IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

Prospective Analysis of NSAID Utilization and Adverse Events in a Tertiary Care Hospital

Sushmitha K, Tejashwini R, Ritika Shukla, Vaisakh U P,

Students,

Hillside college of Pharmacy

Dr. Lokesh S V

Assistant professor

Hillside college of Pharmacy

Short title:

Drug Utilisation pattern of NSAID's and ADR in tertiary care hospital.

Abstract:

Background:

Nonsteroidal anti-inflammatory drugs (NSAIDs) are commonly prescribed for management of both acute pain and chronic pain and inflammatory disorders such as rheumatoid arthritis and osteoarthritis. It is also known to cause various adverse effects. NSAIDs are agents having analgesic, antipyretic and anti-inflammatory effects which are most widely used class of drug worldwide. According to WHO ADR is defined as noxious, unintended effect of drug which occurs at normal dose in humans for prophylaxis, diagnosis or therapy of disease. The most commonly prescribed NSAIDs are paracetamol, aspirin, ibuprofen.

Objectives:

To analyse the prescribing pattern of NSAID's and to analyse the ADR profile of NSAID's in tertiary care hospital.

Materials and methods:

This is a prospective study carried out in the General Medicine Ward for a period of 6 months. The Drug Utilisation pattern of NSAID's and ADR reporting of all the adult patients

(≥18 years of age) of both genders needed to be assessed is included in the study. Vulnerable subjects were excluded from the study.

Results:

Out of the 208 patients, the distribution of males and females were found to be 108 and 100 respectively. This study shows that 30.30% of patients received paracetamol,20.20% patient received diclofenac,4.80% patient received naproxen,8.20% patient received aceclofenac +PCT ,6.70% patient received ibuprofen +PCT, 5.30% patient received mefenamic acid + PCT, 7.70% patient received diclofenac+PCT. By this we get to know that

the number of patients who were receiving the drug paracetamol are highest i.e, 30.3% and the number of patients who were receiving the drug naproxen are leas`t i.e,3.40%. Among the combination drugs studied so far, patient received aceclofenac+PCT 8.20% was found to be highest and mefenamic acid +PCT was found to be least 5.30%.

Interpretation and Conclusions:

Renal tests, liver panel, and CBC are among the recommended monitoring procedure. Patient who are not thought to be at high risk of NSAID toxicity are less likely to be monitored. People with renal or hepatic issues, NSAID use must be monitored or is contraindications. Hepatotoxicity, hypertension, renal damage and GI bleeding are some of the symptoms of NSAID toxicity.

Key words: NSAID'S, ADR, Renal damage, GI bleeding, NSAID toxicity, DUE

Introduction:

Nonsteroidal anti-inflammatory drugs (NSAIDs) are among the most commonly prescribed medications worldwide, extensively used for the management of acute and chronic pain, as well as inflammatory conditions such as rheumatoid arthritis and osteoarthritis. They possess analgesic, antipyretic, and anti-inflammatory properties, which make them invaluable in both clinical and over-the-counter (OTC) settings. NSAIDs account for a significant proportion of global drug prescriptions, and their easy availability has resulted in widespread usage. In India alone, over 400 formulations of NSAIDs are marketed, exposing a large segment of the population to this drug class and its associated adverse effects.

NSAIDs act by inhibiting cyclooxygenase (COX), an enzyme involved in the production of prostaglandins. Prostaglandins play a critical role in mediating pain, inflammation, and fever. There are two isoforms of COX: COX-1 and COX-2. COX-1 is primarily responsible for maintaining physiological functions such as gastric mucosal protection, renal water excretion, and platelet aggregation, while COX-2 is involved in the production of prostaglandins that mediate inflammation and pain. Based on their selectivity for cyclooxygenase (COX) isoforms, NSAIDs are classified into three categories. Non-selective COX inhibitors, such as aspirin, diclofenac, ibuprofen, and piroxicam, inhibit both COX-1 and COX-2 enzymes, thereby providing pain relief and anti-inflammatory effects while increasing the risk of gastrointestinal and renal side effects. Preferential COX-2 inhibitors, including drugs like meloxicam and nabumetone, show a higher affinity for COX-2, resulting in reduced inflammation and pain with a comparatively lower risk of gastrointestinal complications. Highly selective COX-2 inhibitors, such as celecoxib and rofecoxib, specifically target the COX-2 enzyme, offering effective anti-inflammatory and analgesic benefits while minimizing gastrointestinal adverse effects, although they may carry an increased cardiovascular risk with prolonged use.

