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Original Research Article

Functional Outcome of Total Knee Replacement in Obese vs Non-Obese Patients

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Abstract:

Background: Obesity is one of the main concerns among the various patient features that have been recognized as significant risk factors for the development of OA. It has been demonstrated that the chance of developing knee OA rises by 35% for every 5 kg/m^2 increase in body mass.

Objectives: Comparing the functional results and postoperative complications of total knee replacement in obese and non-obese patients was the study's goal.

Materials and Methods: It was a retrospective, observational study. The study was carried out at a tertiary care centre. The study data that was retrieved was for one year. Data from 164 participants were retrieved for the study. Patients with end-stage knee osteoarthritis who were at least eighteen years old, had undergone total knee replacement, and had complete medical records with a minimum six-month follow-up were included in the study.

Results: The mean pre-operative KSS was slightly lower in obese patients, 45.1 ± 6.3 compared to non-obese patients, 47.8 ± 5.9. Although the difference was not statistically significant at p-value of 0.09. Wound infection in obese patients was observed in 07 (7.6%) participants, compared to 2 (2.7%) participants in the non-obese group, with a p-value of 0.04. Deep vein thrombosis occurred in 1 (1.1%) obese patient and in none of the non-obese patients, with a p-value of 0.62.

Conclusion: It has been concluded that TKR leads to significant improvement in functional outcomes for both obese and non-obese patients. However, obese individuals show relatively lower postoperative functional scores, higher rates of wound infection, and longer hospital stays compared to non-obese patients.

Recommendations: Obese patients should be counseled preoperatively, encouraged for weight reduction, and managed with strict infection-prevention measures.

Keywords: Total Knee Replacement, Functional Outcome, TKR, Obese, Non-obese, Osteoarthritis.

Introduction

A degenerative joint disease that progresses over time, osteoarthritis (OA) is a chronic condition that causes significant pain, disability, and financial expenses [1]. In all, OA affects roughly 7% of the global population. Around 360 million cases of knee OA, the most prevalent type of OA, are reported globally [2].

Obesity is one of the main concerns among the various patient features that have been recognized as significant risk factors for the development of OA. It has been demonstrated that the chance of developing knee OA rises by 35% for every 5 kg/m2 increase in body mass [3]. The last resort for treating end-stage knee OA is total knee arthroplasty (TKA) [4].

The goal of this intricate procedure is to improve patients' quality of life by reducing pain and functional restrictions. However, patients' subjective perceptions and objective surgical outcomes—like improved joint range of motion—may not always match. Thus, it is crucial to use subjective patient-reported outcomes (PROs) that gauge health directly from the patient [5, 6].

In actuality, between 10 and 20 percent of TKA patients who have an objectively successful procedure express dissatisfaction with the results of their care [4, 7]. Obesity generally affects surgery in a number of ways, but it also increases the risk of many complications, including wound infections, acute coronary syndrome, and urinary tract infections, after elective surgeries like total knee arthroplasty (TKA) [8].

Obesity is thought to negatively impact TKR survivability, although there isn't enough solid

evidence in the literature to back this up. Overweight individuals were more likely than non-overweight individuals to develop deep infections and require revisions for any cause, according to a systematic analysis by Kerkhoffs et al. [9].

Epidemiologic statistics show that the body mass index (BMI) of patients undergoing total knee arthroplasty (TKA) has risen dramatically over time, followed by a rise in obese individuals [10, 11, 12]. In obese individuals with OA, a high pre-operative BMI is linked to physical impairment following total knee arthroplasty [13]. In terms of results and quality of life, prior studies have connected a high BMI to an increased likelihood of TKA failure [14, 15].

Conversely, several studies have not discovered any connection or association between BMI and outcomes following TKA [16]. Reduced functional recovery and outcomes within a brief follow-up period are associated with obesity and high body mass index [17, 18].

Comparing the functional results and postoperative complications of total knee replacement in obese and non-obese patients was the study's goal.

Methodology

Study Design: It was a retrospective, observational study.

Study Settings: The study was carried out at a tertiary care centre. The study data that was retrieved was for one year.

