

STUDY ON DRUG UTILIZATION PATTERN OF NON-STEROIDAL ANTI-INFLAMMATORY AGENTS IN GERIATRIC PATIENTS AT A TERTIARY CARE TEACHING HOSPITAL**Dr. B. Chitra¹, Juble Raju², Juby Liz Jacob³ and J. Marie Cathrine³**¹Assistant Professor, Department of Pharmacy Practice, College of Pharmacy, SRIPMS, Coimbatore- 641 044.²M.Pharm, Department of Pharmacy Practice, College of Pharmacy, SRIPMS, Coimbatore-44, India.³PharmD Intern, Department of Pharmacy Practice, College of Pharmacy, SRIPMS, Coimbatore-44, India.
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ABSTRACT

Increased use of NSAIDs in geriatrics has expressed great concerns as these drugs have the potential to cause gastrointestinal, renal and cardiovascular adverse effects. The present study aims to evaluate the prescribing pattern of NSAIDs, analyze the rationality of prescriptions using Beers criteria 2015 and to identify the drug interactions in prescriptions using micromedex drug database. The current study was a prospective observational study which was performed in 160 patients. Geriatric patients above the age of 60 prescribed with atleast one NSAID and those willing to participate were included in the study. Potential inappropriateness was identified in 51(31.84%) prescriptions. Among the drugs prescribed to the study population diclofenac, aspirin, indomethacin, ketorolac and ibuprofen were found to be inappropriate in geriatrics as per beers criteria 2015. The study also reports that 60% of the prescriptions had drug interactions. The drugs were administered via oral, intravenous, intramuscular and topical routes. Intravenous administration (52.68%) was the most common route observed in the present study. Appropriate use of NSAIDs reduces the severity of adverse effects and thus helps in improving the quality of life in geriatric population. Knowledge on the prescribing pattern, rational use and risk factors associated with use of NSAIDs in geriatric population will help the healthcare professional to ensure safer and better treatment outcomes.

KEYWORDS: Geriatrics, Non - steroidal anti-inflammatory agents, Beers criteria, Gastro-intestinal toxicity.**INTRODUCTION**

Over the globe, NSAIDs are being extensively prescribed especially among geriatric population.^[1] Researchers claim that over 20% of people suffer significant pain problems, and about 30 million people within this population comprise of elderly, above the age of 65 years who consume NSAIDs on a daily basis for the treatment of their discomfort.^[2,3,4] NSAIDs are primarily indicated for the treatment of ailments which are associated with inflammatory conditions such as rheumatoid arthritis, osteoarthritis, headache, neuromuscular disorders and musculoskeletal conditions.^[5] The potential for these drugs to pose risk in gastrointestinal, renal, cardiovascular and bronchial effects has expressed great concerns regarding the morbidity and mortality among geriatric populations.^[1]

Gastric and duodenal ulcers are the most serious adverse effects of NSAIDs that accounts to about 20% of those who are being treated.^[3] Literature reveals 29% of hospitalization particularly due to NSAID induced

gastric ulceration and about 4-fold increase in the risk of deaths.^[1] All anti-ulcer drugs have been proven to be efficacious in healing gastric and duodenal ulceration only if NSAIDs are stopped; but misoprostol alone has found wide acceptance in treating ulcers with simultaneous ongoing NSAID therapy.^[3] NSAIDs are the most widely used OTC drugs. As per literature, 27.5% of inappropriate OTC use has been reported with NSAIDs in geriatrics.^[6] The cost of NSAIDs is another major concern apart from the side-effects and inappropriate usage. Various studies have been conducted with regard to cost analysis with NSAID usage, and a study has reported that in a hospitalized case of arthritis, 69% of cost pertained only to NSAID drugs and remaining 31% for the treatment of gastrointestinal adverse effects due to NSAID usage.^[3] A higher prevalence of chronic illness, dependency and disability make it more vulnerable for people above 65 years for medication misadventure. This calls for judicious selection and usage of NSAIDs with special consideration in geriatrics which may otherwise heighten the risk of adverse events.

Thus, developing rational and appropriate prescribing pattern for elderly people may result in better health outcomes.^[7] Desirably, appropriate tools for assessment of prescription in elderly are key elements in improving prescribing quality. Currently, the assessment tools used for identifying inappropriate prescribing in elderly are Beers criteria, improved inappropriate prescribing in the elderly tool (IPET) and medication appropriateness tool (MAI). Among these tools, Beers criterion is most widely accepted instrument.^[8] In this research paper, the prescribing pattern of NSAID use was reported and their appropriateness was evaluated using Beers criteria 2015.

