Nigerian Journal of Pharmaceutical and Applied Science Research, 6(2):81-87, September 2017

Utilization of Nonsteroidal Anti-Inflammatory Drugs Among Physicians in General Outpatient Unit of University of Ilorin Teaching Hospital, Ilorin

Jamiu M. O[1*], Giwa, A[1], Abu-Saeed K.[2]

[1]Department of clinical pharmacy and pharmacy practice, Faculty of Pharmaceutical Sciences, University of Ilorin, Ilorin, Nigeria.
[2]Research Unit, Peace Standard Pharmaceuticals, Ilorin, Nigeria.

ABSTRACT

Nonsteroidal anti-inflammatory drugs are medications used to relieve pain, fever and inflammation. Serious toxicity related to gastrointestinal tract, kidney, dermatological and spontaneous abortion during early pregnancy are of serious concern in their use. The study evaluated the utilization of nonsteroidal anti-inflammatory drugs among prescribers at General Outpatient Department of the University of Ilorin Teaching Hospital. Retrospective study of 1297 patient prescription sheets was carried out at General Outpatient Department of the University of Ilorin Teaching Hospital for a period of six months to evaluate prescribing pattern of nonsteroidal anti-inflammatory drugs by Physicians. Data obtained were analyzed using Statistical Package for Social Science. Data were presented in the form of text, frequency tables, bar chart and pie chart. Inferential statistics was done using logistic regression and chi square. Out of 1497 prescription sheets studied, 1297 contained NSAIDs, giving prescribing rate of 86.6%. About 7.3% of prescriptions contained more than one NSAID. The percentage of generic prescribing was found to be 45%. About 17% of the prescribed NSAIDs were of long time use with only 0.04% co-prescribed with gastro-protective agent, omeprazole or misoprostol. Diclofenac tablet was the most prescribed NSAID with 42.2% prescribing rate. There was no significant difference in duration of prescribed NSAIDs and number of prescribed medicines per prescription in relation to patient's gender. The prescribing rate of nonsteroidal anti-inflammatory drugs was high with associated multiple NSAIDs use. Diclofenac tablet was the most widely prescribed. Co-prescribing of nonsteroidal anti-inflammatory drugs with gastro-protective agents was found to be very low.

Keywords: NSAIDs, prescribing pattern, diclofenac, utilization, UITH.

INTRODUCTION

Nonsteroidal anti-inflammatory drugs (NSAIDs) are medications used to relieve pain, fever and inflammation and they include a large group of drugs that work by inhibiting the production of prostaglandins. They represent diverse group of drugs with analgesic property and most frequently prescribed drug globally (Conaghan, 2012). Their demonstrated efficacy in musculoskeletal disorders like osteoarthritis increased their choice in pain management (da Costa *et al*, 2017). Serious toxicity relating to gastrointestinal tract and other side effects are limitations in the choice of this category of drugs (Gul and Ayuba, 2014). Age is a significant risk factor for NSAID-induced gastrointestinal events; indeed, patients above 75 years of age carry the highest risk and are similar in this respect to patients with a history of peptic ulcer (Berardi and Welage, 2005). Other side effects which include acute kidney injury, hypersensitivity reactions and spontaneous abortion during early pregnancy are notably associated with chronic use of NSAIDs (Louie *et al*, 2003).

People desire to take responsibility for their own health care management. Many do so via self-medication. Self-medication is defined as the use medications without consulting a professional health care practitioner. Self-medication involves acquiring medication without a prescription, resubmitting an old prescription to procure medication, sharing medications with others, or utilizing a medication that is already available in the residence. Several governmental organizations developed policies to encourage self-care for minor illnesses, reclassifying many drugs as non-prescription medications instead of prescription-only medications, allowing the drugs to be administered by patients without a prescription (Saeed et al, 2014) and could also be described as medication that is taken on patient's own initiative or on advice of a pharmacist or lay person (Sherazi et al, 2012).

*Corresponding Author: **Email**: jamolakunle@gmail.com **Phone**: +234-07039027492

Apart from gastrointestinal toxicity, renal failure has been recently known to be a risk if the patient is also concomitantly taking an ACE inhibitor and a diuretic - the so-called "triple whammy" effect. Liver problems are also possible with the long term use of NSAIDs (Risser *et al*, 2009).