Study Population: Data of 164 participants were retrieved for the study. Patients with end-stage knee osteoarthritis who were at least eighteen years old, had undergone total knee replacement, and had complete medical records with a minimum six-month follow-up were included in the study. Patients who were obese (BMI ≥30 kg/m2) and those who were not (BMI <30 kg/m2) were taken into consideration. Patients with rheumatoid arthritis, post-traumatic arthritis, revision TKR, previous knee operations, or other inflammatory joint conditions were not included.

Data Collection: Hospital medical records of individuals who had total knee replacements during the study period were used to gather data retrospectively. Age, sex, BMI, clinical history, including the length of osteoarthritis, comorbidities, and perioperative information, were among the demographic parameters that were retrieved. The Knee Society Score (KSS) and Oxford Knee Score (OKS), which were recorded both before and six months after surgery, were used to evaluate functional results. Additionally gathered for study were data on postoperative complications, including length of hospital stay, revision surgery, deep vein thrombosis, and wound infection.

Study Procedure: BMI, comorbidities, clinical history, and demographic information were documented. Using the KSS and OKS, the preoperative functional state was evaluated. Follow-up records were used to recover postoperative outcomes, such as functional ratings at six months, and complications, including revision, deep vein thrombosis, wound infection, and length of hospital stay.

Statistical Analysis: SPSS version 26.0 was used for statistical analysis. Data were initially entered in Microsoft Excel. The data have been presented as either the number of participants (n) with percentages (%), or mean±SD.

The independent t-test was used for statistical analysis. Statistical significance was defined as a p-value of less than 0.05.

Results

Ten of the study participants in the 18–30 age range were obese, while the remaining twelve were not. There were 15 participants who were not obese and 20 who were between the ages of 51 and 60. There were 12 obese and 7 non-obese participants among those over 60. The age distribution of research participants is displayed in Figure 1.

