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Original Research Article

# Functional Outcome and Residual Knee Pain Following Total Knee Arthroplasty: A Retrospective Observational Study

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**Abstract:**

**Background:** Total knee arthroplasty (TKA) has been a well-established surgical intervention for the treatment of advanced knee OA, and it offers a great level of pain relief and functional improvement. However, there is a subset of patients who still suffers with knee pain after a successful surgical procedure, which may have a negative impact on patient satisfaction and recovery.

**Aim:** To assess the functional result and the amount of knee pain after total knee arthroplasty and to determine if there are clinical risk factors for persistent postoperative knee pain.

**Methodology:** Data was obtained from the Department of Orthopedics, Darbhanga Medical College Hospital (DMCH), Bihar, India in a retrospective observational study methodology. A total of 98 patients were included who underwent primary unilateral or bilateral TKA and had a minimum follow-up of one year. Clinical, operative, radiographic, and follow-up information were obtained from the hospital records, and demographic information was obtained from the patient's records. Evaluation of functional outcomes was conducted using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and Knee Society Score (KSS); the KSS pain subscale was used to assess residual knee pain. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 26.0.

**Results:** All post-operative functional outcome measures were significantly improved in comparison to pre-operative measures. Above 50% of the patients had no pain left in the knee one-year after surgery and only a few patients had moderate-to-severe persistent pain. An ideal alignment of the implant, knee stability, satisfactory range of motion and the absence of postoperative complications were noted. Older age, obesity and diabetes mellitus were associated with a trend of increased residual knee pain but not significantly.

**Conclusion:** It is concluded that TKR is a safe and effective treatment option for advanced knee OA which produces excellent functional results, and there is a significant decrease in residual knee pain. The selection of patients standardized surgical techniques and structured rehabilitation continue to play a crucial role in optimizing postoperative results and patient satisfaction.

**Keywords:** Total knee arthroplasty, Knee osteoarthritis, Functional outcome, Residual knee pain, WOMAC, Knee Society Score, Retrospective observational study.

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## Introduction

TKA is one of the most successful orthopedic procedures for the treatment of advanced knee OA and offers significant pain relief, correction of deformity, restoration of joint function and improved health-related quality of life. Osteoarthritis of the knee is a progressive degenerative joint disease that involves cartilage degradation, subchondral bone remodeling, osteophyte formation and chronic synovial inflammation which lead to pain, stiffness, deformity and marked functional limitation. Knee osteoarthritis is one of the most important causes of disability in the world and this condition has been a growing problem due to increased life expectancy, obesity, sedentary lifestyle, and older population. Elderly people, women and overweight patients are at a high risk of developing knee OA in India, and

the prevalence is gradually rising, resulting in significant physical disability and socioeconomic burden. Analgesic, physiotherapy, intra-articular injection and lifestyle modification might be sufficient to achieve relief of symptoms for brief periods, but for patients with end stage disease, surgical treatment may be necessary and TKA is the recommended surgical option for restoring mobility and function in everyday life [1-3].

Improvements in implant design, surgical technique, peri-operative anesthesia, infection control, rehabilitation and enhanced recovery programmes have led to a considerable improvement in outcomes following TKA in the last 30 years. Recent reports have consistently noted patient satisfaction scores between 85% and more than 90%, and a significant amount of patients reported a decrease in pain and a significant improvement in walking ability, climbing stairs and activities of daily living after surgery. It has resulted in a sharp rise in the number of annual primary TKAs in both the developed and developing world. Although there have been these promising results, there are still a large number of patients who experience persistent postoperative symptoms that impact their functional recovery and satisfaction [4-6].

Postoperative knee pain that persists after TKAs has become a major postoperative problem in orthopedic surgery. The 15-year survival rate for prostheses is greater than 90%, but the survival of a prosthesis does not necessarily indicate optimal patient-reported outcomes. Of those patients who have technically successful surgery, 15-30% will still have some knee pain that persists or remains after surgery. Residual pain can either be a mild discomfort while performing tasks or a chronic, debilitating pain that makes it difficult to function and can affect a person's quality of life. Persistent pain is also one of the most powerful predictors of patient dissatisfaction after TKA and can affect pre-operative expectations of surgery and future willingness to have the same procedure. Thus, postoperative pain should be evaluated together with radiographical and implant evaluation to assess the success of surgery [7,8].

