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Original Article

Prescription Pattern Evaluation and Standard Guidelines Adherence in Osteoarthritis Management: A Prospective Observational Study in Secondary Healthcare Settings

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ABSTRACT

To evaluate prescriptions and highlight the pattern of pharmacological and non-pharmacological interventions for management in osteoarthritis patients and clinicians' adherence to the updated international guidelines for management of osteoarthritis of knee, hips, and hand joints in the Secondary healthcare setting (private osteoarthritis clinic) in Lahore. A prospective observational cross-sectional study design was employed for 6 months from September 2025 to March 2026. Patients aged above 18 years, both male and female, with a confirmed diagnosis of osteoarthritis through X-ray were included in the study. Total of 300 patients prescriptions were evaluated and adherence was checked against the common guidelines mentioned in NICE (national institute of health and care excellence), OARSI (osteoarthritis research society international), ACR/AF (American college of rheumatologist/ Arthritis Foundation), ESCEO (European society for clinical and economic osteoarthritis) EULAR (European alliance of association for rheumatology) and AAOS(American academy of orthopedic surgeons).NSAIDs were prescribed 75% of the sample prescriptions, with the highest rate of diclofenac (23.5%) prescriptions, followed by the Selective COX-2 inhibitor celecoxib (21.1%) that suggest over prescription of NSAIDs. In contrast, non- pharmacological interventions were prescribed in only 37% prescriptions. Only in 32% prescriptions, a gastroprotective agent was co-administered with NSAID. The irrational prescribing patterns of NSAIDs and under-reliance on the non-pharmacological interventions clearly state non-adherence to the International standard guidelines. It can be improved through expanding the role of the clinical pharmacist for rationalizing prescriptions and improving patient safety, and by reinforcing clinicians to follow the guidelines and educate and counsel patients about lifestyle modifications to slow the progression of arthritis.

Keywords: Irrational Prescribing Practices; NSAIDs; Non-Pharmacological Interventions; Osteoarthritis; Prescription Evaluation; Standard OA Guidelines.

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INTRODUCTION

Chronic diseases involving excruciating pain or those requiring long-term management with no ultimate cure have become the reasons that make the art of writing a rationale prescription tricky for a physician; this poses a significant public health concern. Osteoarthritis (OA) is a musculoskeletal disorder marked by loss of articular cartilage in synovial joints, usually due to the wear and tear of the joints, along with the thickening of the capsule (Coaccioli *et al.*, 2022) and requires interventions for long-term management of pain and to slow down the progression of the disease because it has no ultimate cure to date (Englund, 2023).

Non-surgical management options for OA include both pharmacological and non-pharmacological interventions that are mentioned in different international guidelines, including NICE (National Institute for Health and Care Excellence) (Nelligan, 2023), OARSI (Osteoarthritis Research Society International) (Sabha & Hochberg, 2022), ACR/AF (American college of Rheumatology/ Arthritis Foundation), ESCEO (European society for Clinical and economic osteoarthritis), EULAR (European Alliance of association for Rheumatology), and AAOS (American Academy of Orthopedic Surgeons) (Brophy & Fillingham, 2022). These guidelines strongly advocate for educating and counselling the patient about disease, lifestyle changes, and non-pharmacological interventions as the first line therapy for OA management. Non-pharmacological interventions include low-impact exercises, both land-based and aquatic, weight loss, physiotherapy, yoga, and acupuncture, which are strongly recommended. Pharmacologic interventions include the use of non-steroidal anti-inflammatory drugs (NSAIDs) and intra-articular injections of corticosteroid or (Anderson & Shaheed, 2022) hyaluronic acid.