NSAIDs are commonly prescribed for conditions such as arthritis, tendonitis, and bursitis due to their ability to alleviate pain, reduce swelling, and control inflammation. While many patients find adequate symptom relief with OTC NSAIDs, prescription-strength formulations are often necessary for more severe conditions or for sustained relief. Selective COX-2 inhibitors, in particular, are favoured in patients who are prone to gastrointestinal (GI) complications, a well-known adverse effect of traditional NSAIDs.

Despite their efficacy, NSAIDs are associated with a wide range of adverse drug reactions (ADRs), particularly gastrointestinal, renal, and hepatic complications. GI side effects are among the most common, ranging from mild symptoms such as dyspepsia, nausea, and heartburn to serious complications such as ulcers and bleeding. NSAID-induced ulcers reported prevalence of 10–25%, contributing significantly to morbidity and mortality. Severe upper GI complications occur in approximately 1–2% of long-term NSAID users. Other ADRs include renal dysfunction, skin reactions, and hepatic enzyme alterations.

Adverse drug reactions, as defined by the World Health Organization (WHO), refer to noxious and unintended effects of a drug that occur at normal doses used for prophylaxis, diagnosis, or therapy. ADRs are a significant concern in clinical practice and rank as one of the leading causes of morbidity and mortality among hospitalized patients. The prevalence of NSAID-related ADRs is reported to be approximately 26%. Given the extensive use of NSAIDs and their potential for causing harm, it is imperative to monitor their utilization patterns and associated adverse effects to optimize patient safety and therapeutic outcomes.

This study aims to evaluate the drug utilization patterns of NSAIDs and their associated adverse drug reactions in a tertiary care hospital setting, providing insights into their safety and prescribing practices.

Material & Methods:

This prospective observational study was conducted in the General Medicine Department of BGS Global Hospital, Kengeri, Bengaluru, over six months, from June to November 2023. Ethical approval was obtained from the Institutional Ethical Committee of BGS Global Institute of Medical Sciences (Reference no: BGSGIMS/IEC/App/June/2023/006) on 26th June 2023, prior to the initiation of the study. The study included 208 inpatients aged 18 years and above who were prescribed NSAIDs during their hospital stay and provided informed consent. Patients who were unwilling to participate, not treated with NSAIDs, or belonged to special populations such as pediatric and pregnant patients were excluded.

Data collection involved reviewing patient medical records, conducting interviews, and using a standardized case record form (CRF). Demographic information such as age, sex, and inpatient number, as well as clinical details including diagnosis, prescribed NSAIDs, their indications, and routes of administration, were recorded. Laboratory reports and adverse drug reactions (ADRs) were also documented. Pain severity was assessed using the Visual Analogue Scale (VAS), and all data were systematically entered into data collection forms. To ensure clear communication, study materials, including consent forms, were translated into the local language (Kannada).

The collected data were subjected to statistical analysis using SPSS software (Statistical Package for Social Sciences). Tools such as p-values, odds ratios, and Chi-square tests were applied to evaluate drug utilization patterns and the prevalence of NSAID-associated ADRs.

Results:

In this study, the data and medication tables of a total of 208 patients in the general medicine ward were collected and analysed. Of 100 patients, men (108) were more affected than women (100). The study looked at the age distribution and found that the majority of the subjects (n = 43 patients) were between the ages of 18 and 28, while the fewest subjects (n = 10 patients) were between the ages of 78 and 88. The age distribution of the patients is shown in Table 1.

Age Group	No of patients
18-28	43
28-38	38
38-48	28
48-58	29
58-68	35
68-78	25
78-88	10

