



## SAFETY PROFILE OF NON-STEROIDAL ANTI-INFLAMMATORY DRUGS: A REVIEW

**Shima Michael\*, K. Krishnakumar, L. Panayappan and Leo Mathew\***

Department of Pharmacy Practice, St James College of Pharmaceutical Sciences, Chalakudy, Kerala.  
St James Hospital Trust Pharmaceutical Research Centre (DSIR Recognized), Chalakudy, Kerala.

\*Corresponding Author: Shima Michael

Department of Pharmacy Practice, St James College of Pharmaceutical Sciences, Chalakudy, Kerala.

Article Received on 31/03/2017

Article Revised on 21/04/2017

Article Accepted on 11/05/2017

### ABSTRACT

NSAIDs are among the most frequently used medicinal products in medical practice and are also very well-known for their various adverse reactions. Each NSAID has its own unique safety profile and selecting an appropriate NSAID must be individualized for each patient based on his or her medical needs and risk factors. They are in great use for managing pain and other symptoms of inflammation, but they can also cause a number of adverse effects on gastrointestinal tract, cardiovascular or kidney and urinary systems, etc. COX-2 inhibitors have smaller gastrointestinal toxicity, though some researches suggest that long-term treatment with COX-2 inhibitors in high doses can increase the risk from cardiovascular incidents. This review article shows that as there are many ADRs for NSAIDs the selection of most appropriate NSAIDs for each patient should be tailored to each individual patient based on the patient's medical background. Hence they can be used safely and effectively.

**KEYWORDS:** COX-2 inhibitor, safety profile.

### INTRODUCTION

The nonsteroidal anti-inflammatory drugs (NSAIDs) are one of the commonly prescribed drugs in the world. They are used mainly in the treatment of inflammation, pain and edema, as well as of osteoarthritis, rheumatoid arthritis and musculoskeletal disorders. This class of drugs mainly includes aspirin and several other selective or non-selective cyclooxygenase (COX) inhibitors.<sup>[1]</sup>

### TYPES OF NONSTEROIDAL ANTIINFLAMMATORY DRUGS

There are two main types of NSAIDs,

1. **Nonselective**
2. **Selective.**
  - **Nonselective NSAIDs** – Nonselective NSAIDs inhibit both COX-1 and COX-2 enzymes to a significant degree.
  - **Selective NSAIDs** – Selective NSAIDs inhibit COX-2, an enzyme found at sites of inflammation, more than the type that is normally found in the stomach, blood platelets, and blood vessels (COX-1).

**Nonselective NSAIDs** — Nonselective NSAIDs include drugs commonly available without prescription, such as aspirin, ibuprofen (Advil, Motrin, Nuprin), and naproxen (Aleve), as well as many prescription-strength NSAIDs.

**Selective NSAIDs** — Selective NSAIDs (also called COX-2 inhibitors) are as effective in relieving pain and

inflammation as nonselective NSAIDs and are less likely to cause gastrointestinal injury. Celecoxib (Celebrex) is a selective NSAID. Other selective NSAIDs include etoricoxib (Arcoxia) and lumiracoxib (Prexige).

Aspirin is one of the oldest and more widely studied NSAID but it is considered different from the others, due to its predominant use in the treatment of cardiovascular and cerebrovascular diseases at low doses.<sup>[2]</sup> NSAIDs are the most commonly used medications in India. They are primarily used as painkiller as well as anti-inflammatory agent. With the continued aging of our population, the Center for Disease Control predicts that the prevalence of painful degenerative joint disease will increase, which will probably lead to an increase in the use of NSAIDs.<sup>[3]</sup> NSAIDs are well-known for their adverse drug reaction. Approximately 30% of hospitalizations of adverse drug reactions are caused by NSAIDs (Pirmohamed *et al.*, 2004). Adverse reactions can affect various organ systems with gastrointestinal bleeding and cardiovascular events being the most serious and sometimes fatal reaction. Most of the toxic effects of NSAIDs are a direct result of their mode of action which includes suppression of prostaglandin synthesis. Cyclooxygenase (COX) is the key enzyme in prostaglandin synthetic process that is inhibited by NSAIDs.<sup>[4]</sup>

