

## The Impact of Obesity on the Outcomes of Total Knee Arthroplasty: A Retrospective Analysis

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### Abstract:

**Background:** Considering into account the effect of obesity on TKA (Total Knee Arthroplasty) results is becoming increasingly relevant due to the rising prevalence of obesity and the increasing demand for TKA treatments. The goal of this retrospective study was to determine that there was a connection between obesity and the occurrence of complications, postoperative pain, length of hospital stay, and functional outcomes following TKA.

**Methods:** Bihar Central Hospital treated 200 patients who need total knee replacement. Participants were classified as either obese (BMI 30 kg/m<sup>2</sup>) or non-obese (BMI 30 kg/m<sup>2</sup>). Hospital records were scoured for information on patient demographics, surgical procedures, and outcomes. Several statistical methods were used to investigate the correlation between obesity and TKA outcomes. These methods included descriptive statistics, chi-square tests, t-tests, analysis of variance, and regression analysis.

**Results:** Patients who carried more had a higher risk of experiencing surgical complications ( $p = 0.037$ ), more severe pain after surgery ( $p 0.001$ ), a longer recovery period ( $p = 0.012$ ), and poorer functional outcomes ( $p 0.05$ ).

**Conclusion:** This study demonstrates the large influence of obesity on TKA outcomes and emphasises the significance of adjusting strategies to address surgical complications, pain, and postoperative rehabilitation for obese patients. Preoperative counselling for TKA patients must emphasise the value of weight management in improving results. The mechanisms linking obesity and TKA outcomes need more investigation.

**Keywords:** Functional Outcomes, Obesity, Postoperative Pain, Retrospective Analysis, Surgical Complications, Total Knee Arthroplasty.

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### Introduction

#### Background

The severe growth of obesity in recent years has placed a heavy strain on healthcare systems worldwide. Obesity is a chronic condition defined by the World Health Organisation (WHO) as an excessive build-up of body fat that contributes to several adverse health outcomes [1]. The worldwide rise in obesity rates can be largely attributed to inactive lifestyles and the popularity of bad eating habits. This increase in obesity has particularly impacted musculoskeletal health and has been linked to a wide range of chronic illnesses, including metabolic abnormalities.

Osteoarthritis is one of the many musculoskeletal disorders made worse by fat. Pain, stiffness, and decreased joint function are all symptoms of osteoarthritis, a degenerative joint illness

characterised by the gradual loss of articular cartilage [2]. The knee is especially vulnerable, making this illness a primary source of disability and decreasing quality of life among people. TKA has become an essential treatment for those with severe osteoarthritis because it helps with pain, increases mobility, and boosts the quality of life. Because of its potential effects on the success of TKA, the relationship between obesity and osteoarthritis is of paramount therapeutic importance. TKA is a transformative surgical option, but it is becoming increasingly apparent that obesity may significantly impact its efficacy [3]. Despite the known effects of obesity on joint health, there is still a significant knowledge emptiness regarding the exact impact of obesity on TKA results. Clarifying this connection is essential beyond the level of the individual patient. Demand for TKA among obese people is likely to rise as the

prevalence of obesity continues to increase. Improving the success rate of TKA in this group of patients is crucial for both patient care and the efficient use of medical resources. This research seeks to fill a knowledge gap and contribute to better clinical decision-making, more effective patient counselling, and more positive outcomes following TKA for obese patients.

### Objectives

- To determine the effect of adiposity on surgical complications following TKA, including infection rates, implant issues, and wound healing issues.
- To examine the possible relationship between obesity, increased postoperative pain levels, and post-total knee arthroplasty pain management requirements.
- To determine if obesity is associated with protracted recovery times, delayed postoperative

mobility, and delayed return to daily activities following TKA.

- To determine if obesity affects functional outcomes, including range of motion, joint stability, and overall knee function, following TKA.

### Literature Review

Obesity and joint replacement results have been studied extensively, especially in the setting of TKA. A systematic analysis of the available literature illuminates the effects of obesity on many aspects of TKA outcomes.

Surgical complications, postoperative discomfort, recovery time, and functional results are just a few of the areas studied about obesity and TKA. [4,5] found that obese patients undergoing TKA were more likely to develop infections at the surgical site, which may be due to slower wound healing and greater tissue stiffness. Obese people were also observed to have a greater rate of aseptic loosening and other implant-related complications [6].



Figure 1: TKA of obese patients [7]

However, there have been places where findings are at odds with one another. [8] research suggests that being overweight is linked to experiencing more pain after surgery, other research has failed to find a statistically significant difference between obese and non-obese patients. Possible causes of these inconsistencies include differences in pain assessment techniques, patient populations studied, and pain management strategies.

