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Comparison of The Efficacy of Oral Versus Topical NSAIDs for Pain Relief in Osteoarthritis

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ABSTRACT

Osteoarthritis is a leading cause of chronic musculoskeletal pain worldwide, significantly impairing quality of life and increasing healthcare burden. Nonsteroidal anti-inflammatory drugs (NSAIDs), administered orally or topically, remain the mainstay of symptom management, though their relative efficacy and safety profiles require further evaluation. **Objectives:** To compare the efficacy of oral versus topical NSAIDs for pain relief in osteoarthritis. **Methods:** This quasi-experimental study was conducted at the Department of Rheumatology, Khyber Teaching Hospital, Peshawar, during the period February 2025 to May 2025. 132 male and female patients aged more than 50 years diagnosed with osteoarthritis were assigned to topical (n=66) and oral NSAID (n=66) groups. Diclofenac gel and tablet diclofenac 50mg BD were administered for 4 weeks, respectively. Patients were evaluated for pain relief using the VAS score. **Results:** Mean age in topical versus oral NSAIDs was 64.73±8.25 years versus 66.55±9.606 years, respectively. Male participants were 41 (52.6%) and 37(47.4%) in topical and oral groups, respectively. 23(50.0%) had bilateral joint involvement in both groups. Pain relief was recorded in 25 patients (37.9%) with topical NSAIDs compared to 35 (53.1%) with oral NSAIDs (p-value 0.080). **Conclusions:** Statistically insignificant difference in pain relief was recorded with topical and oral NSAIDs in patients with chronic MSK pain of osteoarthritis. Though the proportion of pain relief was better with oral NSAIDs, the difference was statistically not significant.

INTRODUCTION

The leading knee condition worldwide is osteoarthritis (OA), which is also one of the main reasons for persistent pain brought on by musculoskeletal injuries [1]. The advancing age of human beings and the growing epidemic of obesity are expected to contribute to a rise in the proportion of persons with clinically significant OA. Given how quickly the frequency of an already prevalent illness is rising, it is likely that OA will continue to have an increasing influence on the nation's healthcare and health care systems in the years to come [2]. Even though it can be difficult to determine the prevalence and prevalence of osteoarthritis, new research indicates that the ailment has been increasing over the past ten years and affects a significant percentage of individuals globally [3]. Osteoarthritis frequently affects the hip and knee joint. Over the past couple of decades, the number of cases of this particular ailment has grown and is anticipated to keep growing, placing additional strain on health-related finances and lowering people's standard of living [4]. Numerous demographic variables are linked to osteoarthritis (OA), including repeated trauma, ongoing misuse and deterioration, elevated BMI, sex, heredity, and several metabolic, or hormonal problems have all been linked to an elevated risk [5]. The emergence of

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abnormalities and tiny erosions, together with inflammation of the cartilage in the joint, are preliminary indications of the disease process of OA. Higher type I and III collagen synthesis from the chondrocyte reaction leads to soft fragmentation, which in turn triggers the expulsion of intra-articular enzymes, which cause cartilage to eventually decline, destruction, and the development of subchondral cysts, throughout which contribute to joint inflammation and discomfort [6]. The goal of traditional medical management of osteoarthritis is to control its symptoms, and nonsteroidal anti-inflammatory medications (NSAIDs) are frequently used in this regard. Due to their painkiller and anti-inflammatory qualities, they are frequently used in musculoskeletal disorders. Opioids are also frequently used to treat persistent discomfort, which is frequently brought on by osteoarthritis [7]. A traditional NSAID that can be applied topically or taken orally, diclofenac, which reduces the production of prostaglandins, which are biochemical indicators linked to inflammation and painful sensations. 8 In addition to its analgesic and antipyretic properties, diclofenac is typically tolerated easily; nonetheless, oral treatment has been linked to significant cardiovascular and gastrointestinal concerns [8]. In a randomized controlled trial, overall pain relief was observed in 36.67% patients who were advised NSAIDs for pain relief in osteoarthritis, pain relief in the topical group was recorded in 28.0% and 51.6% patients with tablet diclofenac [9]. The use of topical application of diclofenac is consequently probably better to oral diclofenac for the relief of symptoms of OA in those individuals with GI, cardiac, and renal comorbidities, given that diclofenac is specifically intended to offer symptomatic managing of OA.

This study aims to provide medical professionals an understanding of recent research on this subject so they can make an informed decision when choosing between topical and oral diclofenac, particularly for the elderly and those who are at risk.

