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RESEARCH ARTICLE
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EVALUATION OF COST UTILITY ANALYSIS IN THE MANAGEMENT OF OSTEOARTHRITIS KNEE IN A TERTIARY CARE HOSPITAL. A PROSPECTIVE OBSERVATIONAL PHARMACOECONOMIC STUDY

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Abstract

Background: Osteoarthritis (OA) of the knee is a prevalent condition that impacts the quality of life significantly. With the global population aging, effective and economically viable management strategies are essential. This study aims to evaluate the cost-utility of various management strategies for knee OA in a tertiary care setting.

Methods: A prospective observational study was conducted at Dhanalakshmi Srinivasan Medical College and Hospital, Perambalur, over the year 2018. Participants included outpatients diagnosed with knee OA, aged 35 to 65 years, meeting specific inclusion and exclusion criteria. The study utilized the Kellgren-Lawrence (KL) Grading for assessing OA severity and the Short Form 36 Health Survey (SF-36) for quality of life assessments. Participants were divided into two treatment groups: oral medications and intra-articular corticosteroids. Cost-utility was analyzed by comparing direct medical costs and quality of life improvements.

Results: The study included 300 patients, highlighting a higher prevalence of OA among females, particularly aged 60-65. Comorbidities like diabetes mellitus and systemic hypertension were significantly associated with OA. Obesity was identified as a significant risk factor. The cost utility analysis showed a notable reduction in cost per Quality Adjusted Life Year (QALY) gained after treatment. Quality of life, as measured by SF-36, improved significantly in both treatment groups. Pharmacological management, including the use of analgesics, topical NSAIDs, and Symptomatic Slow-Acting Drugs for OA (SYSADOAs), was emphasized as effective.

Conclusion: The study underscores the economic and health burden of knee OA, advocating for a holistic and multifaceted treatment approach. The findings support the importance of pharmacoeconomics in improving healthcare accessibility and highlight the potential for optimizing OA management to reduce its economic and health impacts.

Keywords: Osteoarthritis, Knee, Cost-Utility Analysis, Pharmacoeconomics, Quality of Life, Pharmacological Management

Introduction

Osteoarthritis (OA) of the knee is a prevalent and debilitating condition that significantly affects the quality of life of millions of individuals worldwide. As a chronic degenerative joint disease, it leads to pain, stiffness, and functional impairment, imposing a considerable burden on both patients and healthcare systems [1]. With the aging global population, the incidence of knee OA is expected to rise, necessitating effective management strategies that are both clinically beneficial and economically viable. In this context, the economic evaluation of healthcare interventions, particularly through cost-utility analysis (CUA), has become increasingly important for healthcare decision-makers. CUA provides a systematic approach to evaluate the cost-effectiveness of medical treatments by comparing the costs and health outcomes, typically measured in quality-adjusted life years (QALYs) [2].

This prospective observational pharmacoeconomic study aims to evaluate the cost-utility of various management strategies for knee OA in a tertiary care hospital setting. By focusing on a comprehensive analysis of direct and indirect costs associated with medical treatments, non-pharmacological interventions, and potential surgical procedures in comparison to the quality of life and clinical outcomes achieved, this research seeks to offer valuable insights into the economic and clinical value of current knee OA management practices [3].

Given the complex nature of knee OA management, which often requires a multifaceted approach including medication, physical therapy, lifestyle modification, and in some cases, surgery, assessing the cost-effectiveness of these interventions is crucial [4]. This study will utilize a well-structured CUA framework to identify the most economically efficient treatment modalities, thereby guiding healthcare professionals, policymakers, and patients towards more informed decisions that optimize both economic resources and patient health outcomes.

Furthermore, this research acknowledges the growing need for evidence-based, patient-centred care in the management of knee OA [5]. By evaluating the cost utility of different treatment strategies from a pharmacoeconomic perspective, the study endeavors to contribute to the optimization of healthcare delivery, ensuring that resources are allocated efficiently while maximizing patient benefit. This prospective observational study, therefore, stands at the intersection of clinical medicine and health economics, aiming to illuminate the path towards more sustainable and effective healthcare solutions for the management of knee osteoarthritis in a tertiary care hospital context.

Materials and Methods

Study Centre:

The research was conducted at Dhanalakshmi Srinivasan Medical College and Hospital, Perambalur, following approval from the Institutional Ethical Committee (IECHS/DSMCH/072).

