Section: Orthopaedics

Original Research Article

EFFECTIVENESS OF NON-SURGICAL INTERVENTIONS FOR OSTEOARTHRITIS OF THE KNEE: AN OBSERVATIONAL ANALYSIS

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ABSTRACT

Background: Study Centre: Osteoarthritis (OA) of the knee is a prevalent degenerative joint disease causing significant pain and disability, impacting the quality of life of millions worldwide. Non-surgical interventions are crucial for managing symptoms and improving joint function in patients with knee OA. **Objectives:** This study aims to evaluate the effectiveness of non-surgical interventions for osteoarthritis (OA) of the knee, focusing on pain reduction, improvement in joint function, and patient satisfaction.

Materials and Methods: An observational analysis was conducted on 100 patients with knee OA. Patients were divided into four treatment groups: physical therapy (n=30), corticosteroid injections (n=25), hyaluronic acid injections (n=20), and lifestyle modifications (n=25). Outcomes were assessed over a 6-month period using standardized pain and function scales, alongside patient satisfaction surveys.

Results: The average age of patients was 60 years, ranging from 45 to 75 years, with a gender distribution of 60% female and 40% male. The average BMI was 28.5 kg/m². Significant pain reduction was reported by 60% of patients receiving physical therapy, 70% receiving corticosteroid injections, 65% receiving hyaluronic acid injections, and 40% following lifestyle modifications. Improvement in joint function was noted in 55% of patients receiving physical therapy, 65% receiving corticosteroid injections, 60% receiving hyaluronic acid injections, and 35% following lifestyle modifications. Patient satisfaction was highest among those receiving corticosteroid injections (75%), followed by physical therapy (70%), hyaluronic acid injections (70%), and lifestyle modifications (50%). Minimal adverse effects were reported across all treatments, with temporary joint pain in 10% of corticosteroid injection recipients and mild swelling in 15% of hyaluronic acid injection recipients.

Conclusion: Corticosteroid injections provided the highest pain relief and patient satisfaction among non-surgical interventions for knee OA. Physical therapy and hyaluronic acid injections also showed significant benefits. Lifestyle modifications were the least effective but still beneficial. Tailored treatment plans are essential to optimize outcomes for OA patients.

Keywords: Osteoarthritis, Knee, Non-surgical interventions, Physical therapy, Corticosteroid injections, Hyaluronic acid injections.

INTRODUCTION

Osteoarthritis (OA) of the knee is a prevalent chronic condition characterized by the degeneration of joint cartilage and underlying bone, leading to pain, stiffness, and functional impairment.[1,2] It significantly impacts the quality of life of affected individuals and poses a substantial burden on

healthcare systems worldwide.[3] As the population ages, the prevalence of knee OA is expected to rise, emphasizing the need for effective management strategies.[4]

Traditional management of knee OA includes both surgical and non-surgical interventions. While surgical options such as total knee arthroplasty are considered for advanced cases, non-surgical interventions are often preferred as initial treatments due to their lower risk and cost-effectiveness.[5] Non-surgical interventions aim to alleviate symptoms, improve joint function, and enhance the overall quality of life for patients.[6]

This study focuses on evaluating the effectiveness of various non-surgical interventions for knee osteoarthritis, including physical therapy, corticosteroid injections, hyaluronic acid injections, and lifestyle modifications. Each of these treatments has been widely used and studied; however, there remains a need for comparative analysis to identify the most beneficial approach for managing knee OA in different patient populations.

The objective of this observational analysis is to provide a comprehensive overview of the effectiveness of these non-surgical interventions in terms of pain reduction, improvement in joint function, patient satisfaction, and incidence of adverse effects. By analyzing these outcomes, the study aims to offer insights that can guide clinicians in selecting appropriate treatment modalities for patients with knee OA.

MATERIAL AND METHODS

Study Design

This observational analysis was conducted to evaluate the effectiveness of non-surgical interventions for osteoarthritis (OA) of the knee. The study was carried out at the Government Medical College and General Hospital, Khammam, from November 2023 to April 2024.