METHODS

This quasi-experimental study was carried out at the department of Rheumatology, Khyber Teaching Hospital department, Peshawar, during the period February 2025 to May 2025, after taking approval from the research review board of Khyber Medical College, Peshawar, Pakistan (Ref. No. 137/DME/KMC). Informed consent was obtained before enrollment in the study after explaining the study risks, benefits, and purpose. Participants were enrolled using a convenience sampling technique. Baseline clinical and socio-demographic data were collected. Participants aged 50 years or above diagnosed with osteoarthritis, complaining of knee joint pain (VAS>4), were enrolled. Patients with inflammatory joint disease, systemic disease, prior history of intra-articular steroid injection, infected joint, and traumatic injury to the knee were excluded. Osteoarthritis was confirmed when the patient was complaining of knee joint pain (VAS>4), and X-ray AP view of the joint shows narrowing of the knee joint space and formation of osteophytes. Efficacy was measured in terms of pain relief assessed after 4 weeks of treatment using the VAS score. The VAS score ranges from 0 to 10, with 0 representing no pain and 10 representing maximum pain. Generally, the score is interpreted as 0=no pain, 1 to 3=mild pain, 4 to 6= moderate pain, and 7 to 10 = severe pain. It is a globally adopted score for pain assessment in clinical studies, validated and endorsed [10]. Sample size was 132, (66 in each group), calculated using online Open Epi calculator using the formula $n = [(Z\alpha/2 + Z\beta)^2 \times (p0(1-p0) + p1(1-p1))] / (p1 - p0)^2$ taking anticipated proportion of pain relief with topical and oral NSAIDs as 28.0% and 51.6% respectively, 80.0% power of test and 95% confidence level [9]. Detailed history and clinical examination were performed for all patients. Following this, patients were assigned to two groups (A and B) in equal numbers through blocked randomization. Patients in group A received topical diclofenac, and group B received oral diclofenac. Topical diclofenac (1%) was administered four times per day, approximately 1gram of gel was gently applied on the affected knee cap and rubbed with hands softly for 2 to 3 minutes. The gel wasn't cleaned thereafter. Oral diclofenac was administered as a tablet in 50mg strength twice daily after a meal. Both groups were evaluated after 4 weeks for pain relief using a visual analogue scale. Data analysis was carried out using SPSS version 26.0. Continuous data were reported as means and standard deviation, and categorical data as frequencies and percentages. Pain relief in both groups was compared using the chi-square test at 5% significance level. Effect modifiers were controlled through stratification. Post-stratification chi-square test was applied at 5% significance level.

RESULTS

Mean age in topical versus oral NSAIDs was 64.73±8.25 years versus 66.55±9.606 years, respectively and mean pain duration in the topical versus oral group was 7.70±2.578 versus 8.36±2.944 months (Table 1).

Table 1: Descriptive Statistics of Study Participants (N=132, 66 In Each Group)

Groups	Variables	Mean ± SD
Topical	Age (years)	64.73 ± 8.25
	BMI (kg/m^2)	24.92 ± 0.96
	Duration (months)	7.70 ± 2.57
Oral	Age (years)	66.55 ± 9.60
	BMI (kg/m^2)	25.32 ± 0.99

In terms of age distribution, 36 patients (52.9%) were aged

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below 65 years in the topical group compared to 32 (47.1%) in the oral group. Male participants were 41 (52.6%) and 37(47.4%) in topical and oral groups, respectively. 23(50.0%) had bilateral joint involvement in both groups (Table 2).

Table 2: Distribution of Study Participants According to Various Parameters(Total=32, Topical=66, Oral=66)

Variables	Category	Topical, N (%)	Oral, N (%)	Total, N (%)
Age (years)	≤ 65	36 (52.9)	32 (47.1)	68 (100.0)
	> 65	30 (46.9)	34 (53.1)	64 (100.0)
Gender	Male	41 (52.6)	37 (47.4)	78 (100.0)
	Female	25 (46.3)	29 (53.7)	54 (100.0)
BMI (kg/m^2)	≤ 24.0	16 (69.6)	7 (30.4)	23 (100.0)
	> 24.0	50 (45.9)	59 (54.1)	109 (100.0)
Pain Duration (months)	≤ 7	32 (56.1)	25 (43.9)	57 (100.0)
	> 7	34 (45.3)	41 (54.7)	75 (100.0)
Joint	Right	25 (58.1)	18 (41.9)	43 (100.0)
	Left	18 (41.9)	25 (58.1)	43 (100.0)
	Bilateral	23 (50.0)	23 (50.0)	46 (100.0)
Smoking	Yes	19 (41.3)	27 (58.7)	46 (100.0)
	No	47 (54.7)	39 (45.3)	86 (100.0)
Comorbidities	Hypertension	18 (39.1)	28 (60.9)	46 (100.0)
	Diabetes Mellitus (DM)	33 (52.4)	30 (47.6)	63 (100.0)
	Ischemic Heart Disease (IHD)	15 (65.2)	8 (34.8)	23 (100.0)

Comparison of pain relief in both groups showed that the chi-square p-value for the difference in pain relief was 0.080, which was statistically not significant(Table 3).