According to the recent updates, international guidelines no longer consider paracetamol an effective treatment option for OA (Anderson & Shaheed, 2022; Shareef *et al*., 2025). NSAIDs are not recommended for patients with cardiovascular comorbidities. If required use NSAIDs are to be used at the lowest possible dose and for the shortest duration of time. IAC (intra-articular corticosteroid injections) are conditionally recommended, but not for widespread pain, and some guidelines strongly oppose their use. Topical NSAIDs should be used first, and if the pain continues, then move to oral NSAIDS. If patients have GIT ulcers history, always prescribe a gastroprotective agent with NSAIDs, and if patients have been taking NSAIDs for a long period of time, then they must be co-administered with gastroprotective agents. Use of IAC should be very limited, only in case of severe inflammation; it should be used, but not for the long term. Not more than 3-4 injections a year. Oral opioids are strongly recommended against in all guidelines. In case of knee and hand osteoarthritis, a topical NSAID is the first-line treatment option. In case of knee and hip OA, weight loss should always be recommended in obese patients. Adherence to these guidelines is very low in Pakistan, especially in the case of non-pharmacological interventions (Said *et al*., 2022) and irrational prescribing of NSAID (Shareef *et al*., 2025) and ICA has ultimately not only worsened the osteoarthritis progression but also decreased the quality of life of people because of immobility. All this caused an increase in the economic burden of OA patients every year on our already crumbling economy and healthcare system.

This study aims to determine the prescription pattern for symptomatic management of OA, including both pharmacological and non-pharmacological interventions, and adherence to the international treatment guidelines among rheumatologists and orthopedics in OA of the knee, hips, and hands. Prevalence studies suggest that by 2021, the prevalence of OA increased from 2.8 million to 8.4 million by 2021 (Tayyab *et al*., 2025) and the high incidence of irrational prescribing, especially in private clinic settings, suggests that authorities need to reinforce the healthcare professionals in Pakistan to adhere to the established clinical guidelines.

METHODS AND MATERIALS

Study Design and Setting

A prospective observational cross-sectional study design was employed for 6 months from September 2025 to March 2026 to evaluate prescriptions and highlight the pattern of pharmacological and non-pharmacological interventions for management in osteoarthritis patients and their adherence to the updated international guidelines for management. One-time data was

collected from the prescriptions of the OA patients with no follow-up or interventions to the patients or to the doctor.

Study Population and Eligibility Criteria

The study was conducted in a primary health care setting, a private arthritis clinic, which serves a diverse patient population ranging from upper to middle class. These settings consisted of rheumatologists, orthopedic doctors, and orthopedic surgeons in outpatient settings. Adult patients aged above 18 years with a confirmed diagnosis of osteoarthritis through X-ray were included in the study.

Both males and females were considered eligible for inclusion. Patients suffering from rheumatoid arthritis or any other type of arthritis, and patients suffering from joint pain without an arthritis diagnosis, were excluded from the study. Patients who were planning for knee replacement but were currently using NSAIDS were included in our study. Patients who developed osteoarthritis due to any reason, such as old age, accident, or physical trauma, were all included in our study.

Sample Size and Sampling Technique

The sample size was calculated using OpenEpi, with a calculated value of 20%. So, for a 95 percent confidence level, a sample size of 246 was calculated, and with a 20 percent addition in this number for any exclusions that can happen, the final sample size was calculated to be 300 patients. The sampling technique we employed was a convenience sampling technique during a routine outpatient visit.

Data Collection and Data Collection Form

Data was collected only after a confirmed diagnosis of osteoarthritis, after an X-ray report, and the prescription was reviewed to collect data about pharmacological and non-pharmacological interventions on a structured data collection form containing four sections. Adherence to guidelines was done by checking the prescription against a questionnaire which was developed by taking common recommendations mentioned in recent international guidelines for OA named NICE (national institute of health and care excellence), OARSI (osteoarthritis research society international), ACR/AF (American college of rheumatologist/ Arthritis Foundation), ESCEO (European society for clinical and economic osteoarthritis) EULAR (European alliance of association for rheumatology) and AAOS (American academy of orthopedic surgeons).