Table 1: Age wise distribution

Indication	Drug	Dose (mg)	ROA	VAS SCORE	ADR Noticed	ADR Severity
Headache, Sprain, Arthritic pain	Paracetamol	325/500/650	Oral/IV/Rectal	4-6	Urticaria, GI pain, Hepatotoxicity	mild
osteoarthritis , rheumatoid arthritis muscle pain	Diclofenac	25/50/75	Oral/IV/IM	4-6	Edema, Nausea, Dizziness , Constipation	Mild
Muscle pain, Artritic pain	Aspirin	325/500	Oral/IV/Rectal	7-9	Bronchospasm, GI ulcerstion	Moderate
Acute gouty arthritis, osteoarthritis , rheumatoid arthritis,Ankylosing spondylosis	Etorcoxib	60/90	Oral	7-9	GI bleeding, Palpitations	Mild
Muscle pain,Neuralgia,Migrane	Ibuprofen	200/400	Oral	4-6	Bloating, Rashes	Mild
Ankylosing spondylitis, bursitis,polyarticular	Naproxen	370/500	Oral	7-10	Confusion(CNS alteration	Moderate

jevenileidiopathic arthritic tendonitis					), Headache	
osteoarthritis, rheumatoidarthritis, Ankylosing	Aceclofenac + PCT	100+325	Oral	1-3	Nausea, Cloudy urine	Mild
Tension, Headache, Sinus pain, Migraine, Muscle ache	Ibuprofen + PCT	400+325	Oral	4-6	Epigastric pain	Moderate
Migraine, Ankle ache, Muscle ache	Mefenamic acid + PCT	250+825	Oral	4-6	Dark coloured stool	Mild
Sprain, Muscle strain, AS	Diclofenac + PCT	50+500	Oral/IV	4-6	Flatulence, Bloating	Mild

Table 2: Indications, Dosage, Routes of Administration, and Adverse Drug Reactions of NSAIDs in Study Population

In this study, NSAIDs were commonly prescribed for conditions such as headache, sprain, osteoarthritis, rheumatoid arthritis, and migraines. Paracetamol was the most frequently used NSAID (30.3%), followed by diclofenac (20.2%), while naproxen was the least prescribed (3.4%). Combination therapies, including aceclofenac + paracetamol (8.2%) and diclofenac + paracetamol (7.7%), were also widely utilized. Pain relief was assessed using VAS scores, with higher scores (7–9) observed for etoricoxib and aspirin, while lower scores (1–3) were seen for aceclofenac + paracetamol. (Table 2)

Adverse drug reactions were reported, with gastrointestinal issues (pain, bleeding, ulcers) being the most prevalent, alongside CNS effects, bloating, and hepatotoxicity. These findings highlight the frequent use of NSAIDs, the associated ADRs, and the importance of careful monitoring in clinical practice. (Table 2)

Discussion:

The study was done on the basis of propective analysis of NSAIDs Utilization and adverse event in general medicine.A total of 208 patients included in this study who are of aged between 18years to 90 years. Data collection was done on the bases of patients neutrophils,lymphocytes,ESR(Erythrocytes Sedimentation Rate). Renal tests, liver panel, and CBC are among the recommended monitoring procedures. Patients who are not thought to be at high risk of NSAID toxicity are less likely to be monitored. However, in people with hepatic or renal issues, NSAID use must be monitored or is contraindicated. Hepatotoxicity, hypertension, renal damage, and GI bleeding are some of the symptoms of NSAID toxicity.Acute NSAID overdose usually presents with little gastrointestinal symptoms or no signs at all.

On the other hand, unconsciousness, convulsions, anion gap metabolic acidosis, and abrupt renal failure are possible signs of poisoning consequences. Moreover, NSAIDs can harm the gastrointestinal system by blocking COX-1, which lowers the synthesis of the stomach mucosa. Because NSAIDs lower prostaglandin

levels, which are necessary for the vasodilation of the renal arterioles, nephrotoxicity can also result from their use. Finally, fatigue, disorientation, nystagmus, blurred vision, diplopia, headache, and tinnitus are possible symptoms of CNS toxicity.

The most common ADR addressed were GI bleeding, GI pain, oedema, nausea, dizziness, constipation, GI ulceration, nausea, bloating, rashes, CNS related effects like confusion, cephalgia, nystagmus, blurred vision, hepato-toxicity, and hypertension.

These ADR were taken into suspected adverse drug reaction reporting form and were reported to the physician who were treating patients, feedback was obtained from physician which was taken into consideration for further treatment of patient.

ACKNOWLEDGEMENT:

We are heartily thankful to Dr. Balachandra G, Professor and Head, Department of general medicine Department, B.G.S GIMS Hospital, Kengeri, Bangalore for his inspiring guidance and constant encouragement throughout the project work We wish to express our sincere gratitude to Dr. S. N. Sriharsha, M.Pharm. PhD., Professor & Principal of the hillside college of Pharmacy, Bengaluru for providing us the opportunity to perform our project work. We thank Our vice principal and our guide Prof. Dr. G Jesindha Beyatricks, M Pharm, PhD, HOD of pharmacy practice, Hillside college of pharmacy and Research centre, and co-guide, Dr. Saba Farooqui Asst Professor, Hillside college of pharmacy and Research centre, for providing their insight. It is our pleasure to express our gratitude to all who support us in this study.