Study Design:

A prospective observational study design was utilized to evaluate the cost utility analysis in the management of osteoarthritis knee.

Study Population:

Participants were outpatients diagnosed with knee osteoarthritis at the Department of Orthopaedics, Dhanalakshmi Srinivasan Medical College and Hospital, Perambalur.

Study Period:

The study spanned from January 2018 to December 2018.

Inclusion Criteria:

- Individuals of both sexes aged between 35 and 65 years.
- Symptomatic and radiographic diagnosis of Kellgren-Lawrence (KL) Grading 1 to 4 Osteoarthritis Knee, as determined by orthopedicians.
- Geographical stability during the study period and willingness to follow up.

Exclusion Criteria:
- Inflammatory arthritis.
- Secondary osteoarthritis.
- History of trauma.
- History of surgeries.
- Malignancy.
- Neurological disorders like hemiplegia, paraplegia.
- Participants purchasing medicines from outside pharmacies without providing bills.
- Participants requiring surgery during the study period.

Sample Size:
Calculated using the prevalence of osteoarthritis in India (22-39%), with an assumed prevalence of 25%, and an allowable error of 5%, leading to a calculated sample size of 300, adjusted from 288 for statistical robustness.

Study Tools:
- **Kellgren-Lawrence (KL) Grading for Osteoarthritis Knee:** Utilized for the radiological assessment of OA severity, with grading from 0 (no pathological features) to 4 (severe pathological features).
- **Short Form 36 Health Survey (SF-36):** A validated questionnaire assessing global health status, including vitality, physical functioning, bodily pain, general health perceptions, physical role functioning, emotional role functioning, social role functioning, and mental health. Scores range from 0 to 100, with higher scores indicating lesser disability.

Statistical Analysis:
Data were recorded in a structured case record form, entered in Microsoft Excel, and analyzed using SPSS software version 16. Descriptive statistics and percentages were utilized for analysis. Paired and unpaired T-tests compared quantitative variables within and between groups, respectively, with a P-value of 0.05 considered statistically significant.

Study Procedure:
Relevant details, including demographic profiles, co-morbid conditions, and radiological grading, were collected from patients at the Orthopaedic outpatient department and recorded in a proforma. Participants were divided into two groups based on their treatment: Group 1 received oral medications, and Group 2 received intra-articular corticosteroids. Direct medical costs were calculated from prescriptions, and participants' quality of life was assessed at baseline, 4 weeks, and 12 weeks using the SF-36 questionnaire.

Results and Discussion

Economic Impact and Pharmacoeconomics in Osteoarthritis Management

This comprehensive study conducted in Tamil Nadu has shed light on the economic burden and pharmacoeconomics involved in managing knee osteoarthritis, emphasizing its significance for the economically disadvantaged in India. The escalating costs of medication underscore the growing economic impact of osteoarthritis, a condition whose prevalence is anticipated to surge. Notably, the study included 300 patients, revealing a higher incidence in the Perambalur and Cuddalore districts, predominantly affecting individuals aged 60-65 years. This aligns with global findings that indicate age as a significant risk factor for osteoarthritis, particularly impacting the health status of the elderly population [6].

Gender Disparities in Osteoarthritis Prevalence

The study highlighted a higher prevalence of knee osteoarthritis among females, consistent with global studies like the Framingham Knee Osteoarthritis study. This gender disparity is attributed to various factors, including the increased severity of OA in females, more symptomatic joints, and the complex relationship between menopause and osteoarthritis. Occupational hazards, particularly in housewives and farmers, further elucidate the risk factors contributing to osteoarthritis, underscoring the need for targeted preventive strategies [7].

Comorbidities and Obesity in Osteoarthritis Patients

A significant association between osteoarthritis and comorbidities such as diabetes mellitus and systemic hypertension was observed. This relationship emphasizes the multifaceted challenges in managing osteoarthritis, compounded by the limitations in pharmacological options due to the adverse effects of NSAIDs. The study's findings on obesity highlight it as a potent risk factor for osteoarthritis, reinforcing the importance of weight management in disease prevention and progression.

Cost Utility Analysis and Quality of Life

The study's cost utility analysis (CUA) revealed a significant reduction in the cost per Quality Adjusted Life Year (QALY) gained after treatment, highlighting the economic benefits of effective osteoarthritis management. Comparisons with international data on the cost per QALY offer valuable insights into the economic efficiencies of various treatment modalities [8]. The study also utilized the SF-36 questionnaire to measure the improvement in quality of life post-treatment, demonstrating significant enhancements in both treatment groups.