Data Analysis

Data was analyzed using SPSS Statistical Package for Social Sciences version 27. We used descriptive and frequency analysis as well as chi-square test to compare drug givens in patients with or without comorbidities.

Ethical Approval

Since we collected data from a private clinic with no review board, we got ethical approval from our university review board, named ORIC (Office of Research, Innovation, and Commercialization), and got it signed by the head of the clinic (UCP/FOP/INT/0826)

RESULTS AND FINDINGS

Out of 300 patients included in this study, 210 were females, and the most affected joint by OA was the knee joint (84%), followed by the hip joint (8.7%). Most of the patients suffering from OA lie in the age category of 50-70 years (60.3%), and the least common age was less than 30 years of age (0.7%). The data reveal that the most common comorbidity in OA patients was hypertension (29%) (Table 1).

Table 1

Descriptive Data of Patients (n = 300)

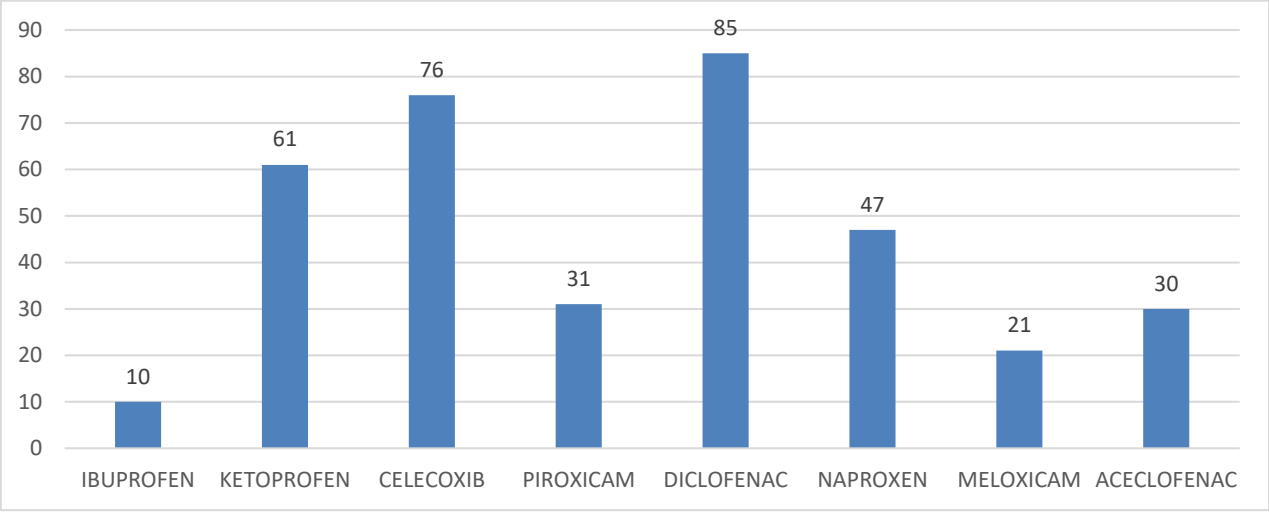
Characteristics	Frequency (n)	Percentage (%)
Gender		
Female	210	70
Male	90	30
Site affected by OA		
Knees	252	84
Hips	26	8.7
Hands	22	7.3
Comorbidities		
Stomach ulcer	28	9.3
Hypertension	87	29
Diabetes	19	6.3
Other (obesity, hyperthyroidism etc.)	62	20.7
No comorbidity	104	34.7
Age in years		
< 30	2	0.7
30 - 50	69	23
50 - 70	181	60.3
>70	48	16

Use of NSAIDs

Out of 300 prescriptions, NSAIDs were prescribed in a total of 225 prescriptions (75%). Out of which oral NSAIDs were prescribed in 175 prescriptions (57.7%). DICLOFENAC (23.5%) is the most common NSAID used in the OPD through oral as well as topical routes. Secondly, the drug prescribed is a selective COX 2 INHIBITOR that is CELECOXIB (21.1%). The least common NSAID prescribed is IBUPROFEN (2.8%). The most common topical NSAID after diclofenac prescribed was PIROXICAM (8.6%) (figure 1).

