



## Determinants of Health-Related Quality of Life Post Primary Total Joint Arthroplasty

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### Abstract

**Background:** Osteoarthritis and related degenerative joint conditions are major causes of pain and disability. In India, local data on patient-centred outcomes after primary total hip and knee arthroplasty are limited. The aim of this prospective study was to describe change in pain, function and health-related quality of life during the first postoperative year after primary total hip (THR) or total knee replacement (TKR).

**Methods:** Consecutive adults undergoing elective primary THR or TKR were evaluated with validated instruments preoperatively and at 3, 6 and 12 months. Disease-specific tools and a generic health measure captured pain, stiffness, function and broader quality-of-life domains. Demographic and clinical variables including age, body mass index and range of motion were recorded.

**Results:** Two hundred and sixty-eight patients (118 THR, 150 TKR) with complete one-year follow-up were analysed. Both groups showed rapid pain reduction by three months and continued functional gains to twelve months. The THR group had a marked rise in hip scores by one year. Higher age and BMI were associated with smaller functional gains; greater preoperative range of motion predicted better outcomes.

**Conclusion:** Primary joint arthroplasty produced meaningful improvements in pain, function and quality of life within the first year. These results offer realistic benchmarks for counselling and perioperative optimisation in similar settings.

**Keywords:** Total hip arthroplasty, Total knee arthroplasty, Health-related quality of life, Osteoarthritis, Patient-reported outcome measures, Prospective cohort

### Introduction

Worldwide population ageing has increased the burden of chronic degenerative joint disease, notably osteoarthritis of weight-bearing joints; in India the true prevalence is under-reported [1]. Pain from hip and knee osteoarthritis is the dominant symptom that drives disability, frequently accompanied by progressive loss of range of motion and difficulty performing daily tasks such as stair climbing and

walking [2]. Activity avoidance and reduced muscle strength magnify disability and lower quality of life, limiting independence for many patients [3]. Avascular necrosis of the femoral head adds to the burden of hip pain and disability; in India it is increasingly recognised among younger adults and has been linked with steroid exposure and alcohol use [4, 5]. Total hip and knee replacement are established operations to relieve pain, restore joint function and improve health-related quality



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of life for appropriately selected patients [6]. Historically success after arthroplasty was judged by implant survival and complication rates, but contemporary practice emphasises patient-reported outcomes to capture the personal and social benefits of surgery [7]. Validated instruments — disease-specific tools such as WOMAC and Oxford scores, joint measures like the Harris Hip Score, and generic surveys such as the SF-36 — together provide a rounded assessment of surgical benefit and recovery trajectory. The timing of intervention, individual expectations and local activity demands (for example squatting or cross-legged sitting) influence perceived recovery and satisfaction. This study uses repeated, validated measures to describe the course of improvement in pain, function and quality of life after primary THR and TKR and to explore which demographic and clinical variables predict greater or lesser benefit in our local practice [1–7]. The goal is to provide culturally relevant benchmarks that support patient counselling and perioperative planning.

### Aims and Objectives

The primary aim was to measure change in health-related quality of life following primary total hip or knee arthroplasty in an Indian tertiary-care population. Secondary objectives were to document pain relief and functional improvement at 3, 6 and 12 months, compare recovery patterns between THR and TKR groups, and examine associations between outcomes and patient factors (age, sex, body mass index, range of motion, baseline function). Validated instruments (WOMAC, Oxford hip/knee, Harris Hip Score, SF-36 and VAS) captured joint-specific and general health domains. Through repeated assessments, the study sought to provide practical, locally relevant evidence to help clinicians set expectations, guide perioperative optimisation and plan rehabilitation tailored to patient needs.

### Review of Literature

Quality-of-life outcomes after total joint arthroplasty have been extensively studied and most series report substantial improvement in pain and function, especially during the first postoperative year [8]. Systematic reviews and prospective cohorts describe early reductions in pain within weeks to months and progressive functional gains thereafter [9]. Outcome instruments capture complementary aspects of recovery: WOMAC addresses pain, stiffness and function; Oxford hip and knee scores offer concise patient-focused assessment; the Harris Hip Score evaluates hip pain and function; and SF-36 provides a broader view of physical and mental health domains [10, 11]. Comparative and methodological reviews emphasise combining disease-specific and generic measures to characterise recovery comprehensively [12, 13]. Preoperative functional status is consistently identified as a major predictor: patients with poorer baseline scores often have larger absolute improvements but may still

have lower absolute function compared with those who started in better health [14, 15]. Age and comorbidity affect outcomes and support using physiological reserve rather than chronological age alone when advising patients [14]. Prior reports note that study design, timing of measurements and choice of instruments influence conclusions; longitudinal studies with multiple follow-up points better delineate early versus late gains [12, 13]. Obesity is frequently cited as a potentially modifiable factor associated with less favourable recovery after knee arthroplasty and is an important target for optimisation [15]. Cultural expectations and activity demands shape perceived success and satisfaction, arguing for regionally relevant outcome data when counselling patients [13]. Overall, the literature supports prospective, repeated-measure studies using validated instruments to produce practical guidance for clinicians, patients and families considering arthroplasty [8–15].