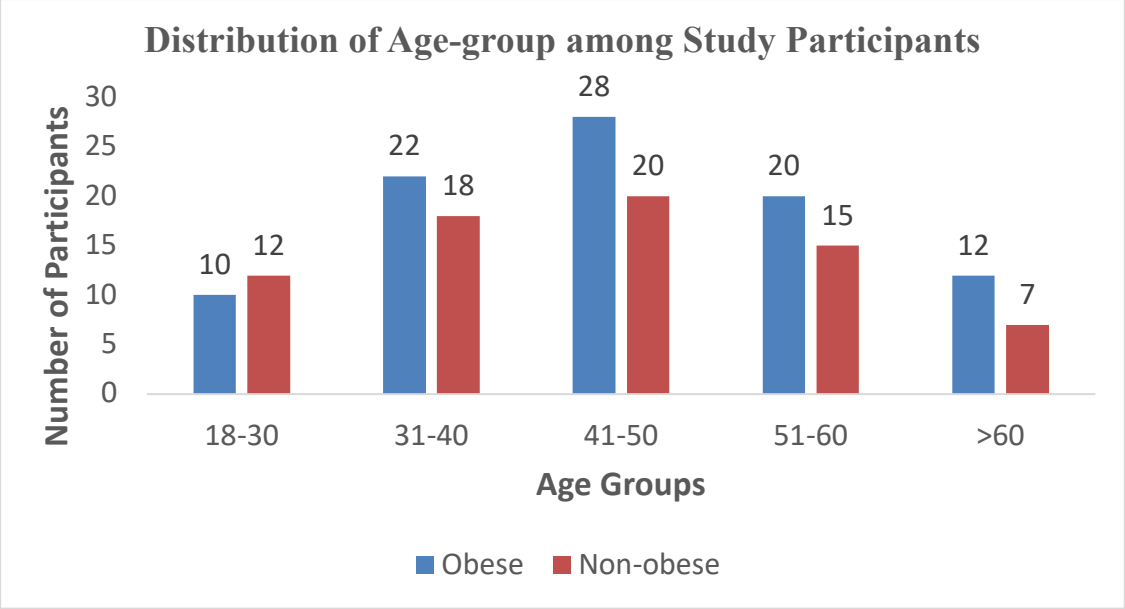

Figure 1: Distribution of Age Groups among Study Participants

The mean age was comparable between obese, 63.1 ± 7.2 years, and non-obese, 62.4 ± 7.6 years patients, with a p-value of 0.41, with statistical difference of 0.41. Obese patients had a significantly higher mean BMI, 32.8 ± 2.6 compared to non-obese patients, 27.4 ± 1.9, which was found to be statistically significant at p-value of <0.001. Table 1 depicts characteristics of baseline among study participants.

Table 1: Characteristics of Baseline among Study Participants

Parameters	Obese (n=92)	Non-Obese (n=72)	P-value
Mean Age (in years)	63.1 ± 7.2	62.4 ± 7.6	0.41
Female (in %)	60.8%	67.2%	0.29
BMI (in kg/m²)	32.8 ± 2.6	27.4 ± 1.9	**<0.001**
Duration of OA (in years)	7.1 ± 2.3	6.8 ± 2.1	0.38

Hypertension was the most frequent comorbidity, present in 42 obese patients compared to 23 non-obese patients, while diabetes mellitus was observed in 26 obese patients versus 11 non-obese patients. Figure 2 shows associated comorbidities among study participants.

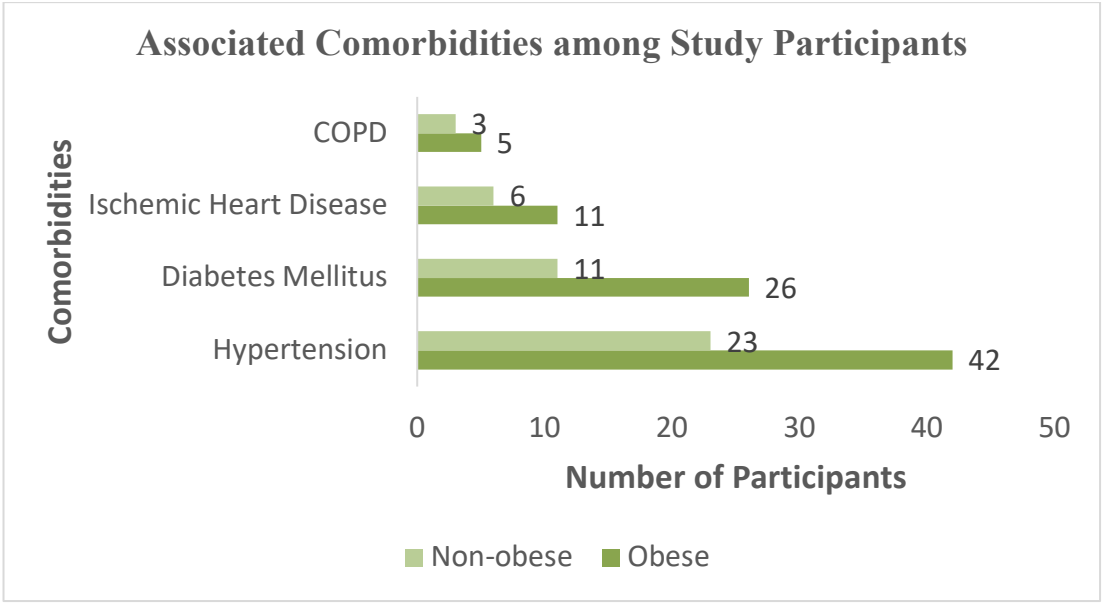

Figure 2: Associated Comorbidities among Study Participants

The mean pre-operative KSS was slightly lower in obese patients, 45.1 ± 6.3 compared to non-obese patients, 47.8 ± 5.9. Although the difference was not statistically significant at p-value of 0.09. Similarly, the mean pre-operative OKS did not differ significantly between obese, 20.3 ± 4.5 and non-obese, 21.1 ± 4.2 patients, with a p-value of 0.27. Table 2 represents scores of functional outcomes among study participants.

