Original Article

PAIN REDUCTION AND FUNCTIONAL IMPROVEMENT IN KNEE OSTEOARTHRITIS: A CLINICAL COMPARISON OF NSAIDS AND OPIOIDS

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Abstract

Background: Knee osteoarthritis (OA) is a significant contributor to pain and disability globally, with the efficacy and safety of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) and opioids in managing this condition are still being debated.

Objective: This study aimed to evaluate and compare the effects of NSAIDs and opioids on knee pain reduction and functional improvement in knee OA patients.

Methods: A randomised controlled trial was conducted at the Orthopedics Department of Varun Arjun Medical College & Rohilkhand Hospital, involving 80 knee OA patients aged 40-60 years. Participants were randomly assigned to two groups: Group I (n=40) receiving NSAIDs and Group II (n=40) subjects receiving opioids Pain intensity was assessed using the Visual Analog Scale (VAS), and functional status was evaluated through the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) at baseline and bi-weekly intervals over three months. Adverse events were also monitored.

Results: Both NSAIDs and opioids significantly alleviated pain and enhanced functional status over a 3-month period, evidenced by reductions in mean VAS scores by -2.2 for Group-I and -1.7 for Group-II; (P=0.001) and mean WOMAC scores -16.2 for NSAIDs and -12.2 for opioids; (P=0.001). NSAIDs exhibited marginally better efficacy and a more favourable side effect profile, although opioids were linked to a significantly higher incidence of constipation (P=0.02).

Conclusion: NSAIDs and opioids effectively manage knee OA pain, with NSAIDs slightly outperforming opioids in effectiveness and safety. These results underscore the necessity of tailored pain management strategies for knee OA patients. Further studies must validate these findings over larger populations and extended periods.

Keywords: Knee osteoarthritis, NSAIDs, opioids, pain management, randomised controlled trial.

Introduction

Osteoarthritis (OA) is a degenerative joint disease that represents a leading cause of chronic pain and disability worldwide, especially among the elderly population. Characterised by the breakdown of cartilage, OA predominantly affects the knee and hip joints, leading to pain, stiffness, and a significant reduction in the quality of life of affected individuals [1]. As the global population ages, the prevalence of OA is expected to increase, highlighting the need for effective management strategies to alleviate pain and improve functional outcomes [2].

Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) and opioids are commonly prescribed for the management of OA pain. NSAIDs, including medications such as paracetamol, diclofenac sodium, and ibuprofen, act by inhibiting enzymes involved in the inflammation pathway, thereby reducing pain and inflammation. However, their use is often limited due to potential gastrointestinal, cardiovascular, and renal side effects [3]. On the other hand, opioid analgesics like tramadol, oxycodone, and hydrocodone/acetaminophen offer potent pain relief but are associated with risks of dependence, tolerance, and other serious adverse effects [4].

Recent studies have begun to compare the efficacy and safety of NSAIDs and opioids in the treatment of OA pain, with mixed results. While some research suggests that opioids may provide superior pain relief in the short term, their long-term effectiveness and safety profile remain concerns [5][6]. Conversely, NSAIDs are recommended as first-line therapy in many guidelines despite the risks associated with their use [7]. If participants received opioids for more than four weeks, the benefits of pain relief were even further reduced.

The rationale for this study stems from the ongoing debate and the need for evidence-based guidance on the optimal management of OA pain. With an ageing population and the increasing burden of OA, understanding the comparative effectiveness of these pharmacological interventions is crucial. Moreover, there is a gap in the literature regarding the direct comparison of NSAIDs and opioids specifically for knee OA pain in the middle-aged population.

This study aims to compare the effect of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) and opioid analgesics in reducing knee pain among patients aged 40-60 years. By focusing on this age group, the study seeks to provide insights into the most effective pain management strategies for individuals in the early stages of OA, potentially improving patient outcomes and quality of life. This study aims to generate evidence to guide clinicians in selecting the most appropriate pharmacological therapy for managing knee OA pain, considering both efficacy and safety profiles.

Materials and Methods

Study Design and Participants

This study was conducted at the OPD, Orthopedics Department of Varun Arjun Medical College & Rohilkhand Hospital. A total of 80 patients aged 40-60 years were diagnosed with knee osteoarthritis, according to the American College of Rheumatology (ACR) criteria, and were included.

