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Exploring Drug Utilization Patterns and Adverse Drug Reactions in the Management of Osteoarthritis: A Prospective Study

Ashok Kumar

Department of Pharmacology, Sri Aurobindo Medical College & PG Institute, Indore, Madhya Pradesh, India

**Corresponding e-mail:* ak3510@gmail.com

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ABSTRACT

Osteoarthritis (OA) is a prevalent degenerative joint disease characterized by pain, stiffness, and functional impairment, leading to significant morbidity and healthcare burden. The management of OA often involves pharmacological interventions aimed at relieving symptoms and improving quality of life. However, the utilization patterns of drugs in OA management and their associated Adverse Drug Reactions (ADRs) remain areas of ongoing research and clinical interest. In this prospective study, we aimed to explore the drug utilization patterns and identify potential adverse drug reactions among patients undergoing treatment for osteoarthritis. A diverse cohort of participants diagnosed with osteoarthritis was recruited and followed longitudinally over a specified duration. Baseline assessments captured demographic characteristics, disease severity, and previous treatment history. Participants were monitored for drug prescriptions or recommendations, including Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), analgesics, Disease-Modifying Osteoarthritis Drugs (DMOADs), corticosteroids, physical therapy, and alternative therapies. Regular monitoring was conducted to identify and assess adverse drug reactions, utilizing patient self-reporting, clinician observation, and medical records review. Data analysis focused on identifying trends in drug utilization, evaluating the frequency and severity of adverse reactions, and identifying potential risk factors associated with ADRs. The findings of this study contribute to the understanding of real-world drug utilization patterns in the management of osteoarthritis and provide insights into the safety profiles of commonly prescribed medications. By identifying potential adverse drug reactions and risk factors, this research aims to inform clinical decision-making and improve patient care and treatment outcomes in osteoarthritis management.

Keywords: Osteoarthritis, Drug utilization patterns, Adverse drug reactions, Pharmacovigilance, Management, Prospective study, Orthopedic care, Treatment outcomes, Pain management, Clinical practice

INTRODUCTION

Osteoarthritis (OA) stands as one of the most prevalent musculoskeletal disorders globally, characterized by joint pain, stiffness, and functional impairment [1]. As a chronic degenerative condition, OA poses significant challenges in its management, often necessitating pharmacological interventions to alleviate symptoms and improve patients' quality of life. However, the optimal selection and utilization of drugs for OA management remain areas of ongoing research and clinical interest [2]. Treatment guidelines for osteoporosis play a crucial role in guiding healthcare providers to effectively manage this condition and prevent associated complications such as fractures [3]. By comprehensively understanding the risk factors and potential complications linked with osteoporotic fractures, healthcare professionals can tailor drug therapy to meet the specific

needs of each patient. This personalized approach helps in reducing the likelihood of inappropriate drug utilization, thereby optimizing treatment outcomes [4].

Healthcare providers should prescribe medications based on evidence-based guidelines such as those provided by organizations like the National Osteoporosis Foundation or the American College of Rheumatology. These guidelines consider factors such as age, gender, fracture risk, and comorbidities when recommending specific medications such as bisphosphonates, Selective Estrogen Receptor Modulators (SERMs), denosumab, or teriparatide. Regular monitoring of medication efficacy and side effects is also essential to adjust treatment plans as needed. These guidelines typically encompass recommendations for lifestyle modifications, dietary interventions, and pharmacological therapies [5]. Lifestyle modifications may include regular weight-bearing exercises, adequate intake of calcium and vitamin D, avoidance of tobacco and excessive alcohol consumption, and fall prevention strategies. Pharmacological therapies often involve the use of bisphosphonates, Selective Estrogen Receptor Modulators (SERMs), denosumab, teriparatide, and calcitonin, among others. By adhering to evidence-based treatment guidelines, healthcare providers can make informed decisions regarding the selection, initiation, and monitoring of osteoporosis medications. This not only helps in reducing the risk of fractures but also contributes to the overall management of osteoporosis as a significant global health concern. Through continuous updates and revisions based on emerging research and clinical evidence, treatment guidelines ensure that healthcare professionals remain abreast of the latest advancements in osteoporosis management, ultimately leading to improved patient care and outcomes [6].