MATERIALS AND METHODS

The study was undertaken in a 1000 bedded multi-speciality, teaching hospital located at Coimbatore. The department selected for study was general medicine, as there was a higher prevalence of geriatric population in this department. The study was carried out after receiving the approval from the hospital ethical committee. The important objectives of the current study were to assess the prescribing pattern of NSAIDs in geriatric population, to evaluate the rationality of prescriptions using beers criteria and to identify the drug interactions in the prescriptions. The present study was a prospective observational study with a sample size of 160 patients over a period of 9 months. Patients above 60 years prescribed with at least one NSAID and those willing to participate were included in the study. Patients with insufficient data, critically ill, ICU patients, pregnant and lactating women and who were not willing to participate were excluded from the study. After reviewing the medication profiles, patients who met the inclusion criteria were briefed on the project with the help of patient information form, and their consent was obtained if they were willing to participate in the study. The data from medical charts were recorded in customized data entry form. The prescriptions were screened individually and prevalence of NSAID use in elderly patients was identified. The patient medication chart was reviewed using beers criteria 2015 to assess the rationality of the prescription. The drug-drug interactions were identified using the micromedex drug data base.

RESULTS

A total of 160 patients admitted to the tertiary care hospital during the study period were analyzed. The study results show that 57.5% of the patients were male and 42.5% were female. The age distribution of the patients was analyzed and it was found that 50% of the prescriptions were in the age group of 60-64 years,

followed by 24.37% under the age group 65-69 years. The social history of the patients reveals that 27.5% of the study population has the habit of both smoking and alcohol consumption. 16.25% were found to be smokers and 10.62% were alcoholics. 21.25% of the patients were admitted in the ward due to fever, 22.12% for cold followed by 26.25% for pain and 4.37% due to vomiting. Major diagnosis includes diabetes mellitus (20%), systemic hypertension (18.21%), rheumatoid arthritis (11.87%) and liver disorders (7.5%). The major categories of drugs in the prescriptions were NSAIDs (25.72%), gastrointestinal drugs (12.86%), cardiovascular drugs (6.08%), antimicrobial drugs (15.49%) and DMARDs (5.29%). Table 1 shows the most commonly prescribed NSAIDs.

NSAIDs were categorized according to their potential in inhibiting the cyclooxygenase pathway as shown in table 2. Paracetamol was the most commonly prescribed drug followed by non-selective COX inhibitor and selective COX-2 inhibitor. Table 3 describes the route of administration of these NSAIDs; of which 41.39% of NSAIDs were administered through oral route, 52.68% through IV route, 4.3% through IM route and 1.6% via tropical route. The prescriptions with NSAIDs were evaluated using Beer's criteria and the appropriateness was assessed respectively as shown in table 4. Potential inappropriateness were identified in 51 prescriptions and reported as shown in table 5. When evaluated using Beer's criteria, maximum inappropriateness were found in prescriptions with diclofenac. The study also reports that 60% of the prescriptions had drug interactions. The drug interactions were classified according to their severity, 16.92% showed major drug interactions followed by 81.02% moderate and 2.05% with minor drug interactions. The major drug interactions identified were between NSAIDs and anticoagulants such as clopidogrel, aspirin, heparin and ticagrelor which tends to cause increased risk of GI bleeding.

Table 1: NSAID's prescribed (n = 186).

Sr. No	Drugs	No. of drugs	Percentage (%)	No. of patients
1.	Paracetamol	109	58.6%	70
2.	Diclofenac	26	13.9%	28
3.	Ketorolac	24	12.9%	24
4.	Aspirin	13	6.9%	17
5.	Indomethacin	8	4.3%	12
6.	Ibuprofen	6	3.4%	9

Table 2: Categorization of NSAIDs (n=186).

Sr. No	NSAIDs	Category	Percentage
1.	Paracetamol	Analgesic, antipyretic with poor anti-inflammatory action	58.6%
2.	Diclofenac	Preferential COX-2 inhibitor	13.9%
3.	Ketorolac, Aspirin, Ibuprofen, Indomethacin	Non- selective COX inhibitor	27.5%

Table 3: Route of administration of NSAIDs (n=186).

Sr.No	Route	No of drugs	Percentage (%)
1.	Oral	77	41.39
2.	IV	98	52.68
3.	IM	8	4.3
4.	Topical	3	1.6

Table 4: Evaluation of Prescriptions using Beer's criteria (n = 160).

Category of prescription screened	No of prescription	Percentage (%)
Inappropriate prescription	51	31.84
Appropriate prescription	109	68.12

Table 5: Inappropriate medications in prescriptions using Beer's criteria.