Financial support & Sponsorship:

None

Conflict of Interest:

None

BIBLIOGRAPHY:

1. Anandan I, Selvaraj N, Anandabaskar N, Meenakshi R, Dhamodharan A, Ganesan S, et al. Assessment of drug use pattern of nonsteroidal anti-inflammatory drugs using the World Health Organization core indicators in a tertiary care teaching hospital – A cross-sectional study. Natl J Physiol Pharmacol. 2019;9(10):1021-6.

2. Khairudin KA, Jatau AI, Manan MM, Tiong CS, Chitneni M, Abdullah AH, et al. Utilization pattern of non-steroidal anti-inflammatory drugs at a primary health care in Malaysia. Indian J Pharm Educ Res. 2017;51(1):156-61.

3. Jain M, Patil T. A prospective study on drug utilization pattern of NSAIDs in patients attending orthopaedics OPD of a tertiary care hospital. Int Arch Biomed Clin Res. 2016;2(3):55-7. doi: 10.21276/iabcr.2016.2.3.13.

4. Motgahre VM, Bajait CS, et al. Analysis of prescription patterns and adverse drug reaction profile of NSAIDs prescribed in orthopedic outpatient department of tertiary care hospital. Indian J Pharm Pharmacol. 2016 Oct-Dec;3(4):178-81.

5. Pappala RT, et al. A clinical study on prescribing patterns of NSAIDs and assessment of drug interactions. Acta Sci Pharm Sci. 2020;4(5):83-7.

6. Harirforoosh S, Jamali F, Asghar W, et al. Adverse effects of non-steroidal anti-inflammatory drugs: an update of gastrointestinal, cardiovascular, and renal complications. J Pharm Pharm Sci. 2013 Dec;16(4):429-47.

7. Samikbindu, Mazumder S, Bandopadyay U, et al. Non-steroidal anti-inflammatory drugs and organ damage: a current perspective. Natl Inst Biomed Genomics.

8. Yadav SN, et al. Prescribing pattern of non-steroidal anti-inflammatory drugs (NSAIDs) in orthopaedic department in tertiary care hospital. Indo Am J Pharm Res. 2020;10(6):748-53.

9. Bahreini A, Koneri R, et al. Prescription pattern analysis of nonsteroidal anti-inflammatory drugs in the southeastern Karnataka population, India. Arch Pharma Pract. 2020;11(S1):116-9.

10. Moore N, Pollack C, et al. Adverse drug reactions and drug-drug interactions with over-the-counter NSAIDs. Expert Opin Drug Saf. 2015;11:1061-75.

11. Kumar S, Thakur PK, Sowmya K, Priyanka S. Evaluation of prescribing pattern of NSAIDs in a South Indian teaching hospital. J Chitwan Med Coll. 2016;6(18):54-8.

12. Kandasamy G, Almaghaslah D, Vasudevan R, et al. Prescribing pattern for non-steroidal anti-inflammatory drugs. Indian J Pharm Sci. 2017;83(2):287-92.

13. Hawkey CJ, Langman MJ. NSAIDs, risk, and management. Br Med J. 2003;311:222-6.

14. Zhao H, Fleming R, Pollack R, et al. Risk of serious adverse events associated with NSAIDs in orthopedic surgery. Acta Anaesthesiol Scand. 2022;66(10):1257-65. doi: 10.1111/aas.14140.

15. Merskey H, Bogduk N, editors. Classification of chronic pain. 2nd ed. Seattle: IASP Press; 1994.

16. Woolf C. Somatic pain — pathogenesis and prevention. Br J Anaesth. 1995;75:169-76.

17. Siddall PJ, Cousins MJ. Persistent pain as a disease entity: implications for clinical management. Anesth Analg. 2004;99:510-20.

18. Costigan M, Scholz J, Woolf CJ. Neuropathic pain: a maladaptive response of the nervous system to damage. Annu Rev Neurosci. 2009;32:1-32.