Understanding the patterns of drug utilization and the occurrence of Adverse Drug Reactions (ADRs) is essential for enhancing the effectiveness and safety of OA treatment regimens. While numerous medications, including Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), analgesics, Disease-Modifying Osteoarthritis Drugs (DMOADs), and corticosteroids, are commonly prescribed for OA management, their utilization patterns and associated risks warrant further investigation. In this context, prospective studies play a pivotal role in elucidating real-world practices and outcomes in OA management [7]. By prospectively tracking patients over time, such studies offer valuable insights into the dynamic nature of drug utilization patterns and the incidence of ADRs in clinical practice settings. This prospective study aims to explore the drug utilization patterns and identify potential adverse drug reactions among patients undergoing treatment for osteoarthritis. Through systematic data collection and analysis, we seek to delineate the factors influencing drug prescription choices, assess the frequency and severity of adverse reactions, and identify opportunities for optimizing treatment strategies. By shedding light on the complexities of drug utilization and adverse reactions in OA management, this study endeavors to inform evidence-based clinical decision-making, ultimately improving patient care and treatment outcomes in osteoarthritis [8].

MATERIALS AND METHODS

This observational study encompassed patients across all age groups diagnosed with orthopedic disorders who sought treatment in both government and private hospital orthopedic departments. The primary objectives revolved around scrutinizing drug utilization among orthopedic patients, encompassing both inpatients and outpatients. Additionally, the study aimed to evaluate drug utilization in alignment with the World Health Organization's (WHO) core drug use prescribing indicators. Prescription data were meticulously collected from patient case papers over 12 months [9]. A prescription or an encounter was defined as a written order for drugs in a patient's case paper, provided by physicians for one day. The dataset included information from orthopedic patients, totaling 267 males and 243 females. Analysis was conducted on 510 prescription orders.

Inclusion Criteria

- Diagnosed cases of arthritis by visiting the orthopedic department.
- Patient of either sex aged between 18 years-80 years.

Exclusion Criteria

- Patients below 18 years.
- Patients with diagnosis of gastro-esophageal reflux disease and peptic ulcer.
- Pregnant and lactating women.
- Patients with cardiovascular problems.

- Patients presenting with significant neurological deficits.
- Terminally ill patient.

Ethics

The study received approval from the local Ethical Review Board (RIMS/IEC/17-31) consent from patients. Patients unwilling to participate were not enrolled unless consent was obtained from legally acceptable representatives. Confidentiality was strictly maintained throughout the study.

Study Procedure

Patients diagnosed with osteoarthritis were enrolled in the study based on specific inclusion criteria. Each patient received a detailed explanation about the study, including its purpose, the procedures involved, and assurances regarding the confidentiality of their data. The collected data was then analyzed and the results were presented in tables as described [10].

RESULTS

Demographic Details

Shows details of locality of the patient, most of the patients are from Urban area (53.52%) as compared to Sub-urban area (32.74%), Rural (10.78%) and Remote Rural area (02.94%) (Table 1). Shows details of gender distribution in osteoarthritis, over all gender distribution in osteoarthritis in males is (54.12%) and in females is (45.88%) (Table 2). Shows details of age distribution of patient. Both OA and RA is more prevalent in age group of 51 years-65 years (52.35%) followed by age group of 36 years-50 years. (32.52%) (Figure 1).

Table 1 Locality of the patient

Place	No of Patient	Percentage
Urban	273	0.5352%
Sub-urban	167	0.3274%
Rural	55	0.1078%
Remote-Rural	15	0.0294%
Total	510	

Table 2 Details of gender distribution in osteoarthritis

Gender	Subject	Percentage
Male	276	54.12% (17.94%*)
Female	234	45.88% (-15.21% **)
(*Increase percentage, **Decrease percentage)		

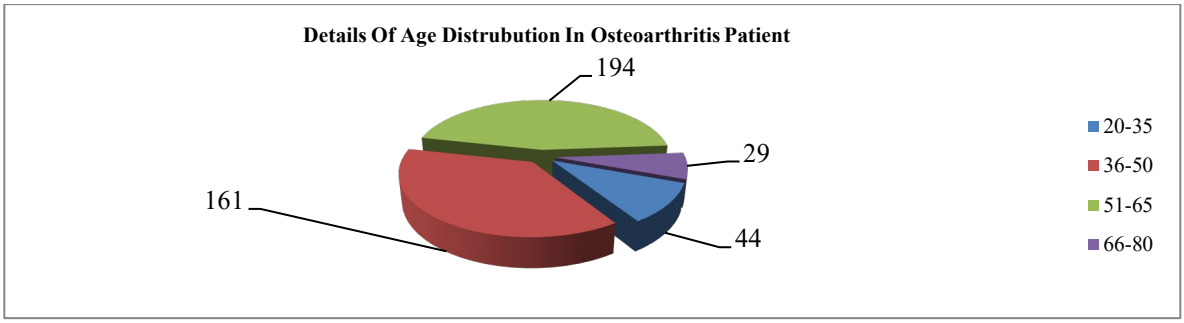

Figure 1 Shows details of age distribution patient in osteoarthritis patient. Osteoarthritis is more prevalent in the age group of 51 years-65 years (45.32%) followed by 36 years-50 years. (37.61%)

