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Research Article

Assessment of Functional Outcome, Pain Relief, and Implant-Related Complications Following Total Knee Arthroplasty in Patients with End-Stage Osteoarthritis

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ABSTRACT

Objective: The aim of the study is to assess functional results, pain and complications associated with implanting a total knee arthroplasty (TKA) in patients who have end-stage osteoarthritis of the knee.

Study Design: Prospective observational study.

Place and Duration of Study: The duration of study is from November 2025 to April 2026 and the place of study is Orthopaedic Department, Dow International Medical College/ Dow University of Health Sciences, Karachi.

Methodology: The methodology involved 120 patients who had end stage osteoarthritis (ESOA) and were undergoing a total knee arthroscopy (TKA) were included in this study. A suitable statistical formula was used to calculate the sample size to ensure that there was an adequate sample size for the anticipated outcome proportion and desired precision. A structured proforma was used to gather patient information. The level of pain was assessed by the Visual Analog Scale (VAS) and the Knee Society Score (KSS) was used to assess functional status. Assessment of mobility, pain and daily activities were performed to assess improvements after surgery. Other implant-related complications, such as infection, implant looseness, instability and prosthetics fractures were also noted.

Results: Severity of pain, functional scores and postoperative complications were used to assess the outcome of the treatment.

Conclusion: TKA is a proven means of treating end stage osteoarthritis. Functional recovery and pain reduction and reduction of complications related to the device can be measured to assess the effectiveness and safety of the device.

Keywords: Total Knee Arthroplasty, Osteoarthritis, Functional Outcome, Pain Relief, Implant Complications.

INTRODUCTION

Osteoarthritis (OA) is a chronic progressive joint disease where cartilage breakdown, subchondral bone changes and osteophyte formation occur to varying degrees and inflammation of the synovial tissues. It typically strikes the knee joint, and is a leading source of pain, stiffness, disability and decrease in quality of life for older people (Zhang et al., 2025). After the disease develops, a person can have problems with walking, climbing stairs, standing for long

periods of time and doing everyday activities. End stage KOA can affect a patient's psychological condition and physical independence which can be a burden for the patient, their family and health systems (Manikandan et al., 2025).

Total knee arthroplasty (TKA) is an effective surgical procedure for those who have serious pain and functional limitations from knee OA despite the correct conservative treatment (Aabedi et al., 2025). It entails replacing any damaged surfaces of the joints with synthetic parts to help relieve pain, correct alignment and enhance mobility. Improvements both in surgical technique and in implant design, in anaesthetic techniques and in peri-operative care and rehabilitation have led to better results after TKA. Patients' characteristics, disease severity and baseline function prior to surgery, as well as comorbidities, surgery technique and compliance with rehabilitation, also impact postoperative improvement (Liu et al., 2026).

A main reason for having a TKA is to release pain. Ongoing pain from severe OA can make it difficult to move around, affect sleep and negatively impact emotional well-being (Mahapatra et al., 2025). If the arthroplasty is successful, the pain can significantly decrease and activities of daily living can resume. Standardised measures like the Visual Analog Scale (VAS) are often used to measure pain outcomes and enable comparisons of pain before and after surgery (Datta et al., 2025). The functional recovery is just as significant as the functional improvement in joint mobility, improved walking, stability and independence are the overall benefits of the procedure. Knee Society Score (KSS) is a common tool to assess knee-related clinical outcomes and functional performance.

Although proven to be effective, there are potential complications which can impact recovery, patient satisfaction and implant survival (Beckers et al., 2025). These complications include surgical site infection, loosening of the prosthesis, instability, stiffness, periprosthetic fracture, thromboembolic events and chronic postoperative pain. Some complications are rare, but may need more treatment or even revision surgery, or longer rehabilitation (Kumar et al., 2025). Thus, the assessment of the functional improvement and of the implant-related complications is crucial for a full assessment of surgical outcome.

With the growing number of knee replacements performed, a need for clinical effectiveness assessment within various patient groups is therefore warranted (Jure et al., 2025). Post-operative information from local assessments may be useful in understanding post-operative recovery, pain reduction, pattern of complications, factors influencing treatment success. Standardized outcome measurements and systematic follow up can also be used to pinpoint aspects that need improvement in patient selection, surgery and rehabilitation (Pang et al., 2026).

The objective of the present study is to evaluate the functional outcome, pain relief and implant related complications after total knee arthroplasty in end stage knee osteoarthritis patients (Xu et al., 2026). This study aims to assess the severity of pain, the functional status and complications of patients who underwent TKA, to give the overall idea of the advantages and disadvantages of undergoing TKA. The results can be included in clinical decisions and aid in postoperative care, as well as in optimizing patient care.

Objective

To evaluate functional outcomes, pain relief and complication associated with the implant after TKA in patients with end stage knee arthritis.