### NSAID medicines that need a prescription<sup>[5]</sup>

- Celecoxib

- Diclofenac
- Diflunisal
- Etodolac
- Fenoprofen
- Ibuprofen
- Indomethacin
- Ketoprofen
- Ketorolac
- Mefenamic acid
- Meloxicam
- Nabumetone
- Naproxen
- Oxaprozin
- Piroxicam
- Sulindac
- Tolmetin

#### Some important information on NSAIDs<sup>[5]</sup>

- **NSAID medicines may increase the chance of a heart attack or stroke that can lead to death.** This chance increases.
  - with longer use of NSAID medicines
  - in people who have heart disease
- **NSAID medicines can cause ulcers and bleeding in the stomach and intestines at any time during treatment. Ulcers and bleeding.**
  - can happen without warning symptoms
  - may cause death
- **NSAID medicines should never be used right before or after a heart surgery called a “coronary artery bypass graft (CABG).”**
- **Some of these NSAID medicines are sold in lower doses without a prescription (over-the-counter). Talk to your healthcare provider before using over-the-counter NSAIDs for more than 10 days.**

#### Possible side effects of Non-Steroidal Anti-Inflammatory Drugs<sup>[6,7]</sup>

Serious side effects include	Other side effects include
heart attack	stomach pain
stroke	constipation
high blood pressure	diarrhea
heart failure from body swelling (fluid retention)	gas
kidney problems including kidney failure	heartburn
bleeding and ulcers in the stomach and intestine	nausea
low red blood cells (anemia)	vomiting
life-threatening skin reactions	dizziness
life-threatening allergic reactions	
liver problems including liver failure	
asthma attacks in people who have asthma	

#### CONCLUSION

Selecting the most appropriate NSAIDs for each patient should be tailored to each individual patient based on the patient's medical background. In general, ibuprofen is the preferred NSAIDs based on its favorable GI and nephrotoxicity profiles. Naproxen might be considered in patients who have greater cardiac risk. Celecoxib, at the dose of less than or equal to 200 mg day<sup>-1</sup>, might be an option in the patients who are at high risk for GI bleeding. However, both selective and nonselective NSAIDs should be avoided in patients who have a MI, heart failure and chronic kidney disease. It is clear that the COX-2 inhibitors are safer, better tolerated and equally efficacious, but many clinical issues need to be fully resolved. Presently, adverse reactions because of selective COX-2 inhibition are being studied and whether these agents are real advancement or not, only time will tell; but early results show promise. Proper clarification of these issues is important because these drugs are now being used increasingly instead of the conventional NSAIDs in spite of being many times expensive.

#### REFERENCES

1. Rumen Stoilov. Safety Profile of Nonsteroidal Anti-inflammatory Drugs (NSAID). *Journal of Clinical Medicine*, 2008; 1(1): 15-24.
2. Perneger TV, Whelton PK, Klag MJ.. Risk of kidney failure associated with the use of acetaminophen, aspirin, and, nonsteroidal anti-inflammatory drugs. *The New Indian Journal of Medicine*, 1994; 331(25): 1675-9.
3. Ong CK, Lirk P, Tan CH, Seymour RA. An Evidence-Based Update on Nonsteroidal Anti-Inflammatory Drugs. *Clin Med Res*, 2007; 5(1): 19-34.
4. Medication Guide for Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)[online]http://www.fda.gov/downloads/drugs/drugsafety/ucm089162.pdf. (Accessed on 10.02.17).

5. David Rosenbloom Marilyn A. Craven. A Review of Non-Steroidal Anti-Inflammatory Drugs. Canadian Family physician, 1983; 29: 2121-2124.
6. Vikas Dhikav, Sindhu Singh, Swati Pande, Non-Steroidal Drug-induced Gastrointestinal Toxicity: Mechanisms And Management, Journal, Indian Academy of Clinical Medicine, 2003; 4(4): 315-322.
7. Patompong Ungprasert, Wonngarm Kittanamongkolchai, Chrystal Price, Supawat Ratanapo, Napat Leeaphorn, Daych Chongnarungsin, Wisit Cheungpasitporn. What Is The "Safest" Non-Steroidal Anti-Inflammatory Drugs?. American Medical Journal, 2012; 3(2): 115-123.