Figure 1

NSAIDS Prescribed

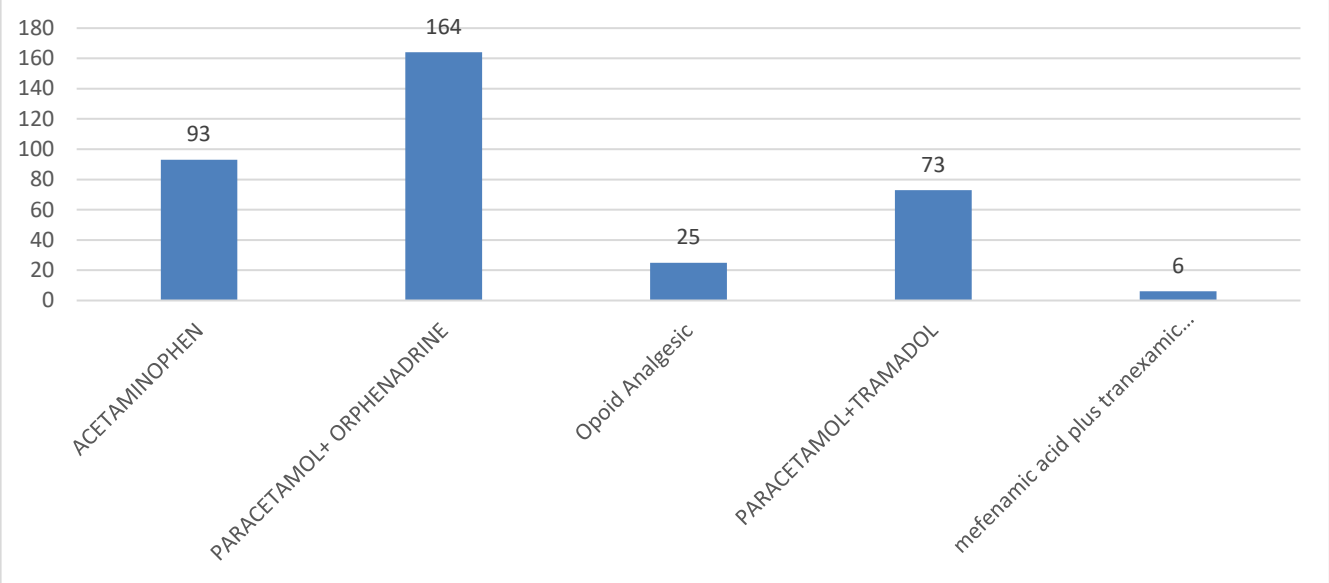


Non-NSAID Painkillers Prescribed

The most common non-NSAID drug prescribed in the Outpatient Department was a muscle relaxant named Orphenadrine with a combination of paracetamol under the brand name Nuberol-Forte (45.4%). The second most prescribed drug was paracetamol monotherapy (25.8%), followed by a combination of paracetamol and tramadol (Figure 2).

Figure 2

Painkillers Prescribed other than NSAIDS



Variables Related to NSAIDS Use

A chi-square test suggested that the number of NSAIDS did not change in the groups with or without comorbidities. A p-value greater than 0.05 suggested that there is no difference between the two groups with and without comorbidities.

Non-Pharmacological Interventions

Only 37% prescriptions from our sample had non-pharmacological interventions prescribed. The most common non-pharmacological intervention was exercise (16.3%). The use of nutraceuticals (supplements) was also prescribed to a considerable number of patients (22%). The least recommended intervention was weight loss (Table 2).