Table 3: Comparison of Pain Relief in Topical Versus Oral NSAIDs (Total=132, Topical=66, Oral=66)

Pain Relief	Topical, n (%)	Oral, n (%)	Total, n (%)	p-Value
Yes	25 (41.7)	35 (58.3)	60 (100.0)	0.080
No	41 (56.9)	31 (43.1)	72 (100.0)	
Total	66 (50.0)	66 (50.0)	132 (100.0)	

DISCUSSIONS

Chronic MSK pain is still a widespread issue, even with the latest advances in therapy. Substantial impairment may arise from prolonged MSK pain, which is frequently linked to decreased activity, insomnia, exhaustion, and mood swings. Patients with chronic pain may find themselves in a "vicious circle" of issues. Anxiety and depression brought on by the pain might exacerbate it [11, 12]. NSAIDs and other drugs, such as antidepressants, are among the many therapy options available for persistent MSK pain [13]. There are several ways to deliver NSAIDs, including topical, parenteral, rectal, and oral. Even though taking them by mouth is among the most often utilized methods, it can be linked to major adverse effects, including renal, cardiovascular, and gastrointestinal problems [14]. Numerous topical NSAID formulations, such as gels and transdermal patches, are accessible to address the issue with oral NSAIDs and are authorized for use for pain indications [15]. Diclofenac, when used topically, penetrates the subcutaneous tissue. A tiny lipophilic molecule, it has been demonstrated to diffuse quickly through the skin and to disperse into synovial fluid. When a dressing with occlusive qualities is employed, penetration is boosted and continues into the basal skin layers to a depth of 3–4 mm [16]. After many epicutaneous applications, diclofenac significantly penetrates the skeletal muscle directly. Within four weeks of starting medication, the impacts of the diclofenac sodium pill became noticeable in our research. After four weeks of therapy, the 100 mg diclofenac sodium pill also resulted in a greater decrease in the quantitative scale of evaluation for pain. A study revealed comparable outcomes with diclofenac SR tablets [17]. When the two categories in this research were evaluated for effectiveness, it was shown that local diclofenac gel was just as effective at lowering pain as daily tablets of diclofenac sodium (100 mg) at the end of four weeks. Final pain reduction in this trial was estimated to be 37.9% for the topical diclofenac gel group and 53.1% for the diclofenac tablet group. According to research, the greatest degree of patient perception of recovery was associated with a 50% decrease in the level of pain [18]. Despite a thorough review of the literature, no trials comparing the effects of topical and tablet forms of diclofenac sodium SR on chronic MSK pain have been identified. Comparing our findings with previous publications is therefore challenging. However, in many trials, topical and tablet forms of diclofenac sodium SR have been contrasted in terms of safety profile. In a previous study, the topical group produced analgesia comparable to oral diclofenac (100 mg) after the extraction of mandibular impacted third teeth, as assessed by VAS [19]. NSAIDs can effectively reduce chronic as well as acute pain when given locally. They lessen the inflammatory response and prevent the creation of prostaglandins. Topical and oral diclofenac sodium work similarly by inhibiting prostaglandin production, which accounts for their comparable effectiveness. According to a Previous study, the topically produced blood concentrations were lower than those obtained orally but lasted longer [20]. According to previous research, the absorbed dosage seems to be sufficient for therapeutic usage; however, the quantity of medication accessible for addressing the locations where it works is less compared to that taken orally [21]. The fact that the topical and oral diclofenac groups did not significantly vary in their pain relief scores at the end of four weeks was one of our study's key conclusions. By the time therapy ended, patients in both groups reported a general improvement in their overall condition for persistent MSK pain, both significantly.

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Research that involved individuals with rheumatoid arthritis and OA found similar results. In the transdermal diclofenac diethylamine group, 20% of patients had adverse medication responses, with 16% of those patients reporting local discomfort across the applied region. Except for 4% of patients experiencing abdominal burning, the transdermal diclofenac diethylamine patch was generally well tolerated. All of the negative medication responses, however, were modest in nature and went away with continuing use [22].

CONCLUSIONS

The present study showed that topical application of NSAIDs was as effective as oral NSAIDs in patients with chronic MSK pain of osteoarthritis. Though the proportion of pain relief was better with oral NSAIDs compared to locally applied NSAIDs, the difference in pain relief was statistically not significant. Further studies should be conducted to evaluate the long-term outcomes and adverse events, as well as cost assessment.