Greater understanding of pain mechanisms and growing appreciation for pain control have, however, caused rheumatologists to consider new approaches in pain management with the use of Nonsteroidal Anti-Inflammatory Drugs (NSAIDs). Both selective and nonselective cyclooxygenase (COX) inhibitors have antipyretic, anti-inflammatory and analgesic effects and are widely used in treating many painful conditions, including rheumatic diseases. NSAIDs are effective and widely available in over-the-counter formulations and in prescription products. Examples include ibuprofen, naproxen, diclofenac, and celecoxib. NSAIDs are frequently used without considering the relative contraindications since most NSAIDs are sold over the counter. Conventional NSAIDs are associated with gastrointestinal side effects. Estimates of the number of deaths from NSAID-related gastrointestinal bleeding vary widely and figures of approximately 3500 to 16,500 per year (Cryer, 2005). Both conventional NSAIDs and COX-2 inhibitors are associated with increased cardiovascular risk. NSAIDs may increase blood pressure, particularly in hypertensive patients. Of all NSAIDs, naproxen seems to pose the least cardiovascular risk, although naproxen is associated with the same risk for myocardial infarction as other NSAIDs. Contrary to some clinical assumptions, gastrointestinal risk is present at first dose with a non-selective NSAID, and co-therapy with a proton pump inhibitor (PPI) does not guarantee complete protection (Catella-Lawson *et al*, 2001; Wells *et al*, 2006).

NSAIDs are among the most commonly prescribed categories of drugs worldwide in the treatment of pain and inflammation in many conditions as over the counter drugs. Each day, it is estimated that 30 million people would wide get benefit from their anti-inflammatory and analgesic effects (Chowdhury *et al*; 2012). NSAIDs guidelines have been established to increase physician awareness of the complications associated with NSAID use; however, some physicians either do not recognize or do not adhere to such guidelines. A recent survey of physicians identified six major barriers that affected their use of established NSAID guidelines. A recent survey of physicians identified six major barriers that affected their use of established NSAID guidelines (Abraham *et al*, 2005). The barriers mentioned were as follows: lack of familiarity with the guidelines, perceived limited validity of the guidelines, and limited applicability of the guidelines to specific patient populations, clinical inertia, anecdotal experiences, and clinical heuristics. The lack of familiarity was attributed to the overwhelming number of published medical guidelines and difficulties in keeping up to date with new recommendations (*Cavazo et al*, 2008). In support of this, a search of the literature identified more than 20 different guidelines that mention NSAIDs and the elderly in addition to other highly acclaimed medication risk factor guidelines or tools (Taylor *et al*, 2012).

Prescribers need to be aware of the possibility of overdosing on NSAIDs that might result from prescribing and/or taking OTC medications that contain the same active NSAID ingredient. A meta-analysis of data from case-control studies revealed that the odds ratio (reference point is non-use of NSAIDs) for experiencing a serious GI complication was 4.9 in patients taking a single NSAID, 10.7 in patients taking two, and 60.0 in patients taking three NSAIDs simultaneously (Lewis et al, 2002). Combination of certain medications or herbal additives with prescribed or OTC NSAIDs may intensify or mask the side effects associated with NSAIDs; for example, corticosteroids, ginkgo biloba, warfarin, and alcohol can increase the severity of gastrointestinal bleeding or peptic ulcers (Tulner *et al*, 2002; Abebe, 2008; Cheetham *et al*, 2009; Kaufman *et al*, 1999).

METHODOLOGY

Study setting

University of Ilorin Teaching Hospital is a tertiary health facility located in Oke Oyi, Ilorin East Local Government Area. It serves as referral hospital for patients from Kwara and other neighbouring States like Oyo, Kogi, Niger, Osun, Ekiti. It provides tertiary level of health care services even though quite a number of patients bypass the primary and secondary health facilities. The hospital has over 600 beds with over 100 specialists in various disciplines of medicine in addition to resident doctors- in-training and medical officers (Akande, 2009).

Study design

Ethical approval for the study was obtained from the Research Ethics Committee of the University of Ilorin Teaching Hospital, Ilorin, Nigeria. All prescriptions

from November 2013 to April 2014 were obtained from the Outpatient Pharmacy Department prescription bank. Systematic random sampling was used as selection method with one out of every five prescriptions. A total of 7,485 prescription sheets were obtained. The prescriptions containing NSAIDs were separated from those without NSAIDs**.** A total of 1497 prescriptions were found to contain NSAIDs. Out of these 1,297 met the inclusion criteria. The inclusion criteria include all prescriptions containing at least one non-steroidal anti-inflammatory drug and should contain both patient and prescriber identifiers according to WHO specification for validation of prescriptions (WHO, 2017)

Data collection

Data collection form was used to collect information about the prescribing pattern of NSAIDs in the pharmacy unit of General Outpatient Department (GOPD). Information collected from treatment sheets included patient demographics, name of NSAIDs, dosage number of NSAIDs, strength and duration.