There are many factors involved and it is often hard to determine the underlying cause of residual pain after a TKA. There are mechanical causes for postoperative pain including implant malalignment, loosening of the components, instability, patellofemoral disorders, polyethylene wear and periprosthetic infection. Many patients still suffer pain after achieving good radiographs and proper implant placement, however. For such cases, age, gender, obesity, diabetes mellitus, cardiovascular diseases, psychological stress, intensity of pain before surgery, and muscle weakness have been suggested as potential factors. However, the value of these predictive factors is inconsistent across various populations and health care contexts, and thus requires additional research [9,10].

The period of functional recovery after TKA is not just about managing pain, it is about getting healthy, walking, being able to take care of oneself, and regaining range of motion in the knee. The Knee Society Score (KSS), Oxford Knee Score (OKS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and Visual Analogue Scale (VAS) are commonly used clinical assessment tools to objectively assess postoperative outcomes. A functional outcome measure offers important data on the success or failure of surgery, patient rehabilitation and lifelong recovery. Persistent pain can have a negative impact on physical performance, patient confidence and rehabilitation compliance, making a comprehensive assessment of functional outcome and residual knee pain more useful following TKA [11].

The aim of several international studies is to identify the demographic and the clinical factors associated with the persistence of knee pain, such as age, sex, BMI, diabetes mellitus, cardiovascular comorbidities, and the preoperative functional status. Some studies have found strong relationships, but others have found weak ones, indicating the predictors may depend on patient factors, ethnicity, health care, surgical procedures and rehab protocols. Persistent postoperative pain was also shown to be a significant factor in patient dissatisfaction after total knee arthroplasty. Scott et al. also showed that dissatisfaction with pain after TKA was a significant factor in determining patient satisfaction with their TKA [12]. Moreover, information on the Indian population is limited, especially from the government tertiary care teaching hospitals, where patients' demographics and disease severity may differ from what is reported in western literature. Therefore, it is necessary to have local evidence to understand factors that affect postoperative outcomes, and to formulate ways to enhance satisfaction levels and functional recovery of patients.

These gaps in knowledge led the present retrospective observational study in the Department of Orthopedic, Darbhanga Medical College Hospital (DMCH), Laheriasarai, Darbhanga, Bihar, India to assess the functional outcome and residual knee pain after total knee arthroplasty (TKA). Another goal of this study is to determine the course of postoperative pain and the demographic and clinical characteristics that are associated with the occurrence of postoperative knee pain in patients undergoing TKA. The results will help to better counsel patients, manage them perioperatively, optimize their rehabilitation and improve their long-term functional outcomes after TKA.

## Methodology

**Study Design:** The purpose of this study was to be a hospital-based retrospective observational study to assess the functional outcome and knee pain after TKA. The study was retrospective analysis of hospital records of patients who had undergone a primary TKA. Medical records were reviewed and clinical, radiological and follow-up data were extracted to evaluate how well patients recovered clinically after surgery and whether there was residual knee pain.

**Study Area:** The study was carried out in the department of Orthopedics, Darbhanga Medical College Hospital (DMCH), Laheriasarai, Darbhanga, Bihar, India.

**Study Duration:** This study was carried out for one year from January 2025 to December 2025.

**Sample Size:** The total number of patients who met the selection criteria (N = 98) were included. Unilateral and bilateral primary total knee arthroplasty (THA) procedures for degenerative knee disease were all included.

**Sample Population:** This study included adult patients with primary knee osteoarthritis who had undergone primary total knee arthroplasty at the Department of Orthopedics, DMCH. Demographic data, surgical history, x-rays and follow-up information were available for patients having complete information. Data collected from the medical records comprised age, gender, body mass index (BMI), unilateral or bilateral surgery, comorbidities (such as hypertension and diabetes mellitus), type of implant, management of the patellar bone, clinical findings after surgery, radiographic evaluation, and functional assessment scores.

**Data Collection:** A structured data collection form was used for data retrieval from hospital records, operative registers, inpatient and out-patient records and radiological archives. Demographic variables were age, sex, height, weight, and Body Mass Index (BMI) based on the WHO recommendations for Asian population. Clinical information included the indication for surgery, comorbidities, implant design and patellar management. Preoperative, immediate postoperative and follow-up anteroposterior, lateral and skyline radiographs were evaluated. Residual knee pain and functional recovery was evaluated at follow-up at about 6 weeks, 3 months, 6 months, and 12 months. The amount of residual knee pain was determined by the Knee Society Score (KSS) pain subscale. Functional outcome was measured using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and Knee Society Score (KSS), which includes the following measures: pain, stiffness, physical function, knee stability, range of motion, walking ability and stair climbing. The procedures were conducted by well-trained orthopedic surgeons using a standard surgical approach and institutional rehabilitation program.

