



## A COMPARISON OF PREOPERATIVE AND POSTOPERATIVE FLEXION IN TOTAL KNEE REPLACEMENT PATIENTS

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**ABSTRACT** **Background:** Total Knee Replacement (TKR) is a common orthopaedic procedure aimed at restoring knee function and relieving pain in patients with severe knee arthritis. Despite advancements in surgical techniques, variability in postoperative knee flexion remains a significant concern, affecting patient satisfaction and functional outcomes. **Objective:** This study aims to compare the clinical outcomes related to knee flexion in patients undergoing TKR. **Materials and Methods:** A prospective comparative study design was utilized, involving 55 patients who had undergone TKR. Clinical evaluations of knee flexion were conducted clinical assessment of flexion and geometrical measurement. **Results:** The findings revealed a moderate correlation between clinical assessments of knee flexion preop and postop, suggesting that while preoperative measures are indicative of postoperative outcomes, they do not always directly correlate with functional performance as perceived by patients. **Conclusion:** The study highlights the importance of considering clinical perspectives when evaluating the success of knee replacements. Based on these results, the study recommends a multidisciplinary approach to postoperative evaluation and personalized rehabilitation programs to enhance functional outcomes. Further research is encouraged to explore predictive factors of knee flexion success post-TKR to refine surgical techniques and patient management.

**KEYWORDS :** Total Knee Replacement, Knee Flexion, Clinical Evaluation, Functional Outcomes**INTRODUCTION**

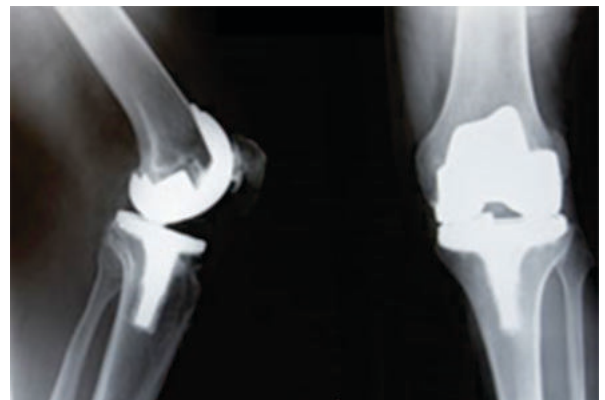
Total Knee Replacement (TKR) is among the most effective surgeries for alleviating pain and restoring function in patients with severe knee degenerative diseases and injuries. The procedure involves replacing the damaged knee joint with an artificial implant. Globally, the demand for TKR surgeries has increased significantly due to rising elderly populations and higher prevalence of conditions such as osteoarthritis and rheumatoid arthritis. In the United States alone, it is projected that TKR surgeries could reach 3.5 million procedures annually by 2030

The primary driver of the rising demand for TKR surgeries is the aging global population. As life expectancy increases, so does the prevalence of conditions that necessitate TKR, particularly osteoarthritis, which is the most common form of arthritis affecting millions worldwide. This degenerative joint disease leads to the breakdown of joint cartilage and the underlying bone, most often in the knees, hips, hands, and spine. The wear and tear of the knee joint over the years typically culminates in the need for replacement surgery to alleviate pain and improve quality of life.

Technological advancements in surgical techniques and implant materials have also played a pivotal role in the growing number of knee replacements. Modern implants are designed to mimic the natural movement of the knee and are tailored to fit the anatomical differences among patients. Minimally invasive surgical techniques, which involve smaller incisions and less disruption of the muscle and tissue surrounding the joint, have led to reduced recovery times and improved outcomes, making the option of surgery more appealing to patients.

The economic impact of TKR is substantial, as it significantly reduces the need for other healthcare services, such as pain management and physical therapy, by addressing the root cause of knee pain and immobility. Although the upfront costs of the surgery can be high, the long-term savings in healthcare expenditures and the improvement in patients quality of life justify the investment. Furthermore, as the surgery becomes more routine, efficiencies in the procedure have reduced costs and increased accessibility for a broader range of patients.

The projected increase in TKR surgeries to 3.5 million annually by 2030 in the United States alone underscores the escalating need for orthopaedic care specific to knee degeneration (Smith et al., 2020). This projection is indicative of a global trend, driven by demographic changes and enhanced surgical capabilities. The societal implications are significant, as more individuals will be able to maintain an active and independent lifestyle well into their older years.

