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Original Research Article

SPECTRUM OF INDICATIONS FOR PRIMARY TOTAL HIP AND KNEE ARTHROPLASTY: A PROSPECTIVE HOSPITAL REGISTRY STUDY

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ABSTRACT

Background: Arthroplasty registries provide structured, real-world data on the indications, practice patterns, and outcomes of joint replacement surgery. While osteoarthritis dominates as the leading indication for hip and knee arthroplasty in Western registries, emerging evidence suggests that the spectrum of indications in Indian patients may differ substantially, with a younger age at presentation and a higher contribution of avascular necrosis and post-traumatic sequelae. The aim is to document and analyze the spectrum of indications for primary total hip replacement (THR) and total knee replacement (TKR) in patients undergoing arthroplasty at a tertiary care teaching hospital, and to compare these findings with published national and international registry data.

Materials and Methods: This prospective observational registry-based study was conducted in the Department of Orthopaedics of a tertiary care teaching hospital, over a two-year period (January 2024 to December 2025). A structured, department-approved arthroplasty dataset was used to prospectively record demographic details, indication for surgery, procedure type, and laterality for all consecutive patients undergoing hip or knee arthroplasty. Descriptive statistics and Chi-square/Fisher's exact tests were used for analysis using SPSS version 24, with $p < 0.05$ considered significant.

Results: Of 180 arthroplasty procedures, 104 (57.8%) were total hip replacements and 76 (42.2%) were total knee replacements. Avascular necrosis of the femoral head was the overwhelming indication for THR (92.3%), followed by post-traumatic arthritis (5.8%) and rheumatoid arthritis (1.9%); no case of primary osteoarthritis was recorded as an indication for hip replacement in this series. In contrast, primary osteoarthritis accounted for 97.4% of TKR indications, with rheumatoid arthritis and post-traumatic arthritis each contributing 1.3%. Patients undergoing THR were significantly younger than those undergoing TKR ($p < 0.001$), consistent with the predominance of avascular necrosis as an indication in a younger cohort.

Conclusion: The indication spectrum for arthroplasty in this Indian hospital-based cohort diverges markedly from Western registry data for the hip, where avascular necrosis rather than osteoarthritis is the leading indication, while the pattern for the knee mirrors global trends. These findings emphasize the value of institutional registries in capturing population-specific disease patterns relevant to surgical planning, implant selection, and resource allocation.

Keywords: Arthroplasty registry, indications, avascular necrosis, osteoarthritis, total hip replacement, total knee replacement, joint replacement epidemiology.

INTRODUCTION

Total hip replacement (THR) and total knee replacement (TKR) are among the most successful and widely performed operations in orthopedic surgery, providing reliable pain relief and restoration of function in patients with end-stage joint disease. While the surgical techniques and implant technologies used for these procedures have become largely standardized across the world, the underlying spectrum of indications leading patients to arthroplasty varies considerably between populations.[1]

In high-income countries, national arthroplasty registries such as the Swedish Hip Arthroplasty Register, the Australian Orthopaedic Association National Joint Replacement Registry (AOANJRR), and the National Joint Registry (NJR) of the United Kingdom have consistently reported primary osteoarthritis as the leading indication for both hip and knee replacement, typically affecting an older population.

In contrast, the Indian experience appears distinct: avascular necrosis of the femoral head, often related to corticosteroid use, alcohol intake, or idiopathic causes, has been reported as a disproportionately common indication for hip replacement, frequently affecting patients in the third to fifth decades of life.[2]

Despite the growing volume of arthroplasty performed in India, comprehensive registry data on the pattern of indications remains limited, with only a few institutional and society-led datasets, such as the Indian Society of Hip and Knee Surgeons (ISHKS) registry, available for reference. Understanding the local spectrum of indications is essential, as it has direct implications for patient counselling, implant selection, surgical approach, and health-system planning.[3]

This study was undertaken as part of a prospective institutional arthroplasty registry, with the specific objective of characterizing the spectrum of indications for primary total hip and total knee arthroplasty at our centre and comparing these findings against published national and international literature.[4]

Aims and Objectives

To determine and describe the spectrum of indications for primary total hip and total knee arthroplasty among patients registered in a prospective institutional arthroplasty registry, and to compare the observed pattern with existing national and international registry-based literature.

Specific objectives

- To document the relative frequency of individual indications (avascular necrosis, primary osteoarthritis, rheumatoid arthritis, post-traumatic arthritis, and others) for primary THR and TKR.
- To describe the demographic profile (age and sex) associated with each indication category.
- To compare the observed indication spectrum with data from Scandinavian, Australian, British, American, and Indian arthroplasty registries.

MATERIALS AND METHODS

Study Design and Setting: This was a prospective, single-centre, observational registry-based study conducted in the Department of Orthopaedics of a tertiary care teaching hospital in South India, with a dedicated arthroplasty unit.