**Inclusion Criteria**

Patients were included in the study if they fulfilled the following criteria:

- Patients aged 40 years and above.
- Patients are diagnosed with primary osteoarthritis of the knee.
- Patients who underwent primary unilateral or bilateral total knee arthroplasty.
- Patients with complete preoperative, operative, postoperative, radiographic, and follow-up records.
- Patients who completed at least 12 months of postoperative follow-up.

**Exclusion Criteria**

The following patients were excluded from the study:

- Patients who underwent revision total knee arthroplasty.
- Patients with inflammatory arthritis such as rheumatoid arthritis or other inflammatory arthropathies.
- Patients with previous patellar fractures, patellectomy, or patellofemoral instability.
- Patients with pathological fractures around the knee.
- Patients with active or previous septic arthritis or osteomyelitis involving the knee.
- Patients with incomplete medical records or inadequate follow-up.
- Patients lost to follow-up before completion of the required postoperative assessment period.

**Procedure:** Retrospective analysis of the medical records of patients who received primary total knee arthroplasty (PTSA) in the study period was performed from the departmental database. Demographic, clinical, operative, implant, and patellar management parameters were documented. X-rays were taken both before and after surgery, and follow-up x-rays obtained, to assess for postoperative complications, knee pain, or functional recovery. Residual knee pain was measured by the Knee Society Score (KSS) pain grading system and functional outcomes were measured by the WOMAC and KSS. A standardized data collection form was used to extract all data, to achieve uniformity.

**Statistical Analysis:** Data were inputted into spreadsheet software (Microsoft Excel) and analyzed with the help of Statistical Package for the Social Sciences (SPSS) version 26.0 (IBM Corp., Armonk, NY, USA). Frequency and percentages were used to present categorical variables and mean ± SD or median with interquartile range (IQR) were used for continuous variables as appropriate.

Chi-square test or Fisher's exact test was used to compare categorical variables as appropriate. For comparing differences between continuous variables, the independent Student's T-test or Mann-Whitney U test was used depending on distribution of data. Pearson's or Spearman's correlation coefficient was used to assess the correlation between functional scores and residual knee pain (if data were normal or not, respectively). Univariate analysis variables with significant association were included in a multivariable logistic regression analysis to determine independent predictors of persistent knee pain after TKA. Throughout the study, a p-value less than 0.05 (two-tailed) was defined as statistically significant".

## Result

Table 1 shows the demographic and clinical baseline data for a total of 98 patients. The mean age of the study population was 64.1 ± 8.3 years, with the highest proportion of patients belonging to the 60–69 years age group (39.8%), followed by those aged 50–59 years (24.5%), ≥70 years (23.5%), and 40–49 years (12.2%). The majority of the patients (65.3%) were female while 34.7 % were male. In terms of body mass index (BMI), the mean BMI was 27.4 ± 3.8 kg/m². Excess body weight was present in over half of the patients (52.0%) were classified as obese, 29.6% were overweight and 18.4% had a normal BMI, suggesting that excess body weight was common in patients undergoing total knee arthroplasty.

**Table 1: Baseline Demographic and Clinical Characteristics of the Study Population (N=98)**

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| **Age Group (years)** | | |
| 40–49 | 12 | 12.2 |
| 50–59 | 24 | 24.5 |
| 60–69 | 39 | 39.8 |
| ≥70 | 23 | 23.5 |
| **Mean Age (years)** | **64.1 ± 8.3** | |
| **Gender** | | |
| Male | 34 | 34.7 |
| Female | 64 | 65.3 |
| **BMI Category (kg/m²)** | | |
| Normal (18.5–22.9) | 18 | 18.4 |
| Overweight (23.0–24.9) | 29 | 29.6 |
| Obese (≥25) | 51 | 52 |
| **Mean BMI (kg/m²)** | **27.4 ± 3.8** | |

Comorbidities and operative characteristics of the study population are summarized in table 2. Hypertension was the most common comorbidity with 46.9%, diabetes mellitus 32.7%, and hypertension and diabetes 24.5% of patients. No documented comorbidities were documented in about one-fifth (20.4%) of the patients. In terms of surgery, 72.4% of patients had unilateral TKR and 27.6% had bilateral TKR. More posterior stabilized implants (62.2%) were used than cruciate retaining implants (37.8%). In 41.8% of patients, patellar resurfacing was performed and in 58.2% of patients, patellar resurfacing was not performed.

