

# Effect of Pain on Active Squat Depth in Patients with Bilateral Knee Osteoarthritis: An Observational Study

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## I. INTRODUCTION

Osteoarthritis (OA) is a chronic, progressive degenerative joint disorder characterized by pain, inflammation, and gradual destruction of articular cartilage, leading to reduced joint range of motion and functional disability<sup>1,2</sup>. Knee osteoarthritis is one of the most prevalent forms and significantly affects mobility and quality of life<sup>3</sup>. The disease typically develops slowly over several years as a result of cumulative mechanical stress on the joint<sup>4</sup>.

In the Indian population, squatting is an essential activity of daily living, required for tasks such as toileting, sitting on the floor, and various household activities<sup>5</sup>. Squatting generates low to moderate posterior shear forces at the knee joint<sup>6</sup>. During knee flexion, patellofemoral and tibiofemoral compressive forces, as well as tibiofemoral shear forces, progressively increase and reduce again during knee extension<sup>7,8</sup>. Efficient squatting requires adequate knee range of motion along with coordinated strength of the quadriceps, gluteus maximus, hamstrings, and ankle dorsiflexors<sup>9</sup>. Any limitation in joint mobility or muscle strength can negatively influence squat performance, which is closely associated with reduced functional independence and quality of life<sup>10</sup>.

Pain is the most prominent symptom experienced by individuals with knee osteoarthritis and is often a major limiting factor for functional activities<sup>11</sup>. Increased pain has been shown to alter muscle activation patterns and joint loading strategies during tasks such as squatting<sup>12,13</sup>. Despite this, the relationship between pain intensity and active squat depth has not been adequately explored. Understanding this relationship is essential for functional assessment and rehabilitation planning. Therefore, this study aimed to evaluate the correlation between pain intensity and active squat depth in patients with bilateral knee osteoarthritis.

### Aim

To evaluate the correlation between pain intensity and range of active squat depth in patients with bilateral knee osteoarthritis.

## II. METHODOLOGY

A cross-sectional observational study was conducted on 100 patients diagnosed with bilateral knee osteoarthritis. Participants aged between 50 and 60 years with grade  $\leq 2$  osteoarthritis according to the Kellgren and Lawrence grading system were included<sup>14</sup>. Convenience sampling with periodic selection was used.

### Inclusion Criteria

Participants of either gender aged 50–60 years with bilateral knee osteoarthritis ( $\leq$  grade 2), pain intensity less than 7/10 on the Visual Analog Scale (VAS), the ability to understand the procedure, and willingness to participate were included<sup>15</sup>.

### Exclusion Criteria

Patients with cardiorespiratory involvement, neurological conditions, other musculoskeletal disorders, or those using walking aids were excluded from the study<sup>16</sup>.

### Statistical Analysis

Data were assessed for normality using the Shapiro–Wilk and Kolmogorov–Smirnov tests<sup>17</sup>. Since most variables did not follow a normal distribution, non-parametric analysis was performed. Spearman's correlation test was used to evaluate the relationship between pain intensity and active squat depth. A p-value of less than 0.05 was considered statistically significant.

## III. RESULTS

The analysis demonstrated a statistically significant correlation between pain intensity and active squat depth ( $p < 0.05$ ), indicating that higher pain levels were associated with reduced squat depth. Similar associations between pain severity and functional performance have been reported in previous studies<sup>18,19</sup>.

## IV. CONCLUSION

The findings of this study indicate that pain has a significant negative impact on active squat depth in individuals with bilateral knee osteoarthritis. Increased pain limits functional performance during squatting, an essential activity of daily living in the Indian population. Effective pain management and targeted rehabilitation strategies focusing on pain reduction may help improve functional mobility and overall quality of life in patients with knee osteoarthritis<sup>20</sup>.

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