Obesity's effect on the length of time it takes to recover from TKA has also been met with contradictory data. More gradual wound healing and decreased early mobility have also been linked to obesity, which is related with a longer recovery duration [9]. However, [10] found contradictory results suggesting that although obese patients may have difficulty with surgical mobility initially, their long-term recovery from function may align with non-obese patients.



**Figure 2: Total knee arthroplasty [11]**

There may be selection biases and gaps in data collection because so many studies use historical records. Direct comparisons are made more difficult because research uses different criteria for determining obesity. There is considerable heterogeneity in how TKA results are classified; some studies look just at infection rates, while others assess a broader range of functional features.

The obesity-TKA connection is complex. Therefore, further investigation into possible processes is necessary. Obesity-related metabolic and inflammatory processes may also have a role, even though extra mechanical stress is commonly identified as a contributing cause [12]. There is also a need for additional research on the relationship between obesity and comorbidities like diabetes and hypertension to disentangle their effects on TKA results. There is a clear need for more studies into the effects of obesity on TKA outcomes, as the current literature gives significant insights but is flawed by contradictory results and methodological constraints. To optimise patient outcomes and customise therapies for obese persons receiving TKA, it is crucial to have a deeper understanding of the pathways between obesity and TKA outcomes. To better comprehend this intricate connection, future studies should apply rigorous methodology, consider multifactorial impacts, and overcome the limitations of previous research.

## **Methods**

### **Study Design**

This study utilised a retrospective analysis methodology to investigate the association between obesity and TKR results. This method uses correlations to operate data from past medical records and other sources. A retrospective design is feasible and time-efficient because of the study's long-term goals and the necessity to examine many cases.

### **Participants**

TKA patients from Bihar Central Hospital in India were used for the study. Criteria were used to choose the participants.

### **Inclusion Criteria**

- Primary TKA patients with osteoarthritis.
- Preoperative body mass index records are available.
- Include all pre-, during-, and postoperative medical data in a complete medical record.

### **Exclusion Criteria**

- Individuals who have already undergone knee surgery.
- Patients who already have a preexisting joint pathology, such as inflammatory arthropathies.
- Due to a lack of or insufficient medical records.

### **Data Collection**

Electronic medical records, surgical databases, and radiological reports from Bihar Central Hospital were used to compile the necessary information for this investigation. Patients' demographics, medical history, body mass index, and knee radiographs were collected before surgery. The surgical method, implant used, and length of surgery were all documented. Medical records were also analysed for postoperative outcomes such as pain ratings, mobility evaluations, and the presence or absence of complications. Trained research assistants collected the data under close observation to guarantee its correctness and uniformity.

### **Data Analysis**

To analyse the effect of obesity on the outcomes of TKA, statistical analysis was performed using SPSS version 26. Means, standard deviations, and frequency distributions were used to summarise the

demographic and clinical features of the study participants using descriptive statistics. Appropriate statistical techniques, such as chi-square tests, t-tests, and ANOVA, were used to ascertain the connection between obesity and complications during surgery, levels of pain, recovery time, and functional results.

The multivariate regression technique accounted for potential confounding factors such as age, gender, and comorbidities. To determine the causal role of obesity in the outcomes of interest, we adjusted the odds ratios and regression coefficients. Sensitivity

analyses were performed by omitting cases with incomplete data or outliers to guarantee the reliability of the results. Respect for the patient's right to privacy and confidentiality was maintained throughout all stages of data analysis.

### Results

Two hundred people took part in the research. Key demographic variables, such as age, gender, and body mass index distribution, are summarised in Table 1.

**Table 1: Demographic Characteristic**

Demographic Characteristic	Mean ( $\pm$ SD) or Frequency (%)
Age (years)	63.2 ( $\pm$ 7.5)
Gender	
Male	90 (45.0%)
Female	110 (55.0%)
BMI (kg/m <sup>2</sup> )	29.8 ( $\pm$ 4.2)

Obese (BMI  $\geq 30$  kg/m<sup>2</sup>) and non-obese (BMI  $< 30$  kg/m<sup>2</sup>) subjects were compared to determine the effect obesity had on TKA outcomes.

Wound infections and problems with implants were the most common types of surgical complications in the obese group, which affected 15% of participants. The complication rate was 8% lower in the group that wasn't overweight. The statistical significance of this difference was determined to be  $p = 0.037$ .

Patients who were obese reported considerably more pain after surgery (mean VAS score = 6.8;  $p < 0.001$ ) compared to those who were not obese (mean VAS score = 4.9;  $p < 0.001$ ).

Obese participants had a more extended recovery period, as measured by the time it took to reach functional milestones. Regaining mobility on their own took an average of 2 weeks longer for the obese group than the non-obese group ( $p = 0.012$ ).

When participants' functional results were assessed using the Knee Injury and Osteoarthritis Outcome Score (KOOS), those who were overweight or obese had poorer scores ( $p < 0.05$ ) across the board.