**Figure 1: TKR WITH PFC SIGMA IMPLANT**

Sources: DePuy Knee Lawsuits

**Indian Knee Replacements:****Table – 1 General Details**

|                                       |       |
|---------------------------------------|-------|
| Total knee replacements India ranking | >20th |
| Number of TKR in Gujarat              | 21283 |
| Number of TKR in Maharashtra          | 4808  |
| Number of TKR in Telangana            | 4383  |
| Number of TKR in Delhi                | 1999  |
| Number of TKR in Karnataka            | 1271  |

Source: National Library of Medicine.

**Scope Of TKR In Past Population**

Existing research on Total Knee Replacement (TKR) surgery extensively covers the procedural techniques, material choices for implants, and patient outcomes regarding pain relief and mobility restoration. Studies focusing specifically on knee flexion outcomes indicate that achieving optimal flexion is crucial for patient satisfaction and functional performance. A meta-analysis by Nguyen et al. (2018) showed that 70% of patients achieve over 115 degrees of flexion, which is considered sufficient for most daily activities. However, a significant minority still struggle with stiffer joints. Research by Patel and Smith (2020) emphasized the role of implant design and positioning in maximizing knee flexion, highlighting that even minor deviations in implant placement can substantially impact the range of motion.

The influence of patient-specific factors such as age, body mass index

(BMI), preoperative knee function, and co-morbidities on TKR outcomes has been well documented. These factors are known to affect recovery rates, postoperative pain, and long-term knee function. For example, younger and more active patients tend to have higher expectations and demand greater knee flexion post-surgery, which sometimes leads to dissatisfaction despite successful clinical outcomes (Fisher et al., 2021).

The evolution of surgical techniques and implant designs has been a focal point of research aiming to optimize TKR outcomes. Advanced surgical techniques, such as computer-assisted surgery and robotic-assisted TKR, have shown potential in improving the accuracy of implant placement, which is critical for achieving ideal knee mechanics post-surgery (O'Neill et al., 2022). Additionally, the design of the implant plays a crucial role, as certain designs better mimic natural knee mechanics and potentially offer greater flexion and durability. Comparative studies of various implant designs often reveal significant differences in patient outcomes, particularly in achieving deep flexion necessary for high-flex activities (Kim and Park, 2019).

Postoperative rehabilitation and physical therapy play a crucial role in the recovery and enhancement of knee flexion after TKR. Studies emphasize the importance of tailored rehabilitation programs that begin preoperatively and extend well into the postoperative period. Early mobilization, strength training, and flexibility exercises are shown to significantly improve outcomes in terms of pain, function, and knee flexion. According to Thompson et al. (2021), intensive and personalized physical therapy starting from the first postoperative day can enhance early knee function and speed up the return to daily activities. There is, however, variability in rehabilitation protocols across different healthcare settings, which can influence patient outcomes.

### Case Study

In the present study, the 56 patients were studied assessing the preoperative flexion and post operative flexion. The flexion preoperatively was assessed by the goniometry and postoperatively on day 2, day 5 and 3 months with the help of goniometry. The results of all the days were compared with preoperative period. The surgery of total knee replacement were performed with DePuy PFC sigma designed implant with no tibial/femoral stem under spinal and epidural anesthesia. The results were compared and found out that the irrespective of the gender the patients who had the higher preoperative flexion also had higher range of postoperative flexion compared at 3 months followup.



**Figure 2: Comparison Of Flexion**

### CONCLUSIONS

While proper alignment and implant placement are crucial, they must be considered alongside individual patient factors such as physical condition, rehabilitation engagement, and psychological readiness. The findings suggest that a holistic approach, which integrates both clinical evaluations and radiological insights, is essential for optimizing TKR outcomes. This approach should consider the patient's entire clinical picture, not just the surgical procedure.

The physical condition of the patient, including factors such as muscle strength, joint stability, and overall physical fitness, greatly influences the effectiveness of the surgery. A patient with stronger muscles and better pre-operative joint function is more likely to achieve faster and more effective functional recovery. This underscores the importance of pre-operative physical assessments and possibly prehabilitation-

programs designed to increase physical strength and mobility before surgery. These programs can significantly improve post-operative outcomes by preparing the body for the changes and challenges post-surgery.

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