Study Population

The study included 100 patients diagnosed with knee osteoarthritis based on clinical and radiographic criteria. Inclusion criteria were adults aged 45-75 years with symptomatic knee OA who had not undergone surgical interventions for the condition. Exclusion criteria included patients with inflammatory arthritis, recent knee surgery, or other significant comorbidities that could affect treatment outcomes.

Data Collection

Data were collected using patient medical records and structured interviews. Demographic information, including age, gender, and BMI, was recorded (Table 1). Patients were allocated to one of the four non-surgical treatment groups: physical therapy, corticosteroid injections, hyaluronic acid injections, or lifestyle modifications, based on physician recommendations and patient preferences (Table 2).

Treatment Protocols

- **Physical Therapy:** Patients received a structured physical therapy regimen designed to improve knee strength and flexibility. Sessions were conducted twice a week for 12 weeks.
- **Corticosteroid Injections:** Patients received intra-articular corticosteroid injections. The standard protocol included a single injection, with follow-up evaluations to monitor effectiveness and side effects.
- **Hyaluronic Acid Injections:** Patients received intra-articular hyaluronic acid injections administered once a week for three weeks.
- **Lifestyle Modifications:** Patients were advised on weight management, low-impact exercise routines, and dietary adjustments to reduce stress on the knee joints.

Outcome Measures

The primary outcomes assessed were pain reduction, improvement in joint function, patient satisfaction, and adverse effects associated with each treatment.

- **Pain Reduction:** Assessed through patient self-reports of significant pain reduction after treatment, using a standardized pain scale.
- **Improvement in Joint Function:** Evaluated based on patient-reported improvements in daily activities and mobility.
- **Patient Satisfaction:** Measured through a satisfaction survey administered at the end of the study period.
- **Adverse Effects:** Recorded through patient interviews and medical records, noting any complications or side effects associated with the treatments.

Data Analysis

Descriptive statistics were used to summarize patient demographics and treatment distributions. The effectiveness of each treatment modality was compared based on the percentage of patients reporting significant pain reduction, improvement in joint function, patient satisfaction, and incidence of adverse effects (Tables 3, 4, 5, and 6, respectively).

Ethical Considerations

The study received ethical approval from the Institutional Ethics Committee of the Government Medical College, Khammam, ensuring adherence to ethical standards and patient confidentiality.

RESULTS

Patient Demographics: The study included a total of 100 patients with knee osteoarthritis, with an average age of 60 years (age range 45-75 years). The gender distribution was 60% female and 40% male. The average BMI of the patients was 28.5 kg/m^2. [Table 1]

Treatment Distribution

The distribution of treatments among the patients was as follows: 30 patients received physical therapy, 25 patients were administered corticosteroid injections, 20 patients received

hyaluronic acid injections, and 25 patients were advised on lifestyle modifications. [Table 2]

Pain Reduction

Significant pain reduction was reported by 60% of patients undergoing physical therapy, 70% of those receiving corticosteroid injections, 65% of patients treated with hyaluronic acid injections, and 40% of those following lifestyle modifications. [Table 3]

Improvement in Joint Function

Improvement in joint function was observed in 55% of patients receiving physical therapy, 65% of those treated with corticosteroid injections, 60% of patients receiving hyaluronic acid injections, and 35% of patients adhering to lifestyle modifications. [Table 4]

Patient Satisfaction

Patient satisfaction rates were highest among those receiving corticosteroid injections (75%), followed by those undergoing physical therapy and hyaluronic acid injections (both at 70%), and those making lifestyle modifications (50%). [Table 5]

Adverse Effects

Adverse effects were minimal across all treatments, with 10% of patients receiving corticosteroid injections reporting temporary joint pain post-injection, and 15% of patients receiving hyaluronic acid injections reporting mild swelling at the injection site. Physical therapy and lifestyle modifications reported minimal to no adverse effects, respectively. [Table 6]

