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Research Article

# Clinical Profile and Outcomes of Total Hip Replacement in Qatar

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## Abstract

**Background:** Total hip replacement (THR) is a common surgical procedure that improves the functional outcomes and health-related quality of life (HRQOL) in patients with severe hip joint pathology, particularly those with osteoarthritis (OA) and avascular necrosis (AVN). This study evaluates the clinical profile and outcomes of THR in Qatar.
**Methods:** We conducted a retrospective cohort study of 123 patients who underwent primary THR at Hamad General Hospital, Qatar, between January 2011 and August 2021. Data on demographics, clinical characteristics, and preoperative and postoperative scores were collected and analyzed. Functional outcomes were measured using the Oxford Hip Score (OHS) and 12-Item Short-Form Health Survey (SF-12). Linear regression analysis was performed to identify factors influencing postoperative outcomes.
**Results:** The primary indications for THR were OA (37.4%) and AVN (25.2%). Significant improvements were observed in both OHS and SF-12 scores postoperatively. However, these scores tended to decrease over time. Age and alcohol consumption were found to affect functional outcomes negatively, as well as mental and physical health, postoperatively.
**Conclusion:** THR significantly improves functional outcomes and HRQOL in patients with severe hip joint pathology. However, age and alcohol consumption are associated with poorer long-term outcomes, highlighting the need for targeted preoperative counseling and postoperative management in these populations.

*Keywords:* Arthritis; Degenerative; Health-Related Quality of Life; Hip Replacement Arthroplasty

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## Background

Total hip replacement (THR) is a common, successful, and frequent surgical procedure in orthopedic surgery, where an artificial joint replaces a damaged or diseased hip joint (1). This surgical intervention has revolutionized the management of hip joint pathology by effectively alleviating pain and restoring mobility, leading to substantial improvements in patients' health-related quality of life (HRQOL) (2, 3). THR is primarily indicated in patients suffering from debilitating hip conditions that severely impair their daily functioning and overall HRQOL. These conditions include degenerative joint diseases such as OA, inflammatory arthritis like rheumatoid arthritis (RA), and secondary arthritis resulting from previous hip joint trauma (4, 5).

In Qatar, the prevalence of hip-related pathologies is rising due to an aging population and increasing rates of obesity and metabolic disorders (6). Because of the growing demand for THR, there is a need for more data on the clinical outcomes and HRQOL of patients undertaking this procedure within the Qatar healthcare system. While global studies have extensively documented THR outcomes, region-specific data in the Middle East, particularly in Qatar, remain limited. Qatar's unique healthcare infrastructure, diverse patient demographics, cultural factors, genetic predispositions, cultural differences in pain perception, and access to postoperative care may influence outcomes in ways not captured by existing literature, which primarily focuses on Western populations. Localized research is thus essential to guide clinical practice and enhance patient care in this region.

Studies following THR have primarily focused on mortality, complications, and survivorship. The mortality rate has been estimated to be between 0.15% and 1.10% within the first 90 days following the surgery (7-11). It has been estimated that 6-15 percent of patients undertaking THR have persistent pain and functional limitation (12), and 6-7 percent are not satisfied with the results of the operation following the first 12 months (13).

A worse preoperative function is associated with more significant postoperative improvements (14-16). However, patients with low baseline scores do not reach better postoperative functioning than subjects with better preoperative function (17). The results concerning the role of potential predictors such as co-morbidities, pain and preoperative HRQOL, educational level, patient expectation, and mental well-being are conflicting (18). Advancements in surgical techniques and implant technology have further enhanced the success of THR; however, the adoption and impact of these innovations within the Qatar healthcare system remain underexplored. Our study aimed to assess the functional outcome and patients' HRQOL following THR in Qatar utilizing the 12-Item Short-Form Health Survey (SF-12) and the Oxford Hip Score (OHS).

## Methods

***Study Design and Population:*** This retrospective cohort study was conducted at Hamad General Hospital, Qatar, focusing on adults who underwent primary THR from January 2011 to August 2021. All adult patients who underwent primary THR during the study were included.

Patients with revision THR, bilateral THR, incomplete medical records, or lost to follow-up were excluded. Patients were interviewed during their regular outpatient clinic follow-up.

***Data Collection:*** Data were systematically collected through a review of electronic medical records and patient interviews during routine outpatient clinic follow-ups. The collected data included demographics [age, sex, body mass index (BMI)], medical comorbidities, preoperative and postoperative OHS and SF-12, surgical approach, operative time, blood loss, length of hospital stay, and postoperative complications. Additionally, surgical implant characteristics, such as bearing surfaces, head size, stem size, and cup size, were recorded.