Disease Details

The knee was the most commonly affected joint in OA patients, consistent with earlier studies. Distribution of Osteoarthritis patients as in maximum number of patients had Osteoarthritis (OA) of knee 285 (66.85%) followed by OA Hip93 (21.72%) followed by OA of spine 50 (11.68%) (Table 3).

Table 3 Joints involved

Joints Involved	No. of Patient	Percentage
Spine	50	11.68%
Knee	285	66.58%
Hip	93	21.72%

Therapeutic Plan

Spondylosis and pain were the most common comorbidities in OA patients shows the class of drugs prescribed for osteoarthritis, NSAIDS (44.45%) are the drug of choice for osteoarthritis patients followed by analgesics (25.68%) antacids (12.28%) and adjuvant (10.15%) (Table 4). shows details of the route of administration of drugs, (94.11%) of the drug were used by oral route in osteoarthritis followed by injectable (04.26%) and topical (01.62%) (Figure 2). Aceclofenac and diclofenac were the most commonly used drugs in monotherapy for OA. Preference for COX-2 Inhibitors: Diclofenac and aceclofenac, as preferential COX-2 inhibitors, were commonly prescribed for OA. Shows that the overall approach to the treatment of osteoarthritis was monotherapy (79.23%) followed by combination therapy (20.76%) shows details of corticosteroids used for osteoarthritis and rheumatoid arthritis out of which prednisolone was more commonly used for rheumatoid arthritis (30.48%) and osteoarthritis (09.34%) (Table 5-7).

Table 4 Details of class of drug prescribed in osteoarthritis

Class of Drug Prescribed	No of Drugs Prescribed (n= 1172)	Percentage
NSAIDs	521	0.4445%
Analgesics	301	0.2568%
Corticosteroids	87	0.0742%
Antacids	144	0.1228%
Adjuvants	119	0.1015%
Total	1172	100

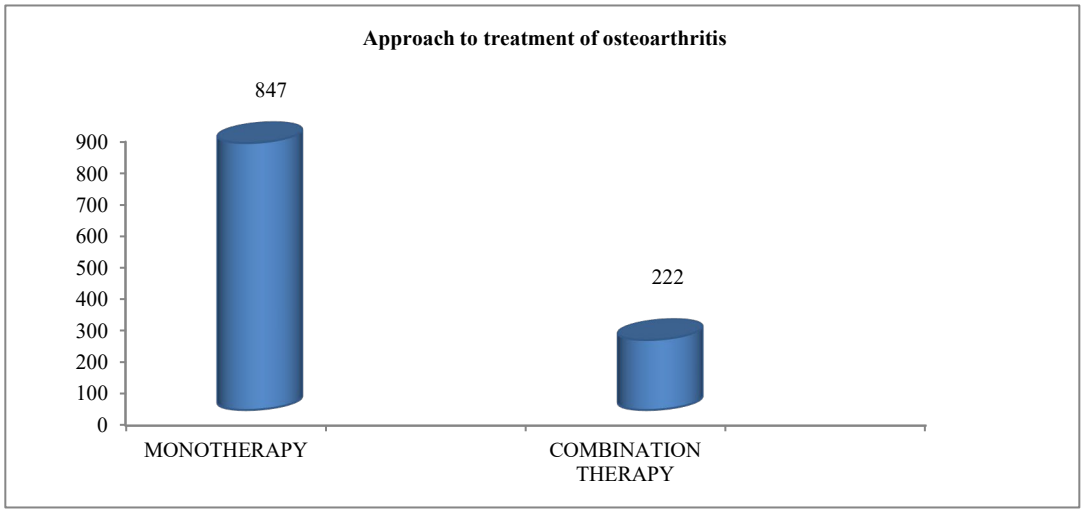

Figure 2 Shows that the overall approach to the treatment of osteoarthritis was monotherapy (79.23%) followed by combination therapy (20.76%)