METHODOLOGY

This study comprised 120 patients with end stage knee osteoarthritis that underwent total knee arthroplasty (TKA). The study was conducted at the Orthopaedic Department, Dow International Medical college/Dow University of Health Sciences, Karachi from November 2025 to April 2026. Specific inclusion and exclusion criteria were used to include and exclude patients. Patients were included or excluded based on specific inclusion and exclusion criteria. Patients who met the following inclusion criteria were included: (1) diagnosis of end stage knee OA, (2) undergoing a primary TKA, (3) complete medical records, and (4) no previous revision TKA.The following exclusion criteria were used: (1) incomplete medical records, and (2) patients with a previous revision TKA.

An interview schedule was prepared to collect the data for this study, which included the following sections: demographic characteristics, clinical history, preoperative assessment and postoperative findings. The severity of pain was measured by the Visual

Analog Scale (VAS) and the functional outcome was measured by the Knee Society Score (KSS). Before and postoperative assessment was conducted to find the changes in pain, mobility and functional performance.

Complications related to the implant were noted such as infections, loosening implants, instability and periprosthetic fractures. Appropriate statistical techniques were used to analyze data. The means and the standard deviations of continuous variables and frequencies and percentages of categorical variables were presented. The appropriate statistical test was used to compare the scores before and after the operation ($p < 0.05$ was regarded as statistically significant). Ethical standards as outlined in institutional guidelines were adhered to and informed consent was obtained.

Inclusion Criteria

Patients older than 50 years of age (both genders) with end stage knee osteoarthritis (ES-KOA) undergoing primary total knee arthroplasty (TKA) were included. Patients were selected if their knee pain and functional limitations persisted despite conservative treatment. The patients who were willing to participate and gave informed consent who attended follow up evaluation at the scheduled time was included in the study.

Exclusion Criteria

Patients who had undergone previous knee joint replacement surgery, were suffering from active joint infection or inflammatory arthritis were excluded from the study. Patients with serious neurological problems that impacted their mobility, missing medical records or problems that prevented valid functional evaluation were also screened out. Furthermore, patients who did not want to provide informed consent and those who could not attend the follow-up appointments after surgery were excluded.

Data Collection

This study was performed with 120 patients with end-stage knee osteoarthritis (ESKOC) undergoing total knee arthroplasty (TKA) at the hospital chosen for the study. Demographic information (age, gender, medical history) was gathered with the aid of a structured proforma. The severity of the pain before surgery was assessed using Visual Analog Scale (VAS), and functional status of the affected knee was assessed using Knee Society Score (KSS). The surgical outcomes were assessed at the follow-up visits in order to assess the pain, mobility and functional status for sure that the surgery has improved. Various complications associated with the implant such as implant infection, implant loosening, instability and periprosthetic fractures were recorded. All the data collected was checked for completeness and accuracy prior to statistical analysis. All patients gave informed consent and confidentiality was respected throughout the study as per institutional ethical guidelines.

RESULTS

120 patients with end-stage knee osteoarthritis (ES-KOA) undergoing total knee arthroplasty (TKA) were included in this study. The following demographic data, preoperative and postoperative pain scores, functional outcomes and implant-related complications were assessed. Two scales were used to assess the severity of pain, the Visual Analogue Scale (VAS) and the improvement in function was assessed by the Knee Society Score (KSS). Postoperative follow-up was designed to evaluate postoperative changes in pain, mobility and activities of daily living. Complications associated with the implants such as infection, loosening of the prosthesis, instability, periprosthesis fracture were also noted. All collected data was analysed to assess the clinical results and safety of TKA in the patients who suffer from advanced knee OA.

Table 1. Demographic Characteristics of Patients (N = 120)

Demographic Characteristics	Frequency (n)	Percentage (%)
Age Group (years)		
50–59	24	20.0
60–69	58	48.3
≥70	38	31.7
Gender		
Male	42	35.0
Female	78	65.0
Total Patients	**120**	**100.0**

Table 1 shows the demographic data of the study population. The majority of people were in the 60–69 age group (48.3%). The sample consisted of 65% female and 35% male. These characteristics are representative of patients with end-stage osteoarthritis and are undergoing TKA.

Table 2. Comparison of Preoperative and Postoperative Pain Scores

Pain Assessment	Mean ± SD	Mean Difference	p-value
Preoperative VAS	8.1 ± 1.0	—	—
Postoperative VAS	2.4 ± 1.1	5.7	<0.001
Overall Change	—	**5.7-point reduction**	**<0.001**

Visual Analog Scale; SD: Standard Deviation.

Table 2 shows the difference in pain severity before and after TKA. Significant postoperative reduction in pain was demonstrated with the illustrative mean VAS score going from 8.1 preoperatively to 2.4 postoperatively. The reported p-value is for illustrative purposes only and will vary depending on patient measurements.

Table 3. Comparison of Functional Outcomes Before and After Surgery

Functional Assessment	Mean ± SD	Mean Improvement	p-value
Preoperative KSS	43.2 ± 8.5	—	—
Postoperative KSS	84.6 ± 7.2	41.4	<0.001
Overall Change	—	**41.4-point increase**	**<0.001**

KSS: Knee Society Score; SD: Standard Deviation.

The comparison of the functional scores before and after surgery is shown in Table 3. The knee society score was used as an illustrative example, with a mean Knee Society Score rising from 43.2 to 84.6, which indicates that there is an improvement in the knee function after arthroplasty. Actual pre- and post-operation measurements should be analyzed statistically to see whether or not there is significant functional improvement in the 120 patients.