SPSS version 26 was used for the statistical analysis. Demographic features and outcome variables were subjected to descriptive statistics analysis. Obesity and surgical complications were correlated using chi-square testing. The postoperative pain ratings of obese and those who were not were compared using a t-test. A t-test for independent samples was used to evaluate differences in recovery times. Multivariate analysis of variance (MANOVA) was used to examine KOOS scores, with obesity status as a between-subjects factor. These results imply that

obese patients experiencing TKA had a higher risk of surgical complications, more significant postoperative discomfort, a more extended recovery, and worse functional outcomes.

### Discussion

#### Interpretation

Our research indicates that obesity significantly impacts the success of a TKA. The collected data strongly suggests that it is of the uttermost importance to recognise obesity as a critical factor influencing the success and complications of TKA treatments.

Obese individuals are more inclined to experience difficulties following surgery, including higher levels of postoperative pain, prolonged recovery times, and decreased functional outcomes, according to our research. These findings underscore the need to integrate obesity evaluation and management measures into the TKA care paradigm.

#### Comparison with Literature

Our results are consistent with the findings of other studies that demonstrate a correlation between obesity and poor outcomes following TKA. [13, 14] discovered a similar pattern of increased complications after surgery in obese groups, validating the applicability of our findings.

It is intriguing to observe that our conclusions regarding postoperative pain differ from those reported by [15]. Variations in approach, patient composition, or treatment of pain practices may have contributed to these results.

### Mechanisms

Understanding the intricate relationship between obesity and TKA outcomes necessitates an in-depth investigation into the molecular complexities.

Due to the increased mechanical pressures imposed on the delicate knee joint, overweight individuals are at a greater risk of failing implants and slowed wound healing. In addition, the prevalent environment of persistent low-grade inflammation related to obesity may exacerbate postoperative discomfort. Obesity is associated with a multitude of metabolic disturbances, some of which can interact to influence how we experience pain and how rapidly we heal from injuries. To completely elucidate the intricate relationship between obesity and TKA outcomes, additional research is required.

### Clinical Relevance

Our findings have significant implications in various clinical settings and provide orthopaedic surgeons and patient care with critical insights. Obesity increases the risks associated with TKA procedures; therefore, surgeons must be aware of this. As a result of this knowledge, individualised plans can be developed to reduce the chance of complications, enhance pain relief methods, and abbreviate the postoperative recovery period. Preoperative counselling sessions are an excellent environment for emphasising the significance of weight management in influencing surgical outcomes and guiding patients to make decisions that are in keeping with their health goals.

### Limitations

Some drawbacks to this study must be addressed openly. While the retrospective design provides a comprehensive view of historical data, it also generates biases and makes it more challenging to identify causes and effects. Our study's (Bihar Central institution) small sample size and singular concentration on a single institution (Bihar Central institution) necessitate caution in extending our results. When using electronic medical records, however, errors or missing data are always possible. Despite these limitations, we hope that our investigations will focus on some of the many facets of the intricate relationship between obesity and TKA.

### Conclusion

This study examined, in a sample of 200 patients managed at Bihar Central Hospital, the complex relationship between obesity and TKA outcomes.

This study demonstrates that obesity significantly impacts TKA outcomes and should be considered when evaluating the advantages and disadvantages of this orthopaedic procedure.

Participants in the study who were overweight or obese were more likely to experience surgical complications, more significant discomfort after surgery, a slower recovery, and poorer functional results. These results emphasise the multifactorial (mechanical, metabolic, and inflammatory) influence of obesity on TKA treatment outcomes.

Comparing this work to previous publications revealed both similarities and distinctions. Even though our findings corroborate those of prior research indicating an increased risk of complications following surgery in obese patients, we did observe some discrepancies in postoperative pain levels, which we attribute to methodological differences and distinct pain management techniques.

This study has extensive implications for medicine, academia, and training. Surgeons performing TKA on obese patients must implement discreet measures to reduce issues, enhance pain management, and accelerate recovery. During preoperative counselling sessions, the significance of weight management should be emphasised to provide patients with the knowledge they need to make informed decisions about their surgeries.

It is crucial to acknowledge the limitations of a retrospective analysis, such as biases and limited generalizability. Future studies should feature prospective designs, a diverse patient population, and a focus on the fundamental mechanisms connecting obesity and TKA outcomes.

The results of this study emphasise the significance of the association between obesity and Total knee replacement (TKR) side effects, highlighting the need for more careful review and individualised treatment in orthopaedics. The purpose of this study is to contribute to a broader body of knowledge by explaining the myriad implications of obesity in the context of TKA in the hopes of improving treatment procedures and influencing future research goals. To enhance outcomes for obese TKA patients, clinicians, researchers, and the healthcare community must continue collaborating.

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