Authors Contribution

Conceptualization: IUD
Methodology: N, HA, A
Formal analysis: AA, HA, UA
Writing review and editing: AA, N, UA, AZ, AKM

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

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REFERENCES

[1] JiaoYi P, YongQi S, KeChun G, XingYu L, ZeZhong L, Jin Shuai D, *et al.* Assessing the Efficacy and Safety of Different Nonsteroidal Anti-Inflammatory Drugs in the Treatment of Osteoarthritis: A Systematic Review and Network Meta-Analysis Based on RCT Trials. PLoS One. 2025 May; 20(5): e0320379. doi: 10.1371/journal.pone.0320379.

[2] Bashiri H, Mohammadi F, Soltani H, Sahebnasagh A, Hoseinzadeh F, Rostami M, *et al.* Comparative Efficacy of Topical Meloxicam and Diclofenac in Primary Knee Osteoarthritis: A Randomized Double-Blind Controlled Trial. SN Comprehensive Clinical Medicine. 2025 May; 7(1): 134. doi: 10.1007/s42399-025-01888.

[3] Wang Y, Fan M, Wang H, You Y, Wei C, Liu M, *et al.* Relative Safety and Efficacy of Topical and Oral NSAIDs in the Treatment of Osteoarthritis: A Systematic Review and Meta-Analysis. Medicine. 2022 Sep; 101(36): e30354. doi: 10.1097/MD.0000000000030354.

[4] Zeng C, Doherty M, Persson MS, Yang Z, Sarmanova A, Zhang Y, *et al.* Comparative Efficacy and Safety of Acetaminophen, Topical and Oral Non-Steroidal Anti-Inflammatory Drugs for Knee Osteoarthritis: Evidence from a Network Meta-Analysis of Randomized Controlled Trials and Real-World Data. Osteoarthritis and Cartilage. 2021 Sep; 29(9): 1242-51. doi: 10.1016/j.joca.2021.06.004.

[5] Wolff DG, Christophersen C, Brown SM, Mulcahey MK. Topical Nonsteroidal Anti-Inflammatory Drugs in the Treatment of Knee Osteoarthritis: A Systematic Review and Meta-Analysis. The Physician and Sportsmedicine. 2021 Oct; 49(4): 381-91. doi: 10.1080/00913847.2021.1886573.

[6] Da Costa BR, Pereira TV, Saadat P, Rudnicki M, Iskander SM, Bodmer NS, *et al.* Effectiveness and Safety of Non-Steroidal Anti-Inflammatory Drugs and Opioid Treatment for Knee and Hip Osteoarthritis: Network Meta-Analysis. British Medical Journal. 2021 Oct; 375: n2321. doi: 10.1136/bmj.n2321.

[7] Lee JK, Abbas AA, Cheah TE, Simanjuntak RN, Sockalingam S, Roohi S. Topical Nonsteroidal Anti-Inflammatory Drugs for Management of Osteoarthritis Pain: A Consensus Recommendation. Journal of Orthopaedic Research. 2023 Sep; 41(9): 1916-24. doi: 10.1002/jor.25549.

[8] Bhat C, Rosenberg H, James D. Topical Nonsteroidal Anti-Inflammatory Drugs. Canadian Medical Association Journal. 2023 Sep; 195(36): E1231. doi: 10.1503/cmaj.230578.

[9] Selig DJ, Kress AT, Horton IM, Livezey JR, Sadik EJ, DeLuca JP. Pharmacokinetics, Safety, and Efficacy of Intra-Articular Non-Steroidal Anti-Inflammatory Drug Injections for the Treatment of Osteoarthritis: A Narrative Review. Journal of Clinical Pharmacy and Therapeutics. 2022 Aug; 47(8): 1122-33. doi: 10.1111/jcpt.13669.

[10] Stoll V, Jost JM, Jack A, Johnson T, Klein S, Darbhanga J, *et al.* Non-Steroidal Anti-Inflammatory Drugs and Osteopathic Manipulative Treatment for Pain Management in Patients with Osteoarthritis: A Literature Review. Cureus. 2023 Aug; 15(8): e44168. doi: 10.7759/cureus.44168.

[11] Weng Q, Goh SL, Wu J, Persson MS, Wei J, Sarmanova A, *et al.* Comparative Efficacy of Exercise Therapy and Oral Non-Steroidal Anti-Inflammatory Drugs and Paracetamol for Knee or Hip Osteoarthritis: A Network Meta-Analysis of Randomized Controlled Trials. British Journal of Sports Medicine. 2023 Aug; 57(15): 990-6. doi: 10.1136/bjsports-2022-105898.