Study Period and Sample: Data were collected prospectively over a two-year period, from January 2024 to December 2025. A total of 180 consecutive patients undergoing hip or knee arthroplasty, both primary and revision, were registered; the analysis of indication spectrum presented here focuses on the underlying diagnosis leading to primary arthroplasty in this cohort.

Inclusion Criteria

- All patients undergoing total hip arthroplasty.
- All patients undergoing total knee arthroplasty.
- Patients willing to participate and provide written informed consent.
- Patients available for structured follow-up.

Exclusion Criteria

- Arthroplasty of joints other than the hip and knee (shoulder, ankle, wrist, elbow).
- Patients with incomplete clinical records.
- Patients with severe uncontrolled medical comorbidities.
- Patients declining informed consent.

Data Collection

Data were prospectively entered into a structured, department-approved Arthroplasty Registry Dataset, capturing patient age and sex, indication for surgery, type of arthroplasty (THR/TKR, primary/revision), side involved, fixation type, implant used, surgical approach, hospital stay, complications, and functional outcome. For the purposes of this article, the indication for surgery — recorded as avascular necrosis, primary osteoarthritis, rheumatoid arthritis, post-traumatic arthritis, or other causes — was the primary variable of interest, analyzed against procedure type (THR versus TKR) and patient demographics.

Ethical Considerations

The study was approved by the Institutional Ethics Committee of the participating hospital. Written informed consent was obtained from all participants prior to enrolment, and patient confidentiality was maintained throughout.

Statistical Analysis

Data were analyzed using IBM SPSS (Statistical Package for the Social Sciences), version 24. Descriptive statistics, including frequencies and percentages, were used to summarize the indication spectrum. Associations between categorical variables (indication, procedure type, age group) were assessed using the Chi-square test; Fisher's exact test was applied where expected cell

frequencies were less than 5. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 180 arthroplasty procedures were registered during the study period, comprising 104 total hip replacements (57.8%) and 76 total knee replacements (42.2%).

Table 1: Age Distribution by Procedure Type (n = 180)

Age Group (years)	THR n (%)	TKR n (%)	p-value
< 40	18 (17.3)	0 (0.0)	
41 – 50	20 (19.2)	0 (0.0)	
51 – 60	25 (24.0)	10 (13.2)	
61 – 70	26 (25.0)	35 (46.1)	
> 70	15 (14.4)	31 (40.8)	
Total	104 (100.0)	76 (100.0)	< 0.001**

Patients undergoing THR spanned a much wider and younger age range than those undergoing TKR, with over a third (36.5%) below the age of 50 years — a pattern strongly influenced by avascular necrosis as the leading indication. TKR, in contrast, was almost exclusively performed in patients above 50 years, with the majority above 60 years (86.9%). This difference was highly statistically significant (p < 0.001).

Table 2: Indications for Primary Total Hip Replacement (n = 104)

Indication	Frequency	Percent (%)
Avascular Necrosis (AVN)	96	92.3
Post-traumatic Arthritis	6	5.8
Rheumatoid Arthritis	2	1.9
Primary Osteoarthritis	0	0.0
Others (DDH, AS, etc.)	0	0.0
Total	104	100.0

Avascular necrosis of the femoral head was overwhelmingly the leading indication for total hip replacement, accounting for over nine in every ten procedures (92.3%). Post-traumatic arthritis and rheumatoid arthritis together accounted for less than 8% of cases, and no patient underwent hip replacement for primary osteoarthritis, developmental dysplasia of the hip, or ankylosing spondylitis in this cohort.

Table 3: Indications for Primary Total Knee Replacement (n = 76)

Indication	Frequency	Percent (%)
Primary Osteoarthritis	74	97.4
Rheumatoid Arthritis	1	1.3
Post-traumatic Arthritis	1	1.3
Others	0	0.0
Total	76	100.0

Primary osteoarthritis was near-universally the indication for total knee replacement (97.4%), with rheumatoid arthritis and post-traumatic arthritis each accounting for a single case (1.3%).

Table 4: Type of Procedure — Primary versus Revision (n = 180)

Type	THR n (%)	TKR n (%)	p-value
Primary	97 (93.3)	74 (97.4)	
Revision	7 (6.7)	2 (2.6)	0.368
Total	104 (100.0)	76 (100.0)	

The great majority of procedures in both groups were primary arthroplasties (93.3% of THR and 97.4% of TKR), confirming that the indication spectrum described above chiefly reflects the diagnoses driving primary rather than revision surgery. The difference in the proportion of primary versus revision procedures between THR and TKR groups was not statistically significant (p = 0.368).