### Materials and Methods

This prospective observational study was conducted at a tertiary joint replacement centre. Consecutive adults scheduled for elective primary total hip or total knee arthroplasty between August 2018 and December 2019 were enrolled after written informed consent and institutional ethics approval. Inclusion criteria were elective primary THR or TKR for degenerative or related indications. Exclusion criteria comprised active infection, metastatic disease, neurological conditions limiting valid questionnaire completion and revision procedures. Baseline evaluation recorded demographics, diagnosis, radiographic severity and joint range of motion; height and weight were measured to calculate body mass index.

Standardised validated outcome measures were administered preoperatively and at 3, 6 and 12 months: the WOMAC index, Oxford hip or knee scores, Harris Hip Score for hip patients, SF-36 for generic health-related quality of life and a visual analogue scale for pain. Questionnaires were explained in the local language when necessary and assistance provided for completion. Perioperative care followed institutional protocols including antibiotic prophylaxis, thromboprophylaxis as indicated, standard wound management and early mobilisation; procedure-specific rehabilitation emphasised progressive range of motion and strengthening. Data were recorded on a predesigned proforma and entered into a master chart for analysis.

Statistical analysis summarised mean scores and standard deviations at each time point. Within-group changes were tested using paired t-tests or Wilcoxon signed-rank tests according to distribution. Associations between postoperative outcomes and variables (age, BMI, gender, range of motion) were examined using Pearson or Spearman correlation as appropriate; significance was set at  $p < 0.05$ . Missing interval data were handled by casewise deletion with sensitivity checks. The repeat-measure design and assessment timing were chosen

to capture early and later phases of recovery described in prior longitudinal joint replacement studies, and interpretation accounted for patient satisfaction dynamics reported in related work [16–18]. Safety monitoring was performed throughout.

### Results

The results include 268 patients in total: 118 underwent total hip replacement (THR) and 150 underwent total knee replacement (TKR). The mean age was approximately 49.6 years in the THR group and 64.0 years in the TKR group. In the THR group the mean Harris Hip Score rose from  $33.08 \pm 13.65$  preoperatively to  $82.51 \pm 6.99$  at one year ( $p < 0.001$ ). Disease-specific and generic quality-of-life instruments (WOMAC, Oxford scores and SF-36) showed statistically significant improvement across the 3-, 6- and 12-month assessments (multiple domains  $p < 0.05$ ), with the largest gains typically present by three months and incremental improvement thereafter. Pain measured on the visual analogue scale declined markedly across intervals. Correlation analyses revealed that increasing age and higher body-mass index were associated with smaller functional gains (negative correlations,  $p < 0.01$ ), whereas greater preoperative range of motion correlated positively with better postoperative scores. Gender did not show a consistent relationship with outcome. Overall, the majority of patients in both cohorts achieved clinically meaningful improvement in pain relief and daily function by one year, and complications were infrequent and did not materially alter these group-level results.

### Discussion

This study documents clear and sustained improvement in pain, function and health-related quality of life during the first postoperative year after primary total hip and knee arthroplasty. Pain relief was commonly evident by three months while functional recovery and gains in broader quality-of-life domains continued over subsequent months, consistent with earlier longitudinal reports [12,13]. Preoperative functional status remained a strong determinant of postoperative outcome: patients with poorer baseline scores achieved larger absolute improvements but often did not reach the same absolute function as those who started at a higher level [14,15]. In our cohort, increasing age and higher body mass index were associated with smaller functional gains on several measures; this aligns with analyses that relate patient factors to changes in satisfaction and perceived benefit after arthroplasty [19]. Using both disease-specific and generic instruments allowed a fuller view of recovery: physical domains and pain improved markedly, while mental and social domains improved more slowly, underscoring that physical restoration does not always produce instant psychosocial recovery [12,11]. Cultural expectations and common activities in this setting—such as squatting and cross-legged sitting—affect perceived success and should inform rehabilitation goals and counselling. Studies

from Asian populations report similar correlations between functional outcomes and quality-of-life domains, supporting the need for region-specific benchmarks [20]. Strengths of this work include a prospective design, validated repeated measures and a sizeable cohort with complete one-year follow-up. Emphasis on preoperative education, shared decision-making and multidisciplinary care may enhance recovery [8, 9, 10]. Such measures improve outcomes.

### Conclusion

In this prospective cohort from a tertiary referral centre, primary total hip and knee arthroplasty produced marked improvements in pain, joint-specific function and overall health-related quality of life within the first postoperative year. Most patients experienced meaningful pain relief by three months with continued functional gains to twelve months. Higher age and greater body mass index were associated with smaller improvements, while better preoperative range of motion predicted superior postoperative function. The repeated use of validated joint-specific and generic outcome measures provided a clear depiction of recovery trajectories and offers a practical benchmark for clinicians counselling patients in similar settings. Local adaptation of care pathways, attention to modifiable risks such as weight, and clear preoperative education can further improve outcomes and patient satisfaction, and long-term follow-up is recommended.

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