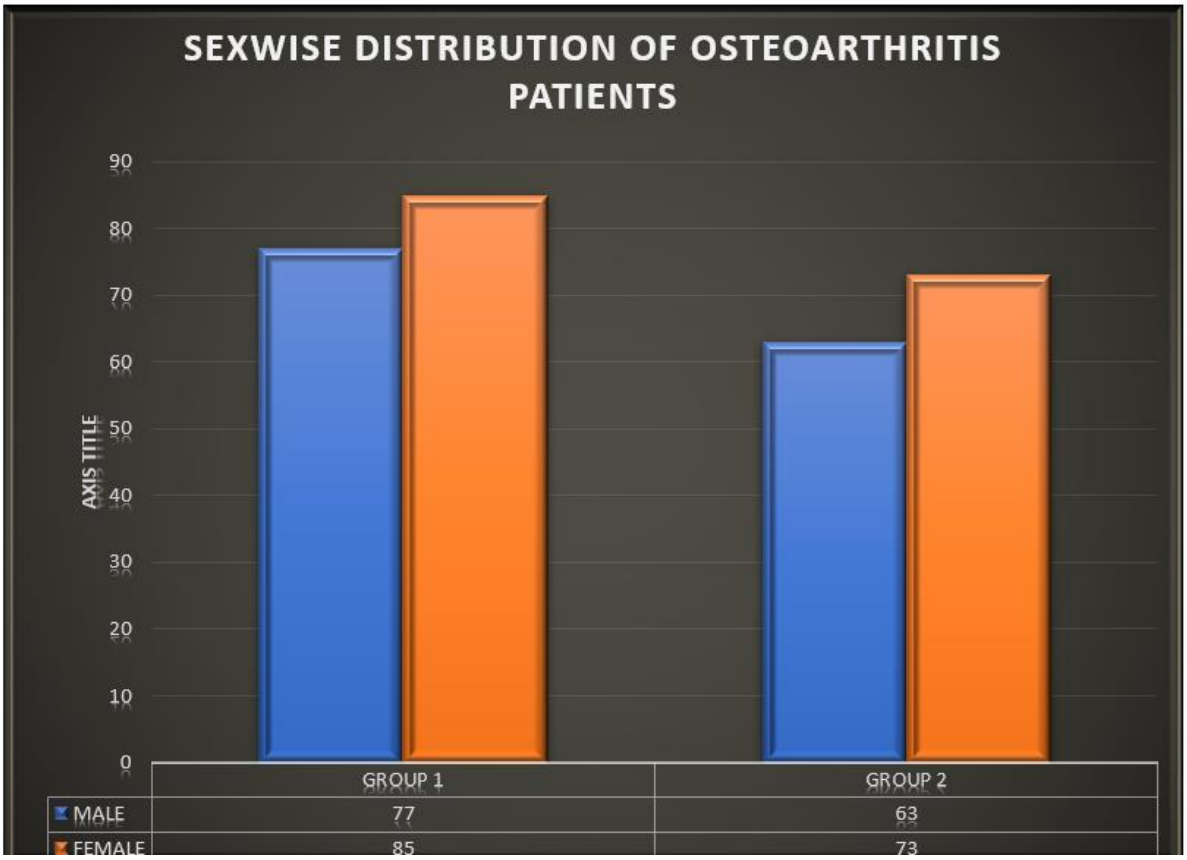

Figure 1: Sex wise distribution of osteoarthritis patients

	Baseline	4 Weeks	12 Weeks
GROUP 1	**29.205±1.717**	**28.056±2.686**	**27.696±1.488**
	p<0.001		
	p<0.001		
GROUP 2	**29.517±1.622**	**28.160±1.445**	**27.680±1.275**
	p<0.001		
	p<0.001		