Grouping

Participants were randomly assigned to one of two treatment groups. Group I (NSAIDs): Patients in this group received one of the following NSAIDs: paracetamol, diclofenac sodium, or ibuprofen. Group II (opioids): Patients in this group were treated with one of the following opioid analgesics: oxycodone, acetaminophen/hydrocodone, or tramadol.

Drugs and Dosage

Patients were prescribed NSAIDs and opioids as follows: paracetamol (acetaminophen, 500 mg, p.o., every 6 hours), diclofenac sodium (50 mg, p.o., twice daily), ibuprofen (400 mg, p.o., three times daily), oxycodone (10 mg, p.o., every 12 hours), acetaminophen/hydrocodone (325 mg/5 mg, p.o., every 6 hours), and tramadol (50 mg, p.o., every 6 hours). Drugs were sourced from certified pharmaceutical suppliers, ensuring the quality and consistency of the medications used.

Data Collection and Procedure

Patients were followed up every 15 days over 3 months. Pain intensity was measured using the Visual Analog Scale (VAS), and functional status was assessed using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). Baseline assessments were conducted prior to the initiation of medication, and follow-up assessments were done at each visit.

Statistical Methods

Data were expressed as mean ± standard deviation (SD). The differences between groups were analysed using the student's t-test for continuous variables and the Chi-square test for categorical variables. A p-value of <0.05 was considered statistically significant. The analysis was performed using SPSS software (Version 25.0, IBM Corp., Armonk, NY, USA).

Ethical Considerations

The study was conducted following the Declaration of Helsinki and was approved by the local ethics committee. All patients provided written informed consent before participating in the study. Patient confidentiality was maintained throughout the study, and data were used exclusively for research.

Note on Modifications and New Methods

Any modifications to standard procedures were documented and justified in the study protocol. New or uncommon methods were described in detail to ensure reproducibility and reliability. The emphasis was placed on transparency and adherence to ethical guidelines when conducting the research and reporting the results.

Results

The study assessed the effectiveness of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) and opioids in reducing knee pain in patients with osteoarthritis. Fifty patients were randomised into two groups: Group I (NSAIDs) and Group II (opioids). A total of 50 patients with knee osteoarthritis were randomised into two groups: Group I (NSAIDs) with 25 participants, and Group II (opioids) also with 25 participants. The demographic and baseline characteristics, including the number of participants, age, gender distribution, body mass index (BMI), and duration of osteoarthritis (OA), showed no significant differences between the two groups (Table 1).

Table 1. Demographic and Baseline Characteristics

Characteristic	Group I (NSAIDs)	Group II (Opioids)	P-value
Number of Participants	25	25	1.0
Age (years, mean ± SD)	52.4 ± 6.3	53.1 ± 5.9	0.67
Gender (M/F)	12/13	14/11	0.45
BMI (kg/m², mean ± SD)	29.8 ± 4.2	30.5 ± 3.8	0.53
Duration of OA (years)	6.2 ± 2.5	6.5 ± 2.8	0.74

The pain intensity reduction, measured using the Visual Analog Scale (VAS), demonstrated significant improvements in both groups over a 3-month period. Group I (NSAIDs) showed a reduction in VAS score from 7.6 ± 1.2 at baseline to 5.4 ± 1.4 at 3 months, with a change in VAS score of -2.2 ± 0.6 (P=0.001). Group II (opioids) exhibited a reduction from 7.7 ± 1.3 at baseline to 6.0 ± 1.5 at 3 months, with a change in VAS score of -1.7 ± 0.7 (P=0.001) (Table 2).

Table 2. Pain Intensity Reduction (VAS Score) at 3 Months

Medication	Baseline VAS	3 Months VAS	Change in VAS Score	P-value
Group I (NSAIDs)	7.6 ± 1.2	5.4 ± 1.4	-2.2 ± 0.6	**0.001**
Group II (Opioids)	7.7 ± 1.3	6.0 ± 1.5	-1.7 ± 0.7	**0.001**

Functional improvement, assessed using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), was significant in both groups. Group I (NSAIDs) showed a decrease in WOMAC score from 58.3 ± 8.2 at baseline to 42.1 ± 9.4 at 3 months, with a change in WOMAC score of -16.2 ± 5.1 (P=0.001). Group II (opioids) showed a decrease from 59.0 ± 8.5 at baseline to 46.8 ± 10.2 at 3 months, with a change in WOMAC score of -12.2 ± 6.3 (P=0.001) (Table 3).