***Outcome Measures:*** The clinical and functional outcomes were assessed using the OHS and SF-12 questionnaires. These questionnaires were available in Arabic and English, with the Arabic version translated and validated by a certified translator through the institutional medical research center. The OHS, ranging from 0 to 48, was used to evaluate hip function, with higher scores indicating better function. The SF-12 questionnaire assessed the HRQOL, through Physical Component Summary (PCS) and Mental Component Summary (MCS) scores, with higher scores reflecting better HRQOL (19, 20). Preoperative scores were collected during the patient's regular clinic visits, and postoperative scores were obtained at least one-year post-surgery.

***Statistical Analysis:*** Descriptive statistics were used to summarize the demographic and clinical characteristics of the patients. Continuous variables were reported as mean ± standard deviation (SD) if normally distributed or as median and interquartile range (IQR) if skewed. Categorical variables were reported as number and percentage. Differences between preoperative and postoperative OHS and SF-12 scores were analyzed using paired t-tests. Linear regression analysis was performed to identify factors influencing score changes, while adjusting for potential confounders, including age, BMI, and comorbidities. All statistical analyses were conducted using SPSS software (version 28, IBM Corporation, Armonk, NY, USA), with a P-value of $< 0.05$ considered statistically significant.

## Results

***Patient Demographics:*** A total of 145 patients were screened for inclusion, with 22 patients excluded from the study due to loss of follow-up, resulting in a final cohort of 123 patients. Of these patients, 52% were men, with a mean age of 49.31 years, and BMI of 29.9 kg/m$^2$. Among the cohort, 31.7% were smokers and 5.7% had a diagnosis of osteoporosis. The primary indications for THR were primary hip OA (37.4%), avascular necrosis (AVN) (25.2%), traumatic osteoarthritis (OA) (14.6%), developmental dysplasia of the hip (13%), and implant-related complications (9.7%) (Table 1).

***Surgical Details and Anesthesia:*** Among the patients, 66.7% had general anesthesia, while 33.3% received spinal anesthesia. Most surgeries were performed using the posterior approach (85.4%), followed by the Hardinge approach (13%) and the anterolateral approach (1.6%). The duration of surgery varied, with 67.5% of procedures lasting 2-4 hours, 21.1% taking less than two hours, and 11.4% taking 4-6 hours. Blood loss during surgery was generally moderate, with 250-500 ml in 58.5%, 0-250 ml in 30.1%, 500-750 ml in 1.6%, and > 750 ml in 9.8% of patients. A postoperative drain was inserted in 60.2% of patients.

**Table 1.** Patient demographics

| Demographics | THA (n = 123) |
|---|---|
| **Age (year)** | 49.31 ± 14.99 |
| **BMI (kg/m$^2$)** | 29.90 ± 5.21 |
| **Sex** | |
| **Men** | 64 (52.0) |
| **Women** | 59 (48.0) |
| **Smoking** | 39 (31.7) |
| **Alcohol consumption** | 7 (5.7) |
| **Osteoporosis** | 11 (8.9) |
| **Number of comorbidities** | |
| **0** | 48 (39.0) |
| **1** | 36 (29.3) |
| **2** | 25 (20.3) |
| **3** | 13 (10.6) |
| **4** | 1 (0.8) |

Data are presented as mean ± standard deviation (SD) or number and percent
THA: Total hip arthroplasty; BMI: Body mass index

Most THR implants used ceramic-on-ceramic (CoC) bearing surfaces (72.4%), followed by ceramic polyethylene (22.8%). A small percentage (4.9%) of patients received other types of implants, including metal-on-metal (MoM), metal-on-polyethylene (MoP), and oxidized zirconium-on-polyethylene. The most common femur head size used was 36 mm (76.4%), followed by 32 mm (19.5%) and 28 mm (3.3%). Stem sizes varied, with 58.5% of patients receiving sizes 0-5, 30.1% receiving sizes 6-10, and 11.4% receiving sizes 11-15. The most frequently used cup sizes were 50-54 mm (59.3%), followed by 55-59 mm (19.5%), 45-49 mm (9.8%), and 60-64 mm (11.4%).

***Post-Operative Complications, Recovery, and Follow-Up:*** Postoperative complications were minimal, with 86.2% of patients experiencing no complications. The most common complications included dislocation (4.1%), limb length discrepancy (3.3%), prosthesis infection (3.3%), iatrogenic fracture (1.6%), wound infection (0.8%), and pulmonary embolism (0.8%). Recovery times varied, with 47.5% of patients returning to work within 2-4 weeks post-surgery, 40.2% within two weeks, and 12.3% requiring more than four weeks. Follow-up evaluations within four years were common (54.5%), with substantial follow-up rates (34.1%) between five to nine years. A minority (11.4%) had follow-ups beyond ten years.