Table 5 Details of the route of administration of drugs in osteoarthritis

Route	Drugs	Percentage
Oral	1103	94.11%
Injectable	50	4.26%
Topical	19	1.62%
Total	1172	100

Table 6 Details of combination therapy

	Combination Therapy	No. of Prescription	Percentage
Osteoarthritis (n=428)	Aceclofenac + Paracetamol	51	0.1191%
	Diclofenac + Paracetamol	25	0.0584%
	Tramadol + Paracetamol	27	0.063%
	Calcium+ Vit D_3	61	0.1425%
	Multivitamins	58	0.1355%

Table 6 shows details of combination therapy for osteoarthritis out of which aceclofenac and paracetamol combination (11.91%) was more preferred for osteoarthritis. for rheumatoid arthritis, DMARDS combination therapy (59.75%) was more preferred followed by aceclofenac and paracetamol combination (13.41%).

Table 7 Details of corticosteroids used for osteoarthritis

Corticosteroids	No. of Prescriptions Osteoarthritis (n=428)	Percentage
Prednisolone	40	0.0934%
Deflazacort	22	0.0514%
Dexamethasone	25	0.0584%

Adverse Drug Reactions

Adverse drug reactions, particularly gastric discomfort, were noted with NSAID usage in OA patients. Shows details of adverse drug reactions with usage of NSAIDs, gastric discomfort (01.86%), and abdominal pain (00.93%) were noted in patients with osteoarthritis (Table 8). Gastric discomfort (12.19%) and abdominal pain (03.65%) were also noted in patients with rheumatoid arthritis. Shows details of the gastroprotective agents used. Ranitidine was the most commonly used gastro-protective agent used for osteoarthritis (53.47%) and rheumatoid arthritis (49.47%) followed by pantoprazole (16.66%) in osteoarthritis and (20.00%) in rheumatoid arthritis (Table 9).

Table 8 Adverse drug reaction with usage of NSAIDs

Adverse Drug Reaction		Symptoms	No. of Prescription	Percentage
Osteoarthritis (n=428)	Total= 23 (05.37%)	Gastric Discomfort	8	0.0186%
		Abdominal pain	4	0.0093%
		Nausea	1	0.0023%
		Vomiting	5	0.0116%
		Skin rashes	3	0.007%
		Loose stools	1	0.0023%
		Dizziness	1	0.0023%

Table 9 Details of gastro protective agents used

Antacids	Osteoarthritis	Percentage	Rheumatoid Arthritis	Percentage
Pantoprazole	24	0.1666	19	0.2%
Omeprazole	23	0.1597	15	0.1578%
Rabiprazole	20	0.1388	14	0.1473%
Ranitidine	77	0.5347	47	49..47%
Total	144	100	95	100

Demographic Details

The study analyzed patients from various localities, with the majority hailing from urban areas (53.52%), followed by suburban (32.74%), rural (10.78%), and remote rural areas (2.94%). Gender distribution among Osteoarthritis (OA) patients showed a higher prevalence in males (54.12%) compared to females (45.88%). Both OA and Rheumatoid Arthritis (RA) were most prevalent in the age group of 51 years-65 years (52.35%), followed by the 36 years-50 years age group (32.52%).

Disease Details

The knee was the most commonly affected joint in OA patients, which aligns with findings from previous studies. Specifically, 66.85% of OA patients had knee involvement, followed by the hip (21.72%) and the spine (11.68%).

Therapeutic Plan

Spondylosis and pain were identified as the most common comorbidities among OA patients. The primary class of drugs prescribed for OA was NSAIDs (44.45%), followed by analgesics (25.68%), antacids (12.28%), and adjuvants (10.15%). Most drugs were administered orally (94.11%), with injectable (4.26%) and topical applications (1.62%) being less common. Aceclofenac and diclofenac were the most frequently used drugs in monotherapy for OA. Diclofenac and aceclofenac, both preferential COX-2 inhibitors, were commonly prescribed. Overall, monotherapy was the dominant treatment approach (79.23%), with combination therapy used in 20.76% of cases. Prednisolone was more commonly used for RA (30.48%) compared to OA (9.34%).