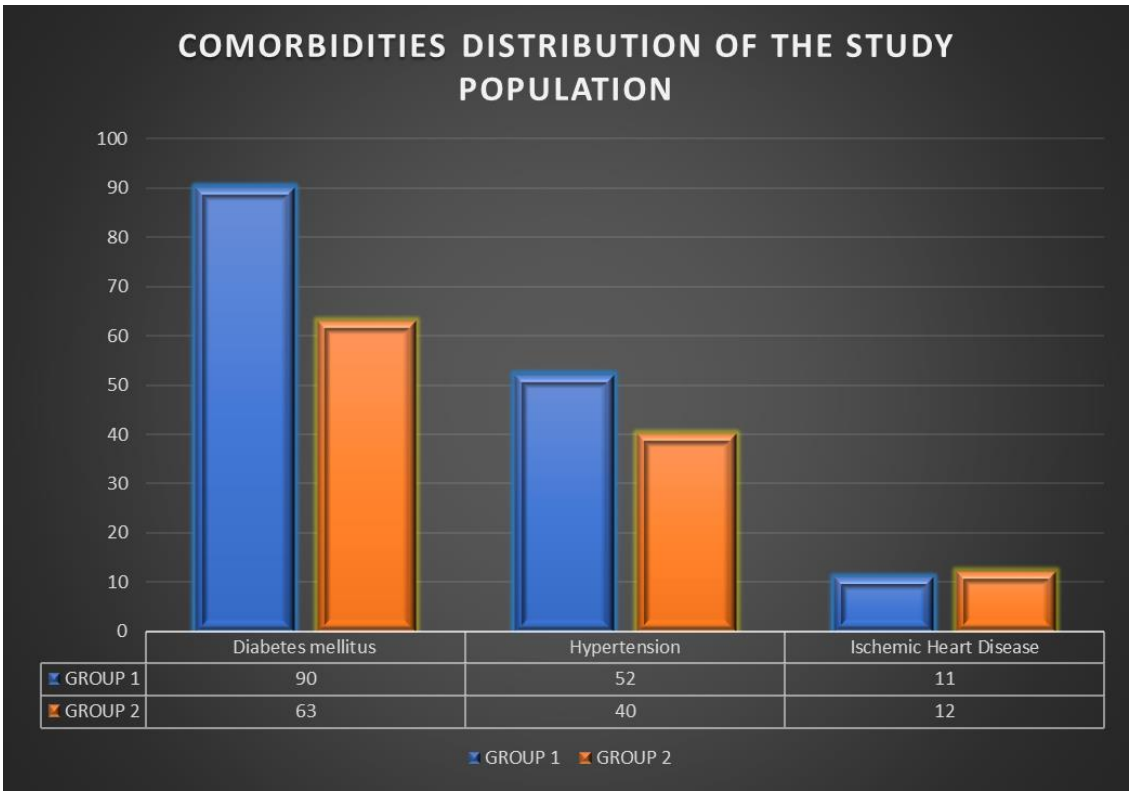

Figure 2: Comorbidities distribution of the study population

Table 1 - Changes in B

	GROUP 1	GROUP 2	p value
Baseline	29.205±1.717	29.517±1.622	0.108
4 Weeks	28.056±2.686	28.160±1.445	0.669
12 Weeks	27.696±1.488	27.680±1.275	0.917

MI during follow-up visits

Table 2: Changes in SF 36 scores during follow-up visits

	Baseline	4 Weeks	12 Weeks
GROUP 1	54.31±0.46	60.40±0.32	57.90±0.77
	p<0.001		
	p<0.001		
GROUP 2	53.42±0.47	66.59±0.43	59.81±0.32
	p<0.001		
	p<0.001		

	GROUP 1	GROUP 2	p value
Baseline	54.31±0.46	53.42±0.47	0.22
4 Weeks	60.40±0.32	66.59±0.43	<0.001
12 Weeks	57.90±0.77	59.81±0.32	<0.001

Table 3: Changes in QALY during follow-up visits

	Baseline	4 Weeks	12 Weeks
GROUP 1	**0.543±0.05**	**0.604±0.040**	**0.579±0.035**
	p<0.001		
	p<0.001		
GROUP 2	**0.534±0.055**	**0.667±0.048**	**0.598±0.038**
	p<0.001		
	p<0.001		

	GROUP 1	GROUP 2	p value
Baseline	**0.543±0.05**	**0.534±0.055**	**0.20**
4 Weeks	**0.604±0.040**	**0.667±0.048**	**<0.0001**
12 Weeks	**0.579±0.035**	**0.598±0.038**	**<0.0001**

Conclusion

This study underscores the multifaceted challenges in managing knee osteoarthritis, from the economic burden and pharmacoeconomics to gender disparities and the role of comorbidities. The findings advocate for a holistic approach in treating osteoarthritis, emphasizing the importance of pharmacoeconomics in making healthcare accessible in economically constrained settings. The significant improvements in quality of life and the strategic use of pharmacological treatments highlight the potential for optimizing osteoarthritis management to mitigate its economic and health impacts.

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