***OHS and SF-12 Outcomes and Follow-Up Analysis:*** Significant improvements were observed in OHS and SF-12 scores postoperatively. The mean OHS (Table 2) increased from 11.87 ± 5.76 preoperatively to 43.72 ± 6.87 postoperatively ($P < 0.0001$). Similarly, SF-12 scores for both the PCS and MCS improved significantly, with PCS increasing from 24.56 ± 5.14 to 52.13 ± 7.11 and MCS from 30.26 ± 9.40 to 55.57 ± 7.60 ($P < 0.0001$ for both).

**Table 2.** Changes in Oxford Hip Score (OHS), 12-Item Short-Form Health Survey (SF-12) physical/mental scores before and after surgery

| Score | Preoperative | Postoperative | P-value |
|---|---|---|---|
| **OHS** | 11.87 ± 5.76 | 43.72 ± 6.87 | < 0.0001 |
| **SF-12 physical score** | 24.56 ± 5.14 | 52.13 ± 7.11 | < 0.0001 |
| **SF-12 mental score** | 30.26 ± 9.40 | 55.57 ± 7.60 | < 0.0001 |

Data are presented as mean ± standard deviation (SD)
SF-12: 12-Item Short-Form Health Survey; OHS: Oxford Hip Score

The average OHS and SF-12 scores were further analyzed across different follow-up periods. While no significant changes were observed in the OHS or SF-12 PCS over time, a significant decrease was noted in the SF-12 MCS during extended follow-up (Figure 1).

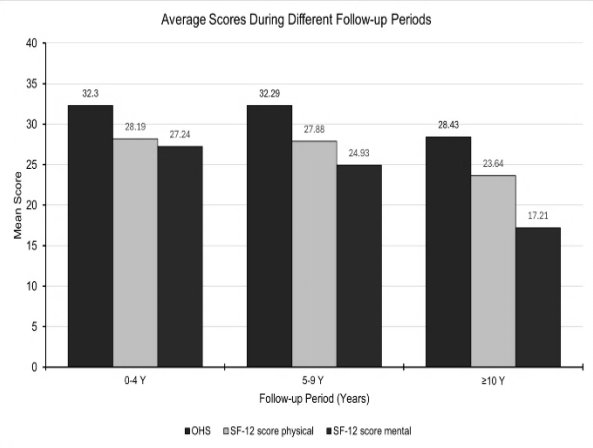


**Figure 1.** Average scores during different follow-ups

Post hoc analysis revealed that the decline in the cognitive component occurred primarily between the 0-4-year and the 10-year or more follow-up periods, with no significant changes observed between other periods (Table 3).

**Table 3.** Average scores during different follow-up periods

| Score | Follow-up period | | | P-value |
|---|---|---|---|---|
| | 0-4 year | 5-9 year | ≥10 year | |
| **OHS** | 32.30 ± 9.96 | 32.29 ± 7.11 | 28.43 ± 8.75 | 0.318 |
| **SF-12 physical score** | 28.19 ± 9.10 | 27.88 ± 7.03 | 23.64 ± 14.17 | 0.235 |
| **SF-12 mental score** | 27.24 ± 12.25 | 24.93 ± 9.79 | 17.21 ± 14.06 | 0.016 |

Data are presented as mean ± standard deviation (SD)
SF-12: 12-Item Short-Form Health Survey; OHS: Oxford Hip Score

***Linear Regression Analysis of Outcome Predictors:*** A linear regression analysis was performed to identify factors influencing changes in postoperative OHS and SF-12 scores compared to preoperative values. The study included age, sex, BMI, smoking, and alcohol consumption as potential factors. Sex, BMI, and smoking did not significantly impact changes in postoperative OHS ($P > 0.05$). However, age [β= -0.124, 95% confidence interval (CI): -0.228 to -0.020, $P = 0.02$] and alcohol consumption (β = -14.027, 95% CI: -20.877 to -7.177, $P < 0.0001$) were found to have a significant adverse effect on postoperative OHS scores.

Similarly, for SF-12 PCS, sex, BMI, and smoking showed no significant effects. In contrast, age (ββ= -0.249, 95% CI: -0.352 to -0.145, $P < 0.0001$) and alcohol consumption (ββ= -13.798, 95% CI: -20.622 to -6.975, $P < 0.0001$) were associated with significant reductions in postoperative PCS scores. SF-12 MCS also showed significant negative associations with postoperative scores for both age (ββ= -0.277, 95% CI: -0.420 to -0.133, $P < 0.0001$) and alcohol consumption (ββ= -10.283, 95% CI: -19.731 to -0.835, $P < 0.0001$).