**Table 2: Comorbidities and Operative Characteristics (N=98)**

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| **Comorbidities** | | |
| Hypertension | 46 | 46.9 |
| Diabetes Mellitus | 32 | 32.7 |
| Both Hypertension and Diabetes | 24 | 24.5 |
| No Comorbidity | 20 | 20.4 |
| **Laterality** | | |
| Unilateral TKA | 71 | 72.4 |
| Bilateral TKA | 27 | 27.6 |
| **Implant Type** | | |
| Cruciate Retaining | 37 | 37.8 |
| Posterior Stabilized | 61 | 62.2 |
| **Patellar Management** | | |
| Patellar Resurfacing | 41 | 41.8 |
| No Resurfacing | 57 | 58.2 |

Table 3 shows the difference in functional outcomes scores between the groups of patients before and 12 months after total knee arthroplasty. There was marked improvement in all the functional assessment parameters after surgery. Pre- and 12-months postoperative mean WOMAC pain scores were 16.8 ± 2.9 and 4.2 ± 2.1 respectively. In the same way, the WOMAC stiffness score went from 6.8 ± 1.6 to 2.1 ± 1.0 and the WOMAC physical function score decreased significantly from 55.4 ± 9.7 to 17.3 ± 7.4. Overall, the total score on the WOMAC was significantly lower after surgery (23.6 ± 8.5) as compared to before surgery (79.0 ± 11.8). Functional recovery also showed significant improvement with mean Knee Score improving from 42.6 ± 11.3 to 86.8 ± 8.4, and the mean Functional Score improving from 39.5 ± 10.9 to 82.5 ± 10.2. The results of all the improvements were statistically significant ($p < 0.001$) and demonstrated good functional recovery after THA.

**Table 3: Functional Outcome Scores Before and After Total Knee Arthroplasty**

| Functional Score | Preoperative Mean ± SD | 12-Month Mean ± SD | p-value |
|---|---|---|---|
| WOMAC Pain | 16.8 ± 2.9 | 4.2 ± 2.1 | <0.001 |
| WOMAC Stiffness | 6.8 ± 1.6 | 2.1 ± 1.0 | <0.001 |
| WOMAC Physical Function | 55.4 ± 9.7 | 17.3 ± 7.4 | <0.001 |
| WOMAC Total Score | 79.0 ± 11.8 | 23.6 ± 8.5 | <0.001 |
| Knee Society Score (Knee Score) | 42.6 ± 11.3 | 86.8 ± 8.4 | <0.001 |
| Knee Society Functional Score | 39.5 ± 10.9 | 82.5 ± 10.2 | <0.001 |

Table 4 shows the proportion of patients who had residual knee pain at the 12-month postoperative follow-up according to the Knee Society Score subscale for pain. Most patients (57.1%) had no pain in the knee at all, and 28.6% patients had mild pain in the knee. The patients who experienced moderate residual pain were 11.2% and 3.1% had severe knee pain. Results overall suggest that, for the majority of patients, TKA surgery provided adequate pain relief, and a small percentage of patients had moderate to severe pain after surgery.

**Table 4: Residual Knee Pain at 12-Month Follow-up According to KSS Pain Subscale**

| Residual Pain Category | Frequency (n) | Percentage (%) |
|---|---|---|
| No Pain | 56 | 57.1 |
| Mild Pain | 28 | 28.6 |
| Moderate Pain | 11 | 11.2 |
| Severe Pain | 3 | 3.1 |

The postoperative radiographic and clinical results after TKR are summarized in Table 5. The radiographic assessment revealed that the implant alignment was normal in 93.9% of patients and slight malalignment in 6.1%. Knee ROM assessment revealed 71.4% patients had a range of motion greater than 110°, 22.4% patients had range of motion between 90° and 110° and 6.1% patients had less than 90° knee ROM. The rest of the patients had stable knees at examination, with mild instability in only 4.1%. The results suggest good radiological positioning of implants and good knee function in most patients after surgery.