Table 3. Functional Improvement (WOMAC Score) at 3 Months

Medication	Baseline WOMAC	3 Months WOMAC	Change in WOMAC Score	P-value
Group I (NSAIDs)	58.3 ± 8.2	42.1 ± 9.4	-16.2 ± 5.1	**0.001**
Group II (Opioids)	59.0 ± 8.5	46.8 ± 10.2	-12.2 ± 6.3	**0.001**

Adverse events reported included gastrointestinal issues, dizziness, nausea, and constipation. Gastrointestinal issues were reported by 3 (12%) participants in Group I and 2 (8%) in Group II (P=0.68). Dizziness was reported by 2 (8%) participants in Group I and 5 (20%) in Group II (P=0.18). Nausea was reported by 1 (4%) participant in Group I and 4 (16%) in Group II (P=0.14). Constipation was not reported in Group I but was reported by 6 (24%) participants in Group II (P=0.02) (Table 4).

Table 4. Adverse Events Reported

Adverse Event	Group I (NSAIDs)	Group II (Opioids)	P-value
Gastrointestinal Issues	3 (12%)	2 (8%)	0.68
Dizziness	2 (8%)	5 (20%)	0.18
Nausea	1 (4%)	4 (16%)	0.14
Constipation	0	6 (24%)	**0.02**

Discussion

The findings of our study contribute to the ongoing debate regarding the optimal management of knee osteoarthritis pain, comparing the efficacy of NSAIDs and opioids. Our results demonstrated that both NSAIDs and opioid analgesics significantly reduce pain intensity and improve functional status among patients with knee osteoarthritis. These findings align with previous research indicating the effectiveness of these drug classes in managing osteoarthritis pain[8][9].

Interestingly, our study observed that while both treatment groups reported significant improvements, NSAIDs showed a slightly better performance in reducing pain intensity and improving functional outcomes as measured by VAS and WOMAC scores, respectively. This is consistent with the literature suggesting that NSAIDs may offer a more favourable benefit-risk profile compared to opioids for osteoarthritis pain management[10][11]. Furthermore, the higher incidence of adverse events, particularly constipation, in the opioid group underscores the need for careful patient selection and monitoring when prescribing these medications[12].

A notable strength of our study is the direct comparison of NSAIDs and opioids in a controlled setting, providing valuable insights into their relative efficacies and safety profiles. However, several limitations must be acknowledged. First, the sample size of 80 patients, though adequate for preliminary findings, may not fully capture the variability in response to these treatments across the broader osteoarthritis population. More extensive multicenter trials are needed to confirm our findings and assess their generalizability[13]. Additionally, the follow-up period of 3 months, while sufficient to observe short-term outcomes, does not address the long-term efficacy and safety of these treatments[14].

Another potential limitation is the lack of a placebo control group, which could help better understand the magnitude of the placebo effect in pain management studies. The inclusion of a placebo group in future studies could provide a more nuanced understanding of the true efficacy of NSAIDs and opioids in osteoarthritis pain management[15].

Our study adds to the evidence suggesting that careful consideration should be given to the choice between NSAIDs and opioids for the management of knee osteoarthritis pain. It highlights the importance of balancing efficacy with the potential for adverse events, particularly in long-term management strategies for osteoarthritis.

Conclusion

Both NSAIDs and opioids are effective in reducing pain and improving functional status in knee osteoarthritis, with NSAIDs showing a slight advantage in terms of efficacy and adverse event profile. These findings should be interpreted in the context of the study's limitations, sample size and duration. Future research should aim to explore these findings further through larger, longer-term studies with a diverse patient population. The ultimate goal should be to develop tailored pain management strategies that optimise efficacy while minimising risks and enhancing the quality of life for patients with knee osteoarthritis.

Conflicts of Interest

The authors declare that they have no conflicts of interest concerning this study.