## Discussion

Our study indicates that primary hip OA is the most prevalent cause for patients in Qatar to undergo THR, followed by AVN. This finding is consistent with the results of Ng et al. (21), who reported that OA was the primary diagnosis in 92.5% of patients undergoing THR in their hospital among the Nepali population (22). On contrast, data from Saudi Arabia demonstrate a relatively higher burden of AVN compared to Qatar, with AVN accounting for 20.5% of cases, while degenerative OA and post-traumatic OA represented 50.6% and 22.9%, respectively (23). These differences highlight the demographic and regional variability in THR indications, potentially influenced by factors such as trauma rates, corticosteroid use, and genetic predispositions.

Since the primary goal of THR is to enhance a patient's HRQOL, assessment of HRQOL measures is crucial in evaluating the effectiveness of this intervention (24). The World Health Organization (WHO) defines HRQOL as an individual's perception of their position in life within the context of their culture and value systems, encompassing mental and physical health. This cultural context is important for Qatar, where extended family support is common and restoring mobility can reduce caregiver burden. Hip joint degeneration adversely affects both physical and psychological well-being, often leading to immobilization due to hip pain and subsequent secondary physiological issues associated with a home-dependent lifestyle (25).

Given the global increase in the incidence of THR, numerous studies have focused on evaluating HRQOL following the procedure (26, 27). For instance, Shan et al. found that mid-term postoperative HRQOL significantly improved in patients with OA compared to quantitatively and qualitatively preoperative levels (28). Conversely, Bahardoust et al. found that patients who underwent THR had significantly reduced HRQOL compared to a matched reference population based on age, sex, and BMI (29). Our findings align with these global trends: patients in Qatar demonstrated significant improvement in HRQOL postoperatively. However, like Mariconda et al. (30), we noted that scores tended to decline over time, suggesting the need for long-term monitoring and support. Despite this decline, patients who underwent THR still performed physically better than those with untreated advanced hip arthritis.

In terms of functional outcomes, our study found that the OHS and SF-12 scores were significantly better after surgery, mirroring the results reported by Ng et al., who observed significant improvements in the Harris Hip Score (HHS) postoperatively, with these improvements sustained over a five-year follow-up period (21). Ng et al. also found that while the most significant improvement in functional scores occurred within the first six months, these gains were maintained in the long term. Similarly, our study observed significant initial improvements in both OHS and SF-12 scores, though these scores tended to decrease over time (21).

Our reports of patients who have undergone THR surgeries show improvement in the physical and mental health components of SF-12, which is similar to other studies (22, 31). The significant initial improvements in functional outcomes and HRQOL, coupled with the observed decline over time, highlight the need for long-term monitoring and support for THR patients. The negative impact of age and alcohol consumption suggests that preoperative counseling should address these risk factors, potentially incorporating lifestyle interventions to optimize outcomes. Furthermore, the cultural and demographic diversity in Qatar necessitates tailored approaches to patient care, considering factors such as pain perception and expectations, which may differ from Western populations. Given Qatar's rising rates of obesity and metabolic syndrome, prehabilitation and optimization programs may improve outcomes.

Future studies with larger, multicenter cohorts and prospective designs could provide more robust data and help validate these findings across diverse populations. Additionally, exploring the long-term outcomes of THR,

including both functional and quality-of-life (QOL) measures, would offer valuable insights into the durability of the procedure's benefits. Moreover, incorporating patient-reported outcome measures, particularly those addressing mental health and patient satisfaction, may further improve our understanding of factors influencing post-surgical recovery.

***Limitations:*** This study has several limitations that should be acknowledged. First, the retrospective design restricts the ability to ensure consistency in data collection and limits the range of variables that can be gathered compared to a prospective design. Additionally, while the sample size of 123 patients is sufficient for statistical analysis, it remains relatively small, which may restrict the ability to detect fewer common complications or variations in outcomes across different subgroups. Lastly, although validated Arabic translations of the OHS and SF-12 were used, cultural differences in health perception may still impact the interpretation of QOL measures.

*Conclusion*

THR significantly improves functional outcomes and HRQOL in patients with severe hip joint pathology in Qatar. However, older age and alcohol consumption are associated with poorer long-term functional and HRQOL outcomes, emphasizing the importance of tailored preoperative counseling and postoperative care to optimize results in these groups.

## Conflict of Interest

The authors declare no conflict of interest in this study.

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This study was approved by our local institution's medical research center (Approval ID: MRC-01-21-010).

The data supporting this study's findings are available from the corresponding author upon reasonable request.

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