DOI: https://doi.org/10.54393/pjhs.v6i9.3265

[12] Chen ZR, Chen BK, Li P, Feng K. Efficacy and Safety of Different Topical Diclofenac Formulations for the Treatment of Knee Osteoarthritis: A Meta-Analysis of Short-Term and Long-Term Treatment Comparisons. BMC Musculoskeletal Disorders. 2025 Mar; 26(1): 230. doi: 10.1186/s12891-025-08465-7.

[13] El-Tallawy SN, Nalamasu R, Salem GI, LeQuang JA, Pergolizzi JV, Christo PJ. Management of Musculoskeletal Pain: An Update with Emphasis on Chronic Musculoskeletal Pain. Pain and Therapy. 2021 Jun; 10(1): 181-209. doi: 10.1007/s40122-021-00235-2.

[14] Sabha M and Hochberg MC. Non-Surgical Management of Hip and Knee Osteoarthritis: Comparison of ACR/AF and OARSI 2019 and VA/DoD 2020 Guidelines. Osteoarthritis and Cartilage Open. 2022 Mar; 4(1): 100232. doi: 10.1016/j.ocarto.2021.100232.

[15] Smith AC, Smith MS, Roach RP, Prine BR, Moser MW, Farmer KW, *et al.* Making Sense of Topical Pain Relief Options: Comparing Topical Analgesics in Efficacy and Safety. Sports Health. 2025 Jul; 17(4): 843-52. doi: 10.1177/19417381241280593.

[16] Pelletier JP, Martel-Pelletier J, Rannou F, Cooper C. Efficacy and Safety of Oral NSAIDs and Analgesics in the Management of Osteoarthritis: Evidence from Real-Life Setting Trials and Surveys. Seminars in Arthritis and Rheumatism. 2016 Feb; 45(4 Suppl): S22-S27. doi: 10.1016/j.semarthrit.2015.11.009.

[17] Persson MS, Stocks J, Sarmanova A, Fernandes G, Walsh DA, Doherty M, *et al.* Individual Responses to Topical Ibuprofen Gel or Capsaicin Cream for Painful Knee Osteoarthritis: A Series of N-of-1 Trials. Rheumatology. 2021 May; 60(5): 2231-7. doi: 10.1093/rheumatology/keaa561.

[18] Chen YF, Jobanputra P, Barton P, Bryan S, Fry-Smith A, Harris G, *et al.* Cyclooxygenase-2 Selective Non-Steroidal Anti-Inflammatory Drugs (Etodolac, Meloxicam, Celecoxib, Rofecoxib, Etoricoxib, Valdecoxib, and Lumiracoxib) for Osteoarthritis and Rheumatoid Arthritis: A Systematic Review and Economic Evaluation. Health Technology Assessment. 2008 Jan; 12(11): 1-278. doi: 10.3310/hta12110.

[19] Shinde VA, Kalikar M, Jagtap S, Dakhale GN, Bankar M, Bajait CS, *et al.* Efficacy and Safety of Oral Diclofenac Sustained Release versus Transdermal Diclofenac Patch in Chronic Musculoskeletal Pain: A Randomized, Open-Label Trial. Journal of Pharmacology and Pharmacotherapeutics. 2017 Dec; 8(4): 166-71. doi: 10.4103/jpp.JPP_35_17.

[20] Li T, Guo M and Zhang W. Comparison of Therapeutic Effects of Topical Application of Diclofenac Sodium Nanoparticles and Conventional Placebo on Knee Osteoarthritis. Cellular and Molecular Biology. 2022 Mar; 68(3): 171-8. doi: 10.14715/cmb/2022.68.3.20.

[21] Silverman SL, Schepman P, Rice JB, Beck CG, Johnson M, White A, *et al.* Drug Utilization, Clinical and Economic Outcomes of Patients with Osteoarthritis of the Hip and/or Knee Treated with Long-Term Use of Traditional NSAIDs, Topical NSAIDs, and COX-2 Inhibitors. Current Medical Research and Opinion. 2022 Jul; 38(7): 1153-66. doi: 10.1080/03007995.2022.2078098.

[22] Jiang W, Zhang Y, Huang Y, Cheng Y. Effects of Different Nonsteroidal Anti-Inflammatory Drugs Combined with Platelet-Rich Plasma on Inflammatory Factor Levels in Patients with Osteoarthritis. Journal of Healthcare Engineering. 2022; 2022(1): 1979892. doi: 10.1155/2022/1979892.