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This research received no specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Abbreviations

OA: Osteoarthritis
NSAIDs: Non-Steroidal Anti-Inflammatory Drugs
VAS: Visual Analog Scale
WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index
SD: Standard Deviation
M/F: Male/Female
BMI: Body Mass Index
IRB: Institutional Review Board
ACR: American College of Rheumatology
SPSS: Statistical Package for the Social Sciences

References:

[1]. Cross M, Smith E, Hoy D, et al. The global burden of hip and knee osteoarthritis: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis. 2014;73(7):1323-1330.
[2]. Litwic A, Edwards MH, Dennison EM, et al. Epidemiology and burden of osteoarthritis. Br Med Bull. 2013;105:185-199.
[3]. Harirforoosh S, Asghar W, Jamali F. Adverse effects of Non-Steroidal Anti-Inflammatory Drugs: an update of gastrointestinal, cardiovascular and renal complications. J Pharm Pharm Sci. 2013;16(5):821-847.
[4]. Chou R, Turner JA, Devine EB, et al. The effectiveness and risks of long-term opioid therapy for chronic pain: a systematic review for a National Institutes of Health Pathways to Prevention Workshop. Ann Intern Med. 2015;162(4):276-286.
[5]. McAlindon TE, Bannuru RR, Sullivan MC, et al. OARSI guidelines for the non-surgical management of knee osteoarthritis. Osteoarthritis Cartilage. 2014;22(3):363-388.
[6]. Nüesch E, Rutjes AWS, Husni E, et al. Oral or transdermal opioids for osteoarthritis of the knee or hip. Cochrane Database Syst Rev. 2009;(4):CD003115.
[7]. da Costa BR, Reichenbach S, Keller N, et al. Effectiveness of Non-Steroidal Anti-Inflammatory Drugs for the treatment of pain in knee and hip osteoarthritis: a network meta-analysis. Lancet. 2016;387(10033):2093-2105.

[8]. Smith SR, Deshpande BR, Collins JE, Katz JN, Losina E. Comparative pain reduction of oral Non-Steroidal Anti-Inflammatory Drugs and opioids for knee osteoarthritis: systematic analytic review. Osteoarthritis and Cartilage. 2016;24(6):962-972.

[9]. Da Costa BR, Nüesch E, Kasteler R, Husni E, Welch V, Rutjes AWS, Jüni P. Oral or transdermal opioids for osteoarthritis of the knee or hip. Cochrane Database of Systematic Reviews. 2014;(9):CD003115.

[10]. Hochberg MC, Altman RD, April KT, Benkhalti M, Guyatt G, McGowan J, Towheed T, Welch V, Wells GA, Tugwell P. American College of Rheumatology 2012 recommendations for the use of nonpharmacologic and pharmacologic therapies in osteoarthritis of the hand, hip, and knee. Arthritis Care & Research. 2012;64(4):465-474.

[11]. Zhang W, Moskowitz RW, Nuki G, Abramson S, Altman RD, Arden N, Bierma-Zeinstra S, Brandt KD, Croft P, Doherty M, Dougados M, Hochberg M, Hunter DJ, Kwoh K, Lohmander LS, Tugwell P. OARSI recommendations for the management of hip and knee osteoarthritis, Part II: OARSI evidence-based, expert consensus guidelines. Osteoarthritis and Cartilage. 2008;16(2):137-162.

[12]. Viscusi ER. Clinical Overview and Considerations for the Management of Opioid-induced Constipation in Patients With Chronic Noncancer Pain. Clin J Pain. 2019;35(2):174-188. doi: 10.1097/AJP.0000000000000662.

[13]. Bannuru RR, Schmid CH, Kent DM, Vaysbrot EE, Wong JB, McAlindon TE. Comparative effectiveness of pharmacologic interventions for knee osteoarthritis: A systematic review and network meta-analysis. Annals of Internal Medicine. 2015;162(1):46-54.

[14]. Felson DT, Zhang Y. An update on the epidemiology of knee and hip osteoarthritis with a view to prevention. Arthritis and Rheumatism. 1998;41(8):1343-1355.

[15]. Lin J, Zhang W, Jones A, Doherty M. Efficacy of topical Non-Steroidal Anti-Inflammatory Drugs in the treatment of osteoarthritis: meta-analysis of randomised controlled trials. BMJ. 2004;329(7461):324.