**Table 5: Radiographic and Clinical Outcome Following Total Knee Arthroplasty**

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| Normal Implant Alignment | 92 | 93.9 |
| Mild Malalignment | 6 | 6.1 |
| Good Range of Motion (>110°) | 70 | 71.4 |
| Moderate ROM (90°–110°) | 22 | 22.4 |
| Poor ROM (<90°) | 6 | 6.1 |
| Stable Knee | 94 | 95.9 |
| Mild Instability | 4 | 4.1 |

Table 6 compares the association of selected clinical variables with presence of residual knee pain among the participants in this study. The proportion of moderate to severe residual knee pain was relatively higher with patients aged 70 years or older, BMI ≥25 kg/m², and those with diabetes mellitus than with patients who did not have these characteristics. Contrary to this, female gender, hypertension, and patellar resurfacing did not have a meaningful correlation with the severity of residual knee pain. Older age, obesity and diabetes seemed to be risk factors for persistent postoperative pain, but these should be viewed with the context of the statistical analysis provided in the study.

| Table 6: Association Between Residual Knee Pain and Selected Clinical Variables | | | |
|---|---|---|---|
| **Variable** | **No/Mild Pain (n=84)** | **Moderate/Severe Pain (n=14)** | **p-value** |
| Age ≥70 years | 17 | 6 | 0.08 |
| Female | 53 | 11 | 0.72 |
| BMI ≥25 kg/m² | 41 | 10 | 0.07 |
| Diabetes Mellitus | 24 | 8 | 0.06 |
| Hypertension | 38 | 8 | 0.41 |
| Patellar Resurfacing | 37 | 4 | 0.52 |

The postoperative complications seen during the follow-up period following total knee arthroplasty are summarized in Table 7. Most of the patients (83.7%) did not have any postoperative complications. Knee stiffness, superficial surgical site infection and persistent swelling were the most frequently reported complications (5.1%, 4.1% and 3.1%, respectively). Deep vein thrombosis (DVT) was present in 2.0% of patients, with aseptic loosening and periprosthetic fracture seen in only 1.0% of each. Overall, the incidence of postoperative complications was low, and this indicates that total knee arthroplasty had a favorable short-term clinical outcome and acceptable safety profile in this patient population.

| Table 7: Postoperative Complications Observed During Follow-up (N=98) | | |
|---|---|---|
| **Complication** | **Frequency (n)** | **Percentage (%)** |
| None | 82 | 83.7 |
| Superficial Surgical Site Infection | 4 | 4.1 |
| Deep Vein Thrombosis | 2 | 2 |
| Knee Stiffness | 5 | 5.1 |
| Persistent Swelling | 3 | 3.1 |
| Aseptic Loosening | 1 | 1 |
| Periprosthetic Fracture | 1 | 1 |

## Discussion

In 98 patients, the functional outcome and knee pain after total knee arthroplasty (TKA) was assessed in a retrospective, observational study. The demographic profile showed that the patients were of mean age 64.1 ± 8.3 years with the majority of patients in the age group 60-69 years (39.8%). The majority of the patients in the study were female (65.3%) and over half (52.0%) were obese with a mean BMI of 27.4 ± 3.8 kg/m². The results are consistent with the known epidemiology of knee osteoarthritis, where the elderly, particularly females and overweight patients, are the highest group for TKA. Lingard et al. [11] also reported similar findings with women making up around 62% of those undergoing TKA, and obesity often being linked to a more severe stage of the knee's degenerative process that required surgical correction. Similarly, Fortin et al. [13] reported a mean age of patient of about 67 year and preponderance of female patients, which is comparable with the present study".

The high prevalence of comorbidities in the current study is also representative of the clinical characteristics of patients who undergo TKA. It was found that 46.9% of the patients had hypertension, 32.7% had diabetes mellitus, and 24.5% had both of these conditions; one-fifth of patients had no documented comorbidity. In 72.4% of the patients, a unilateral TKA was performed; a posterior stabilized implant was used for 62.2% of patients, and patellar resurfacing was performed for 41.8% of patients. These results are similar to those reported by Jones et al. [14] who found that the most prevalent medical comorbidities in arthroplasty patients did not significantly affect postoperative functional outcomes and included hypertension and diabetes. Likewise, Kauppila et al. [15] found that cardiovascular disease and diabetes did not appear to be independent risk factors for poor postoperative outcome, similar to the results of the present study, which showed that these comorbidities had only a minimal effect on postoperative functional improvement.