Adverse Drug Reactions

Adverse drug reactions were particularly noted with NSAID usage. In OA patients, 1.86% experienced gastric discomfort, and 0.93% had abdominal pain. In RA patients, these figures were higher, with 12.19% experiencing gastric discomfort and 3.65% having abdominal pain. Ranitidine was the most commonly used gastroprotective agent for both OA (53.47%) and RA (49.47%), followed by pantoprazole (16.66% for OA and 20.00% for RA). This comprehensive analysis provides valuable insights into the demographic profile, disease characteristics, therapeutic approaches, and adverse drug reactions in patients with osteoarthritis and rheumatoid arthritis. Understanding these patterns can help inform personalized treatment strategies and improve clinical outcomes for individuals affected by these conditions.

DISCUSSION

The study conducted at RIMS Raichur offers a thorough examination of demographic details, disease characteristics, therapeutic plans, and adverse drug reactions among patients with Osteoarthritis (OA) and Rheumatoid Arthritis (RA) [11]. This analysis not only aligns with previous research but also provides contemporary insights that can enhance clinical practice and patient management.

Demographic Details

The study found that a majority of the patients came from urban areas (53.52%), with fewer patients from suburban (32.74%), rural (10.78%), and remote rural areas (2.94%). This distribution suggests a higher incidence or better reporting of OA and RA in urban areas, possibly due to better access to healthcare facilities [12]. The gender distribution indicated that OA was more prevalent in males (54.12%), while RA was more common in females, which is consistent with the known epidemiology of these diseases. Age-wise, both conditions were most prevalent in the 51 years-65 years age group (52.35%), followed by the 36 years-50 years age group (32.52%). This underscores the significant impact of aging on the development of OA and RA, highlighting the need for targeted interventions in middle-aged and older populations [13].

Disease Details

The knee emerged as the most commonly affected joint in OA patients (66.85%), followed by the hip (21.72%) and the spine (11.68%). This finding is in line with other studies and emphasizes the importance of focusing on knee-related interventions to manage OA effectively. The high incidence of knee involvement may be due to the joint's weight-bearing function and its susceptibility to degenerative changes over time [14].

Therapeutic Plan

The study's therapeutic approach revealed that NSAIDs were the primary class of drugs prescribed for OA (44.45%), reflecting their role in managing pain and inflammation. Analgesics (25.68%), antacids (12.28%), and adjuvants (10.15%) were also commonly used, indicating a multi-faceted approach to symptom management [15]. The preference for oral administration (94.11%) suggests ease of use and patient compliance, though injectables (4.26%) and topical applications (1.62%) were also utilized in specific cases [16]. Aceclofenac and diclofenac, both COX-2 inhibitors, were the most frequently prescribed drugs, highlighting their effectiveness in reducing inflammation with a lower risk of gastrointestinal side effects compared to non-selective NSAIDs [17]. Monotherapy was predominant (79.23%), suggesting its efficacy in managing OA symptoms for most patients. However, combination therapy (20.76%) was also used, particularly in cases requiring more comprehensive symptom control. In RA, prednisolone was more commonly used (30.48%) compared to OA (9.34%), reflecting the need for potent anti-inflammatory treatment in managing RA's systemic inflammation [18, 19].

Adverse Drug Reactions

Gastric discomfort was a notable adverse reaction to NSAIDs, affecting 1.86% of OA patients and a significantly higher 12.19% of RA patients [20]. This difference underscores the need for careful monitoring and the use of gastroprotective agents such as ranitidine, which was the most commonly used (53.47% in OA and 49.47% in RA), followed by pantoprazole. The higher prevalence of gastrointestinal issues in RA patients might be due to the higher doses or prolonged use of NSAIDs [21].

Contemporary Outcomes

This study's outcomes align with contemporary findings in rheumatology, confirming the prevalence of OA in males and RA in females, the age-related increase in these conditions, and the predominant use of NSAIDs and COX-2 inhibitors in treatment. The insights into adverse drug reactions highlight the ongoing need for balancing efficacy with safety in pharmacological management [22].

Limitations

In our study, we did not assess the quality of patients undergoing the treatment, which could have provided a better understanding of its effectiveness. Without evaluating patient quality, it is challenging to determine how well the treatment works across different patient types. Including such an assessment in future studies could offer a clearer picture of the treatment's true effectiveness [23-25].

CONCLUSION

This comprehensive analysis contributes to our understanding of OA and RA management by detailing key demographic trends, disease characteristics, therapeutic approaches, and adverse drug reactions. These findings can inform the development of personalized treatment strategies, aiming to improve clinical outcomes and enhance the quality of life for patients with OA and RA. Future research should continue to explore these patterns, focusing on optimizing treatment regimens and minimizing adverse effects.

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