Table 2: Scores of Functional Outcomes

Outcomes	Obese	Non-Obese	P-value
Pre-op KSS	45.1 ± 6.3	47.8 ± 5.9	0.09
Post-op KSS (at 6 months)	78.4 ± 8.2	85.6 ± 7.4	**0.01**
Pre-op OKS	20.3 ± 4.5	21.1 ± 4.2	0.27
Post-op OKS (at 6 months)	36.9 ± 5.8	41.2 ± 5.1	**0.02**

Wound infection in obese patients was observed in 07 (7.6%) participants, compared to 2 (2.7%) participants in the non-obese group, with a p-value of 0.04. Deep vein thrombosis occurred in 1 (1.1%) obese patient and in none of the non-obese patients, with a p-value of 0.62. Table 3 elaborates on complications observed among study participants.

Table 3: Complications observed among Study Participants

Parameters	Obese (n=92)	Non-Obese (n=72)	p-value
Wound Infection (in %)	07 (7.6%)	02 (2.7%)	**0.04**
Deep Vein Thrombosis (in %)	01 (1.1%)	00 (0.0%)	0.62
Revision (in %)	02 (2.1%)	01 (1.3%)	0.71
Mean Hospital Stay (in days)	6.2 ± 1.4	5.1 ± 1.2	0.03

Discussion

This study compared the functional outcomes of TKR in obese and non-obese patients. Our findings demonstrate that while both groups experienced significant improvement in KSS and OKS postoperatively, obese patients had relatively lower functional outcomes, higher incidence of wound infection, and longer hospital stays.

The improvement in functional scores across both groups is consistent with earlier studies, which reported that TKR substantially reduces pain and improves mobility regardless of body mass index (BMI) [19, 20]. However, obesity has been linked with poorer functional recovery and higher complication rates, in line with our findings [21, 22]. Amin et al. reported that obese patients achieve clinically meaningful improvements after TKR but tend to have lower absolute functional outcomes compared to non-obese individuals [23].

In our study, obese patients demonstrated higher wound infection rates. Obesity is known to be an independent risk factor for postoperative infection due to impaired wound healing, increased soft tissue bulk, and immunological alterations [24, 25]. A meta-analysis by Kerkhoffs et al. highlighted that obese patients undergoing TKR have a two-fold increased risk of superficial and deep infections [26].

Hospital stay was significantly longer in obese patients in our cohort. Similar trends were observed in the study by Dowsey and Choong, who attributed longer hospital stays to increased medical complications and rehabilitation challenges in obese patients [27]. This highlights the need for multidisciplinary perioperative management to optimize outcomes.

Despite the increased risks, our findings confirm that obese patients still derive significant clinical benefit from TKR, echoing the conclusion of previous studies [28, 29]. This underscores the importance of not withholding surgical intervention solely based on obesity but rather focusing on preoperative optimization such as weight management, infection prevention strategies, and enhanced physiotherapy.

Conclusion

It has been concluded that TKR leads to significant improvement in functional outcomes for both obese and non-obese patients. However, obese individuals show relatively lower postoperative functional scores, higher rates of wound infection, and longer hospital stays compared to non-obese patients. Despite these differences, TKR remains an effective and beneficial treatment option in obese patients when appropriate perioperative care and risk optimization strategies are applied.

Limitations

Since this study was conducted in a single urban tertiary care facility, it may not be feasible to extrapolate the findings to the broader population. Additionally, the study's sample size was too small to draw conclusions and extrapolate findings.

Recommendations: Obese patients should be counseled preoperatively, encouraged for weight

reduction, and managed with strict infection-prevention measures. A multidisciplinary approach can enhance recovery, and larger prospective studies are needed to confirm long-term outcomes.

List of Abbreviations

OA- Osteoarthritis

TKR- Total Knee Replacement

BMI- Body Mass Index

KSS- Knee Society Score

WOMAC- Western Ontario and McMaster Universities Osteoarthritis Index

LOS- Length of Stay

ASA- American Society of Anesthesiologists

ROM- Range of Motion

SD- Standard Deviation

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