In the current study, functional recovery after TKA was very good. The mean WOMAC total score improved markedly from 79.0 ± 11.8 preoperatively to 23.6 ± 8.5 at the 12-month follow-up, while the Knee Society Knee Score increased from 42.6 ± 11.3 to 86.8 ± 8.4 and the Functional Score improved from 39.5 ± 10.9 to 82.5 ± 10.2. The scores for WOMAC pain, stiffness, and physical function also showed significant improvement ($p < 0.001$). These results are similar to those of Ritter et al. [16] who found that the Knee Society Score improved significantly from about 45 preoperatively to more than 85 after undergoing TKA. Similarly, Nilsdotter et al. [17] showed that WOMAC Total scores decreased drastically from almost 75 preoperatively to below 30 scores at 1 year after TKA, which demonstrates the significant pain relieving and functional benefits of TKA. This extent of improvement, seen in the current study, therefore validates the known effec-

tiveness of TKA in restoring mobility and reducing disability.

One of the key factors of patient satisfaction following TKA is residual knee pain. In this study, 57.1% of patients were free of pain, 28.6% complained of mild pain, 11.2% of moderate pain, and only 3.1% of severe residual pain at 1 year. Residual pain in moderate to severe was seen in 14.3% of the patients overall. These findings are similar to those reported by Brander et al. [18] which reported that approximately 15–20% of patients experienced chronic postoperative pain following uncomplicated TKA. In the same way, Wylde et al. [19] was reported that persistent pain occurs in almost 20% of patients even after technically successful surgery, meaning that it is not always possible to obtain complete pain relief. The present study showed that the rates of clinically significant postoperative pain were lower than those reported in the base study (28.2% at 18 months), suggesting good pain control in most patients.

Highly satisfactory postoperative results were also obtained by radiographic and clinical assessment. Of all the patients, 93.9% had the implant in place and 6.1% had mild malalignment. In addition, of those patients, 71.4% had knee flexion >110° and clinical stability was demonstrated in 95.9% of patients. The results agree with Ritter et al. [16] who showed that the implant alignment and knee stability were strongly related to better functional outcome scores and implant survivability. Good postoperative ROM has also been shown as one of the most important factors influencing patient satisfaction and the rehabilitation after TKA.

The present study also examined factors that were associated with residual postoperative knee pain. The relative proportions of moderate-to-severe pain were elevated, but not statistically significant, in patients over 70 years of age, overweight (BMI ≥ 25 kg/m2), and diabetic ($p>0.05$). There was no meaningful association with persistent pain for female gender, hypertension or patellar resurfacing. The results of the present study were similar to the base study where no association was found between gender and residual knee pain, and where females had also been reported to have poorer functional scores before the surgery.

In the present study, postoperative complications were relatively rare with 83.7% of patients having no complications during follow-up. The most common complication was knee stiffness (5.1 %), with a superficial infection of the surgical site (4.1 %), persistent swelling (3.1 %), deep vein thrombosis (2 %), aseptic loosening (1 %) and periprosthetic fracture (1 %). These complication rates are similar to those previously published, and the overall incidence of major postoperative complications associated with primary TKA is typically <10%. Overall, the low complication rates and excellent functional outcomes with acceptable pain relief suggest that TKA is a safe and effective surgical option for treating advanced knee osteoarthritis when performed in the right patient, with proper surgical technique and rehabilitation.

## Conclusion

Based on the results obtained from the present retrospective observational study, it is concluded that total knee arthroplasty is an effective and reliable surgical procedure in patients with severe knee osteoarthritis that leads to significant functional improvement in the postoperative period and significant decrease in knee pain. The overall success rate of the procedure is evident, as the majority of patients achieved satisfactory functional recovery, with excellent radiographic alignment, sufficient knee stability, and an improvement in the range of motion. Only a few patients had residual pain in the knee after surgery, suggesting that surgery typically was effective at providing substantial pain relief. Advanced age, obesity and diabetes mellitus seemed to be related to a higher risk of persistent postoperative pain but showed no independent significant association. In addition, the rate of postoperative complications was low, demonstrating the safety and effectiveness of TKA when performed with the use of standard surgical protocols and with a proper postoperative rehabilitation program. The study highlights the significance of holistic perioperative care, patient selection, and systematic rehabilitation to ensure functional outcomes, reduce persistent knee pain, and enhance patient satisfaction after TKA.

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