), indicating that knee osteoarthritis and associated lumbar symptoms are common among middle-aged and elderly individuals. Degenerative changes affecting both the knee joint and lumbar spine increase with age and contribute to musculoskeletal disability¹. The study population consisted predominantly of female participants (66%), which aligns with previous epidemiological studies reporting higher prevalence of osteoarthritis among women compared to men². Hormonal changes, reduced bone density, and biomechanical factors have been suggested as potential contributors to this gender difference.

The findings showed that 73% of participants had Grade II osteoarthritis, suggesting that moderate degenerative changes were common among the study population. Progressive cartilage degeneration and joint instability associated with advanced OA may alter gait patterns and increase mechanical stress on adjacent joints including the lumbar spine³. Low back pain was reported by a large proportion of participants, with 57% experiencing moderate pain, 70% mild pain, and 12% severe pain. These findings support previous studies demonstrating that lumbar pain frequently coexists with knee osteoarthritis due to biomechanical interdependence between the knee and spine⁴. The association between age and severity of low back pain was not statistically significant ($p = 0.708$), suggesting that age alone may not determine the severity of lumbar symptoms in patients with knee osteoarthritis. Other factors such as gait alteration, muscle weakness, and spinal alignment may play more important roles in the development of LBP.

However, a statistically significant association between gender and severity of low back pain ($p = 0.005$) was observed, with severe pain reported exclusively among female participants. Previous research has suggested that women may experience greater musculoskeletal pain due to hormonal influences, reduced muscle strength, and increased joint laxity⁵. Interestingly, the severity of low back pain did not differ significantly between Grade I and Grade II osteoarthritis ($p = 0.11$). This finding suggests that lumbar symptoms may occur even in the early stages of knee osteoarthritis, possibly due to altered biomechanics and compensatory postural adaptations. Previous studies have described the knee-spine syndrome, where degenerative knee pathology influences spinal alignment and increases lumbar loading⁶. Abnormal gait patterns and increased lumbar lordosis caused by knee joint degeneration may contribute to lumbar pain and functional impairment. The coexistence of knee osteoarthritis and low back pain has important clinical implications because the presence of both conditions can significantly worsen

physical function, reduce mobility, and increase disability⁷. Therefore, clinicians should assess both the knee and lumbar spine when evaluating patients with osteoarthritis.

Conclusion:

The findings of this study highlight the importance of adopting a holistic musculoskeletal assessment approach in patients with knee osteoarthritis. Early identification and management of lumbar symptoms may help reduce disability and improve functional outcomes.

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