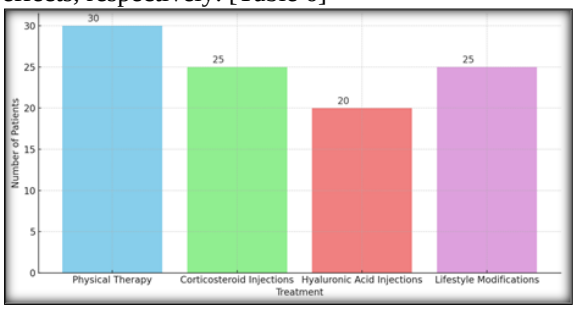

Figure 1: Treatment Distribution for Knee Osteoarthritis Patients

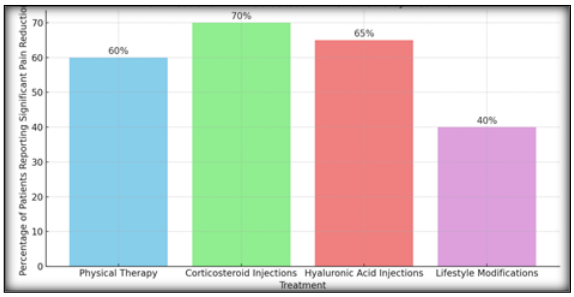

Figure 2: Pain Reduction in knee Osteoarthritis Patients by Treatment

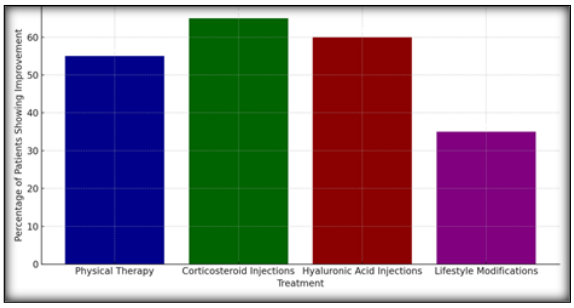

Figure 3: Improvement in Joint Function by Treatment for Knee Osteoarthritis Patients

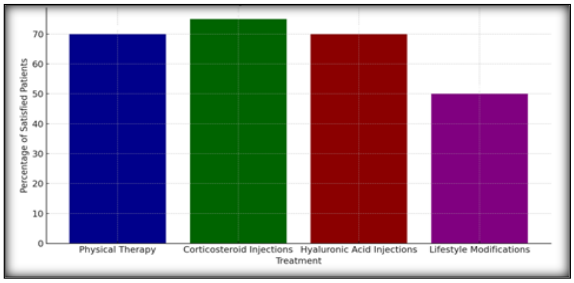

Figure 4: Patient Satisfaction by Treatment for Knee Osteoarthritis Patients

Table 1: Patient Demographics

Average Age	Age Range (Years)	Gender (Female)	Gender (Male)	Average BMI (kg/m²)
60	45-75	60%	40%	28.5

Table 2: Treatment Distribution

Treatment	Number of Patients
Physical Therapy	30
Corticosteroid Injections	25
Hyaluronic Acid Injections	20
Lifestyle Modifications	25

Table 3: Pain Reduction

Treatment	Percentage of Patients Reporting Significant Pain Reduction
Physical Therapy	60%
Corticosteroid Injections	70%
Hyaluronic Acid Injections	65%
Lifestyle Modifications	40%

Table 4: Improvement in Joint Function

Treatment	Percentage of Patients Showing Improvement
Physical Therapy	55%

Corticosteroid Injections	65%
Hyaluronic Acid Injections	60%
Lifestyle Modifications	35%

Table 5: Patient Satisfaction

Treatment	Percentage of Satisfied Patients
Physical Therapy	70%
Corticosteroid Injections	75%
Hyaluronic Acid Injections	70%
Lifestyle Modifications	50%

Table 6: Adverse Effects

Treatment	Adverse Effects
Physical Therapy	Minimal adverse effects reported
Corticosteroid Injections	10% reported temporary joint pain post-injection
Hyaluronic Acid Injections	15% reported mild swelling at the injection site
Lifestyle Modifications	No adverse effects reported

DISCUSSION

The primary aim of this observational study was to evaluate the effectiveness of various non-surgical interventions for knee osteoarthritis (OA) in terms of pain reduction, improvement in joint function, patient satisfaction, and adverse effects. The findings provide valuable insights into the comparative benefits of physical therapy, corticosteroid injections, hyaluronic acid injections, and lifestyle modifications.