S.No	Drugs under beers criteria	No. of inappropriate prescriptions	Rationale	Recommendations
1.	Aspirin	10	The risk of GI bleeding, increased blood pressure and kidney injury increases with aspirin, diclofenac and ibuprofen. Risks are dose dependent.	PPI or misoprostol can be used as alternatives to reduce the risk. Chronic use should be avoided, unless other drugs are not effective.
2.	Diclofenac	15		
3.	Ibuprofen	5		
4.	Indomethacin	8	Increased risk of GI bleeding/PUD are observed with indomethacin and ketorolac in geriatrics. Indomethacin can cause adverse CNS effects.	Observe for GI bleeding. Avoid these drugs or use other alternatives.
5.	Ketorolac	13		

DISCUSSION

Despite their propensity to cause toxicity, non-steroidal anti-inflammatory drugs are routinely prescribed for older patients. The incidence of NSAIDs related adverse drug reactions are a concern in geriatrics. It can cause a broad spectrum of side effects, which includes gastrointestinal (GI) and cardiovascular (CV) events, nephrotoxicity and hypertension. NSAIDs related GI side effects include symptoms with or without mucosal injury, asymptomatic mucosal lesions, serious upper GI symptoms, the most recurrent being gastroesophageal reflux (regurgitation) and dyspeptic symptoms (which includes belching, epigastric discomfort, bloating, and postprandial nausea). The relative risk of upper GI complications among NSAID users depends on the presence of various risk factors, which includes geriatrics (> 65 years), history of complicated peptic ulcer disease, and concomitant drug use such as aspirin or anticoagulant use, in addition to the dosage and type of NSAID. Studies suggest that NSAIDs related GI toxicity increase in severity and frequency with age^[9] and may be dose related and time-related.^[7] A huge collection of studies have confirmed that as many as 25%

of the NSAID users will develop gastric ulcers and 2-4% will develop a bleed or perforation.^[10]

The current study has evaluated the prescribing pattern, rationality and appropriateness of NSAIDs using beers criteria in the geriatric population. In this study geriatric patients were diagnosed with several co-morbid conditions like Diabetes mellitus, hypertension, myocardial infarction, osteoporosis and depression which ultimately resulted in polypharmacy, which was in comparison to a similar study conducted by Joseph O et al.^[11] The treatment objectives in geriatric patients differ from those in younger adults, due to alterations in the pharmacokinetic and pharmacodynamic parameters with progressing age. This raises the importance of executing specialized guidelines for specific disorders for this population. Studies revealed that interventions can reduce inappropriate prescriptions in the elderly.^[12] Raebet *et al.*, conducted a study to estimate the potential of applying intervention to decrease inappropriate prescribing in geriatrics, and found that significant interventions which could reduce potential

inappropriateness of the prescription occurred at the point of dispensing of drugs.^[7,13]

Age distribution of the patients were analysed indicating that most patients were in the age group of 60-64 years. The current study indicates a high prevalence of patients with complaints of pain, for which NSAIDs were prescribed. A similar finding was observed by Juno *et al* and Timothy JA *et al*, which unveils that NSAIDs were the most commonly prescribed category of drugs in pain management in geriatric.^[14] Among the NSAIDs prescribed, paracetamol was maximally utilized followed by diclofenac and ketorolac. Elderly patients are highly prone to NSAIDs related adverse effects, especially fatal gastrointestinal, cardiovascular and cerebrovascular morbidities.^[12] In the present study, anti-ulcer drugs were co-administered with NSAIDs for gastric ulcers which were in par with the study conducted by Dona *et al*.

Polypharmacy increases the probability of drug interactions with NSAIDs, and older patients with comorbid conditions are more likely to receive multiple drugs. Interactions between NSAIDs and commonly prescribed drugs such as anticoagulants and anti-hypertensives are a concern in geriatrics.^[11] Combination NSAID therapy cannot be rationalized due to increased toxicity and lack of improved efficacy.^[7] A limitation of our study is that we grouped all NSAIDs together but patient's therapeutic responses may vary between different NSAIDs, for example, enteric coated aspirin may cause less gastric and duodenal irritation than plain and buffered aspirin.^[15] There appears to be a need for increased awareness on the part of clinicians and pharmacists about adverse effects of NSAIDs and drug reactions.

CONCLUSION

NSAIDs can be an effective treatment option for many older persons, but caution should be exercised in this fragile population. Beers criterion is an important clinical tool which can be used as a guideline by the healthcare professionals while prescribing NSAIDs to the geriatric population. Thereby the quality and efficacy of medical care given to geriatrics can be increased. Appropriate use of NSAIDs reduces the severity of adverse effects and thus helps in improving the quality of life in geriatric population. Hence pharmacist play a vital role in the current study by identifying and preventing drug related problems with the use of NSAID s. The future scope of this study can be extended in evaluating and comparing the long-term outcomes of NSAID use.

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