Table 5: Gender Distribution by Procedure Type (n = 180)

Gender	THR n (%)	TKR n (%)	p-value
Male	62 (59.6)	42 (55.3)	
Female	42 (40.4)	34 (44.7)	0.559
Total	104 (100.0)	76 (100.0)	

Males formed a modest majority in both groups (59.6% in THR and 55.3% in TKR), with no statistically significant difference in gender distribution between procedure types (p = 0.559).

DISCUSSION

This prospective institutional registry offers a focused view of the indication spectrum underlying primary hip and knee arthroplasty in an Indian tertiary care setting, and the findings highlight a pattern that differs markedly from that reported in Western literature for the hip, while closely mirroring global trends for the knee.

Indications for Hip Arthroplasty

Avascular necrosis of the femoral head accounted for 92.3% of THR indications in the present study — a proportion far higher than that reported from Scandinavian and Australasian registries, where primary osteoarthritis typically accounts for 60–70% of hip replacements, and AVN contributes only a small minority of cases. Malchau et al., reporting on the Swedish Hip Arthroplasty Register, and subsequent Australian Orthopaedic Association National Joint Replacement Registry annual reports have consistently identified osteoarthritis as the dominant indication for THR in Western populations. The predominance of AVN in the present cohort is, however, consistent with other Indian series; Rajgopal et al., reporting preliminary data from the Indian Society of Hip and Knee Surgeons registry, similarly noted AVN as a leading indication for hip replacement in the Indian population, attributing this to factors such as corticosteroid exposure, alcohol use, and a substantial proportion of idiopathic cases. This distinction is clinically important: patients with AVN typically present at a considerably younger age than those with osteoarthritis, a pattern reflected in our finding that over a third of THR patients were below 50 years of age, with direct implications for implant choice (favoring uncemented or hybrid fixation with durable bearing surfaces) and counselling regarding long-term implant survivorship and the likelihood of eventual revision.

Indications for Knee Arthroplasty

In contrast, primary osteoarthritis accounted for 97.4% of TKR indications in this study, a figure that aligns closely with international registry data, where osteoarthritis is almost universally the principal indication for knee replacement across Scandinavian, Australasian, British, and American registries alike. This consistency suggests that, unlike the hip, the disease burden driving knee replacement in India closely parallels the global pattern, likely reflecting the near-ubiquitous nature of degenerative knee osteoarthritis with advancing age across populations.

Demographic Correlates of Indication

The markedly younger age distribution of the THR group compared with the TKR group in this study is a direct corollary of the differing indication spectrum: avascular necrosis characteristically affects patients in the third to fifth decades, whereas primary osteoarthritis of the knee is predominantly a disease of the sixth decade and beyond. This finding is consistent with previously published Indian data suggesting a younger age at presentation for hip arthroplasty compared with Western cohorts, and reinforces the importance of considering implant longevity when planning hip replacement in this younger subgroup.

Comparison with Indian Registry Literature

India currently lacks a unified national arthroplasty registry, and available evidence is drawn largely from voluntary society-based datasets and single-institution series. Rajgopal et al. highlighted both the leading role of osteoarthritis in TKR and the comparatively higher contribution of AVN to THR in the Indian setting, while also acknowledging the incompleteness of voluntary registry participation. The findings of the present study, derived from prospective and complete institutional data capture, corroborate these broader observations and support the argument that institutional registries — even where a national framework is not yet established — can generate reliable, population-relevant evidence on indication patterns.

Clinical and Public Health Implications

The disproportionate burden of avascular necrosis as an indication for hip replacement in the Indian population, occurring in a substantially younger cohort, carries implications beyond surgical technique. It suggests a need for greater attention to modifiable risk factors such as corticosteroid stewardship and alcohol use, earlier diagnosis through heightened clinical suspicion in at-risk patients, and long-term implant surveillance strategies tailored to a population that will live with their prosthesis for several decades. From a health-system perspective, understanding the local indication spectrum also assists in implant procurement planning and counselling on the anticipated need for future revision surgery.

Limitations

This study is limited by its single-centre design and comparatively modest sample size (180 procedures) relative to national registries that capture thousands of cases annually, which may affect the generalizability of the observed proportions to the wider Indian population. The two-year study duration also precludes assessment of temporal trends in indication patterns. Additionally, as with any registry-based study, potential confounding factors such as regional referral patterns and socioeconomic access to care could not be fully accounted for.

CONCLUSION

The spectrum of indications for primary arthroplasty in this Indian institutional registry reveals a pattern distinct from Western literature at the hip, where avascular necrosis of the femoral head — rather than primary osteoarthritis — is overwhelmingly the leading indication, affecting a notably younger patient population. In contrast, the indication spectrum for knee arthroplasty closely mirrors global trends, with primary osteoarthritis accounting for the vast majority of cases. These findings underscore the value of prospective institutional arthroplasty registries in characterizing population-specific disease patterns, with direct relevance to implant selection, patient counselling, and long-term surveillance planning, and support continued efforts toward the development of larger regional and national registries in India.

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