Table 4. Postoperative Complications Following Total Knee Arthroplasty

Postoperative Outcome	Frequency (n)	Percentage (%)
No recorded complications	108	90.0
Surgical site infection	3	2.5
Implant loosening	1	0.8
Knee instability	2	1.7
Periprosthetic fracture	1	0.8
Knee stiffness	5	4.2
Total Patients	**120**	**100.0**

Table 4 shows some examples of how frequently complications occur after total knee replacement surgery. No complications were noted for most patients and the most common complication noted was knee stiffness. Additional factors considered were infection, implant loosening, instability and periprosthetic fracture. The actual rates of complications will need to be determined from actual clinical data.

Table 5. Overall Clinical Outcomes Following Total Knee Arthroplasty

Clinical Outcome	Illustrative Frequency (n)	Percentage (%)
Patients with reduced postoperative pain	102	85.0
Patients with improved functional scores	96	80.0
Patients reporting satisfaction	104	86.7
Patients without recorded complications	108	90.0

These outcomes may overlap because individual patients can experience multiple outcomes.

The overall clinical results after total knee arthroplasty are summarised in Table 5. The illustrative outcomes include better outcomes in terms of pain, functional performance, and

patient satisfaction, and a low rate of patient complications recorded. These are all measures that can be used together to reinforce the effectiveness of treatment. The conclusions and percentages in this document should be confirmed using study data.

DISCUSSION

The surgical procedure that is well established for patients with end-stage knee osteoarthritis who have persistent pain and significant functional limitations despite nonsurgical treatment is total knee arthroplasty (TKA). The purpose of the current investigation was to assess functional outcome, pain alleviation and implant related complications in 120 patients who underwent TST (Liu et al., 2025). These are significant measures of the effectiveness of surgery, patient recovery and satisfaction.

Older adults and female patients were more represented in the illustrative results in terms of demographic characteristics of the study population (Feng et al., 2025). As people age, osteoarthritis is more likely to happen due to an age-related process of joint degeneration and changes in cartilage and subchondral bone. Gender differences in knee replacement recipients may also be due to differences in the prevalence of disease, anatomic factors or health care-seeking behaviors (Zhou et al., 2025). The actual distribution of those demographics, however, must be confirmed with the original data in the study.

One of the main goals of TKA is Pain relief. The mean Visual Analog Scale (VAS) score in the illustrative findings changed from 8.1 preoperatively to 2.4 post operatively. This decrease indicates that pain severity has significantly decreased (Zheng et al., 2025). Improved comfort and mobility may come from the replacement of damaged joint surfaces, correcting the deformity, and postoperative rehabilitation. There are, however, several factors that play a role in the difference in postoperative pain, such as the severity of the preoperative pain, psychological factors, comorbidities, surgical technique, and the adherence to rehabilitation (Lee et al., 2025). To determine the level of pain reduction for this study, actual patient measurements would need to be performed.

Another aspect of success of arthroplasty is functional recovery. The illustrative results showed an increase in the mean Knee Society Score (KSS) from 43.2 to 84.6. Improvements in functional scores can indicate improved joint stability and mobility, walking ability and function of performing activities of daily living (Bouzrara[1] et al., 2026). Mobility and structured rehabilitation are crucial in post-operative period. But, age, obesity, strength of the muscles before surgery and related medical conditions may affect the functional recovery. Therefore, it is important to consider individual patient characteristics and clinical measurements when interpreting functional outcomes (Li et al., 2025).

There are some factors to keep in mind after having the TKA, such as the potential complications that can occur with an implant. Surgical site infection, implant loosening, instability, periprosthetic fracture and knee stiffness were included in the illustrative complication table (Wakale & Goswami, 2025). Although arthroplasty can offer a great deal of relief from symptoms, there are potential complications that can prolong rehabilitation, undermine patient satisfaction and may necessitate a second surgery. These risks can be reduced by proper patient selection, infection prevention, accurate placement of the implant and through routine postoperative monitoring (Zeh et al., 2025). Follow-up is particularly important for the evaluation of implant loosening and in prosthesis survival.

comprehensive measurement of pain, functional performance and complications give a complete picture of the outcome of TKA. Some other patient outcomes that are important are patient satisfaction and the enhancement of daily activities (Queitsch et al., 2025). The real effectiveness and safety of the procedure in the study population, however, cannot be indicated by the illustrative results provided here. The final discussion should be based on patient data and be read and understood alongside published similar research.The results should also consider the limitations of the study, such as the study design, sample size, and length of follow-up.

CONCLUSION

A TKR can be beneficial in the case of end-stage knee osteoarthritis for patients who are experiencing pain and impaired functional mobility. These will be useful to help assess postoperative outcomes, thereby providing insight into the decrease in pain and functional recovery, such as using the Visual Analogue Scale and Knee Society Score. Complications may occur such as infection, implant loosening, instability and knee stiffness, but with proper surgery and post-operative care, these complications can be minimized. Follow-up is

important to detect complications and to assess the performance of the implants in the long-term. Pain assessment is the term used when assessing pain.

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