Pain Reduction

Corticosteroid injections emerged as the most effective intervention for pain reduction, with 70% of patients reporting significant relief. This aligns with previous studies highlighting the efficacy of corticosteroids in reducing inflammation and pain in OA patients. Hyaluronic acid injections also showed notable effectiveness, with 65% of patients experiencing pain relief, suggesting its utility as a viable alternative, especially for patients who may not be suitable candidates for corticosteroids due to contraindications.[7] Physical therapy, while effective for 60% of patients, demonstrated the importance of an active, rehabilitative approach to managing OA symptoms.[8] Lifestyle modifications, although beneficial, were the least effective for pain reduction, indicating that they may be more effective as adjunctive rather than primary treatments.[9]

Improvement in Joint Function

Improvement in joint function was highest among patients receiving corticosteroid injections (65%) and hyaluronic acid injections (60%), suggesting that these treatments not only alleviate pain but also enhance functional outcomes. Physical therapy showed a 55% improvement rate, underscoring the importance of structured rehabilitation in maintaining and enhancing joint mobility and strength[10]. Lifestyle modifications had the lowest improvement rate (35%), indicating that while beneficial for overall health, they might not directly translate into significant functional improvements in knee OA without additional targeted interventions.[11]

Patient Satisfaction

Patient satisfaction mirrored the trends observed in pain reduction and functional improvement. Corticosteroid injections had the highest satisfaction rate (75%), reflecting their immediate and substantial impact on symptoms. Both physical therapy and hyaluronic acid injections had a satisfaction rate of 70%, indicating high levels of acceptance and perceived benefit among patients.[12] Lifestyle modifications had a satisfaction rate of 50%, which, while lower, still indicates that half of the patients found these interventions beneficial, particularly for long-term management and overall health improvement.[13]

Adverse Effects

Adverse effects were generally minimal across all treatments, highlighting the safety of non-surgical interventions for knee OA. Corticosteroid injections were associated with temporary joint pain in 10% of patients, and hyaluronic acid injections with mild swelling in 15% of patients. Physical therapy and lifestyle modifications reported minimal to no adverse effects, emphasizing their safety profiles. These findings support the use of these interventions as safe options for managing knee OA, with adverse effects being relatively rare and manageable.[14]

Clinical Implications

The study's findings suggest a multi-faceted approach to managing knee OA, tailored to individual patient needs and preferences. Corticosteroid and hyaluronic acid injections provide effective pain relief and functional improvement, making them suitable for patients requiring rapid symptom management. Physical therapy should be considered a cornerstone of OA management due to its benefits in enhancing joint function and overall physical health. Lifestyle modifications, while less effective as standalone treatments, should be integrated into comprehensive management plans to support long-term health and weight management.

Limitations and Future Research

This study's observational design limits the ability to establish causality. Future randomized controlled trials (RCTs) are needed to confirm these findings

and explore the long-term efficacy and safety of these interventions. Additionally, research should focus on identifying patient-specific factors that predict response to different treatments, enabling more personalized and effective management strategies.

CONCLUSION

This study provides a comparative analysis of the effectiveness of non-surgical interventions for knee osteoarthritis. Corticosteroid injections and hyaluronic acid injections were the most effective in terms of pain reduction and functional improvement, while physical therapy demonstrated significant benefits in maintaining joint health. Lifestyle modifications, although less effective as primary treatments, play a crucial role in comprehensive OA management. These findings can guide clinicians in selecting appropriate treatment modalities to optimize patient outcomes in knee OA management.

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