Table 2

Non-Pharmacological Interventions n=111

Non-Pharmacological Interventions	Frequency (n)	Percentage (%)
Exercise	49	16.3
Heat Or Cold Application	34	11.3
Weight Loss	9	3
Assistive Devices	23	7.7
Physiotherapy	18	6
Calcium Supplements	16	5.3
Vitamin C Supplements	4	1.3
Other Supplements (Vitamin D Or Collagen)	18	6

Variables Related to Non-Pharmacological Interventions

P- value less than 0.05 was considered, and the calculated results shown in Table 3 suggest that almost all non-pharmacological interventions were prescribed equally in all cases except for the use of assistive. Nutraceuticals like vitamin C and D are also included in non-pharmacological interventions, but their use is not mentioned in any of the guidelines (Table 3).

Table 3

Variables related to non-pharmacological interventions (chi-square test)

Interventions	Knee (n)	Hips (n)	Hands (n)	P value
Exercise	44	5	Not applicable	0.096
Physiotherapy	15	3	0	0.244
Calcium Supplements	16	0	0	0.200
Other Supplements	15	1	2	0.745
Vitamin C Supplements	4	0	0	0.680
Vitamin D Supplements	20	0	1	0.607
Assistive Devices	12	2	9	<0.001
Weight Loss	8	1	Not applicable	0.680
Heat And Cold Application	29	3	2	0.942

These indicators have been designed according to the international guidelines for OA management. The average number of painkillers prescribed per encounter was 2.28, and the average number of NSAIDs prescribed per encounter was 1.19. The results suggest that out of the 75% prescriptions containing NSAIDs, only 32.5% were co-administered with a gastroprotective agent like a proton pump inhibitor. And 20.2% of sample prescriptions contained opioid analgesics (Table 4).

Table 4

Adherence Indicators with Respect to Standard Guidelines

Adherence indicators	Results
Average number of painkillers per encounter	2.28
Average number of NSAIDS per encounter	1.19
Number of prescriptions with NSAID	75%
Percentage of NSAID co-prescribed with a gastroprotective agent	32.3 %
Percentage of selective NSAIDs prescribed	25.3%
Percentage of oral NSAIDs prescribed	57.7%
Percentage of topical NSAIDs prescribed	44.7%
The percentage of the combination of topical and oral NSAID prescriptions	28%
Percentage of opioid analgesics prescribed	20.2%
Percentage of non-pharmacological interventions recommended	37%

Linking a Doctor's Specialty to any Specific Pattern of Prescription

No significant link was established between a specific prescription pattern and a doctor's specialty.

DISCUSSION

The result of the study showed the high prevalence of OA in females as compared to males, as well as the high incidence of OA in the knee joint. This result is consistent with the prevalence studies carried out in Lahore (Malik *et al*., 2022). Prevalence of NSAIDs prescription, specifically oral non-selective NSAIDs, is very high 57.7% and the number of NSAIDs prescribed per person is 1.19; these results are consistent with these USA studies (Ide *et al*., 2024).

The guidelines clearly state that use of NSAIDs should be very limited and the first preference should be given to topical rather than oral NSAIDS in case of knee and hand OA, but the study suggested that out of 300 prescriptions, 44.7% of people were prescribed topical NSAIDs. Remaining were either given an oral NSAID 57.7% or a combination of both oral and topical NSAID 28%. The most prescribed oral NSAID was diclofenac sodium 23.5 % followed by the selective NSAID celecoxib 21.1% and the least prescribed NSAID was ibuprofen. These results are partially similar to the study done in Iraqi patients, where ibuprofen was actually the most prescribed NSAID (Fakhrulddin, Jabri, & Shnain, 2024).

The study also suggested that the number of NSAIDs used was not different in people with or without a comorbidity (non-significant p value> 0.05). This is a clear nonadherence to guidelines that suggest that the use of NSAIDs should be dependent on patient conditions and should be started from the lowest possible dose.