19. Broad LM, Mogg AJ, Beattie RE, et al. TRP channels as emerging targets for pain therapeutics. Expert Opin Ther Targets. 2009;13:69-81.

20. Cattaneo A. Tanezumab, a recombinant humanized mAb against nerve growth factor for the treatment of acute and chronic pain. Curr Opin Mol Ther. 2010;12:94-106.

21. Priest BT. Future potential and status of selective sodium channel blockers for the treatment of pain. Curr Opin Drug Discov Devel. 2009;12:682-92.

22. Taylor CP. Mechanisms of analgesia by gabapentin and pregabalin — calcium channel alpha2-delta [Cavalpha2-delta] ligands. Pain. 2009;142:13-6.

23. Bolay H, Moskowitz MA. Mechanisms of pain modulation in chronic syndromes. Neurology. 2002;59:S2-7.

24. Eide PK. Wind up and the NMDA receptor complex from a clinical perspective. Eur J Pain. 2000;4:5-17.

25. Millan MJ. The induction of pain: an integrative review. Prog Neurobiol. 1999;57:1-164.

26. Stamford JA. Descending control of pain. Br J Anaesth. 1995;75:217-27.

27. D'Mello R, Dickenson AH. Spinal cord mechanisms of pain. Br J Anaesth. 2008;101:8-16.

28. Melzack R, Wall PD. Pain mechanisms: a new theory. Science. 1965;150:971-9.

29. Kidd BL, Urban LA. Mechanisms of inflammatory pain. Br J Anaesth. 2001;87:3-11.
30. Dickenson AH. Gate control theory of pain stands the test of time. Br J Anaesth. 2002;88:755-7.

31. Mannion RJ, Woolf CJ. Pain mechanisms and management: a central perspective. Clin J Pain. 2000;16:S144-56.

32. Woolf CJ, Mannion RJ. Neuropathic pain: aetiology, symptoms, mechanisms, and management. Lancet. 1999;353:1959-64.

33. Baron R, Binder A, Wasner G. Neuropathic pain: diagnosis, pathophysiological mechanisms, and treatment. Lancet Neurol. 2010;9:807-19.

34. Devor M, Seltzer Z. Pathophysiology of damaged nerves in relation to chronic pain. In: Wall PD, Melzack R, editors. Textbook of Pain. 4th ed. London: Churchill Livingstone; 1999. p. 129–64.

35. McMahon SB, Bennett DLH. Trophic factors and pain. In: Wall PD, Melzack R, editors. Textbook of Pain. 4th ed. London: Churchill Livingstone; 1999. p. 105–28.

36. Woolf CJ, Salter MW. Neuronal plasticity: increasing the gain in pain. Science. 2000;288:1765-9.

37. Janig W, Habler HJ. Sympathetic nervous system: contribution to chronic pain. Prog Brain Res. 2000;129:451-68.

38. Woolf CJ, Costigan M. Transcriptional and posttranslational plasticity and the generation of inflammatory pain. Proc Natl Acad Sci USA. 1999;96:7723-30.

39. Attal N. Chronic neuropathic pain: mechanisms and treatment. Clin J Pain. 2000;16:S118-30.

40. Wall PD. Recruitment of ineffective synapses after injury. Adv Neurol. 1988;47:387-400.

41. Coghill RC, Mayer DJ, Price DD. The roles of spatial recruitment and discharge frequency in spinal cord coding of pain: a combined electrophysiological and imaging investigation. Pain. 1993;53:295-309.

42. Munglani R, Hunt SP. Molecular biology of pain. Br J Anaesth. 1995;75:186-92.

43. Munglani R, Fleming BG, Hunt SP. Rememberance of times past: the significance of c-fos in pain (Editorial). Br J Anaesth. 1996;76:1-3.

44. Woolf CJ, Shortland P, Reynolds M, et al. Reorganization of central terminals of myelinated primary afferents in the rat dorsal horn following peripheral axotomy. J Comp Neurol. 1995;360:121-34.
45. Scholz J, Woolf CJ. The neuropathic pain triad: neurons, immune cells, and glia. Nat Neurosci. 2007;10:1361-8.

46. Baron R, Tolle TR. Assessment and diagnosis of neuropathic pain. Curr Opin Support Palliat Care. 2008;2:1-8.

47. Waxman SG, Cummins TR, Dib-Hajj SD, Black JA. Voltage-gated sodium channels and the molecular.