The study revealed that only 32.3 % of prescriptions containing NSAIDs were co-administered with a gastroprotective agent, which is again a clear violation of guidelines which state that NSAIDs, when used for long-term, should always be co-administered with a gastro protective agent to reduce the risk of GIT ulcers, and in case of OA patients, the use of NSAIDs is always long term so eventually the patients develop GIT problems (Kvien *et al*., 2026).

The painkillers prescribed other than NSAIDs were a combination of orphenadrine and paracetamol, 45.4%, under the brand name of Nuberol-Forte, which is a muscle relaxant. Although the standard guidelines do not mention the use of this class of drugs, recent studies have proven it to be safe and effective in OA patients (Huang *et al*., 2023). The second most prescribed analgesic was paracetamol, although most standard guidelines clearly state that paracetamol is no longer considered an effective option for OA pain management, but due to its safety, availability, and cost-effectiveness, it is still prescribed by the doctors for OA, especially in low-income areas of Pakistan (Gibbs *et al*., 2023; Patel *et al*., 2024). The use of opioid analgesics is clearly and strongly opposed by the guidelines (Gibbs *et al*., 2023), but the study revealed that 20% of the patients were still prescribed the opioid analgesic, which was tramadol. In the majority of cases (n=73), tramadol was given with a combination of paracetamol.

The study highlighted that only 37% of the sample prescriptions contained non-pharmacological intervention, which is again a low number given that every standard guideline states that the first line of treatment should always be non-pharmacological interventions (Conley *et al*., 2023). Exercise (16.3%) was the most prescribed intervention, but there was not a single patient who was given proper instructions regarding the type and duration of exercise. The second most common nonpharmacological intervention was the use of vitamins and supplements. Although research shows that they might be effective for managing OA, the guidelines either don't recommend such supplements or are neutral about their use.

CONCLUSION

To improve the quality of life of patients suffering from OA in Lahore, a shift in the treatment approach is required. The healthcare workers need to change the "pill for every ill" approach and follow the guidelines to ensure patient safety in the long run. If this irrational prescribing pattern continues to escalate, OA will soon put unbearable strain on our already crippling economy. The lower use of non-pharmacological interventions is also because Pakistani people enjoy a sedentary lifestyle, so convincing them to exercise or lose weight is very difficult. For that, we need to have structured exercise programs where the community gathers, public awareness campaigns, and direct and indirect counselling and education sessions with the OA patients should be conducted. For the part of writing a rational prescriptions pharmacist must be trained to keep a second check on the doctor's written prescriptions, and they should also be the ones providing counselling and education to the OA patients on how they can manage and slow down the progress of OA rather than just suppressing the pain.

FUTURE RESEARCH DIRECTIONS

Future research should focus on long-term studies with a larger sample size, and the study should be done in different hospitals and clinics, expanded to various cities in Pakistan. The study should also include interviews conducted with the participants

so that we can understand why a specific doctor prescribes a certain way and whether any of the patients affect the prescribing pattern of a doctor. Further studies could explore alternative medicines for pain relief in osteoarthritis, as NSAIDS cannot be used for a long time. Future research can explore the local guidelines of OA followed by doctors in Pakistan.

LIMITATIONS

This study has several limitations that should be considered. It includes data from only one private clinic, so applying it to the whole population of Lahore may have produced biased results. Data was only collected once through a prescription, and no follow-up was done.

DECLERATIONS

Ethical Consideration: This study strictly adhered to the Declaration of Helsinki and relevant national and institutional ethical guidelines. All procedures performed in this study were consistent with the ethical standards of the Declaration of Helsinki. The study was conducted according to ethical standards for research involving human participants. Confidentiality as well as the privacy of participants' data were ensured. Since we collected data from a private clinic with no review board, we got ethical approval from our university review board, named ORIC (Office of Research, Innovation, and Commercialization), and got it signed by the head of the clinic (UCP/FOP/INT/0826).

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Similarity Index/ Plagiarism: The similarity index was checked, and it is 6% that is well below the threshold value of 19%, whereas each source is less > 5%.

Authors' Contribution: Equal contribution from each participant.

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