Data analysis

Data obtained from the prescription sheets through the data collection form were properly sorted out coded and entered into spreadsheet of computer software package, Statistical Package for Social Sciences (SPSS) version 16 and analyzed. The data from the questionnaires were sorted and properly checked to ensure that the questionnaires were properly filled. Data were coded and analyzed with the computer using the Statistical Package for Social Sciences (SPSS) software package version 16.

Analyzed data were presented in form of texts, frequency tables, percentages, bar and pie charts for descriptive statistic. Chi-square used to test for significant associations between categorical variables. P-value less than 0.05 were considered statistically significant.

RESULTS

Out of 1497 prescription sheets surveyed, 1297 prescriptions contained at least an NSAID giving a prescribing rate of 86.6%. The prescribing characteristics are provided in Table 3.1. More females used NSAIDs compared to males and a high percentage, (87.1%), of these prescribed medicines were in tablet dosage form. Only 0.1% was injectable and 92.7% of the prescriptions had only one NSAID prescribed while co-prescribing with either omeprazole or misoprostol was 0.04%. The percentage of drugs prescribed from Essential Drug List (EDL) was also high (81%) but generic prescribing was low (45%). Most NSAIDs prescribed were for less than One week duration and only 17% were for duration longer than three weeks (See Table 1).

The frequency distribution of prescribed NSAIDs is provided in Table 2. Diclofenac tablet was the most commonly prescribed NSAID (42.2%) followed by aspirin (19.8%) and ibuprofen tablet (17.7%). The prescribed aspirin was indicated for cardioprotective condition. The least prescribed NSAID was tenoxicam (0.6%) (Table 2).

Table 1: Prescribing characteristics of NSAIDs

Characteristic	Options	Frequency	(%)
Gender	Male	485(37.4)	
	Female	812(62.6)	
	Total	1297	
NSAID dosage form	Tablet	1212(87.1)	
	Capsule	178(12.8)	
	Injectable	2(0.1)	
	Total	1392	
Availability on Essential Drug List	Tablet/capsule/injectable	1127(81.0)	
Generic Prescribing	Tablet /capsule/injectable	630(45.0)	
Prescribing duration	Less than 7 days	789(56.8)	
	7-21 days	365(25.7)	
	More than 21 days	247(17.5)	
Prescribing with Gastroprotective drugs	Omeprazole/ misoprostol	50(0.04)	
Multiple NSAIDs Prescribing	More than one NSAID	95(7.3)	
Therapeutic indication	Analgesic/anti-inflammatory	1117(80.2)	
	Antiplatelet	275(19.8)	

Table 2: Frequency distribution of prescribed NSAIDs

Name of NSAID	Frequency (%)
Aspirin	279(19.8)
Aceclofenac	76(5.7)
Celecoxib	24(1.7)
Diclofenac	588(42.2)
Ketoprofen	241(17.3)
Ketorolac	26(1.9)
Meloxicam	66(4.7)
Tenoxicam	8(0.6)
Ibuprofen	274(17.7)

Table 3 examined gender difference in duration of prescribed NSAIDs. The results showed that although there was proportionally higher number of female patients that was prescribed NSAIDs, there was no statistically significant difference in this proportion.
Table 4 below assessed the relationship between the patient's gender and number of prescribed medication per prescription. Chi square analysis was used to determine the level of significance in the categorical variables.

Table 3: Association between gender of the patient and duration of prescribed NSAIDs

		Prescribing duration		
		Short (≤ 7days)	Long (>7days)	Total
Gender	Male	308(59.1%)	213(40.9%)	521
	Female	479(55.1%)	390(44.8%)	870
	Total	788(56.6%)	603(43.3%)	1392

Chi square =3.485, p-value = 0.48 (p=0.48).

Table 3: Association between gender of the patient and duration of prescribed NSAIDs

		Prescribing duration		
		Short (≤ 7days)	Long (>7days)	Total
Gender	Male	308(59.1%)	213(40.9%)	521
	Female	479(55.1%)	390(44.8%)	870
	Total	788(56.6%)	603(43.3%)	1392

Chi square =3.485, p-value = 0.48 (p=0.48).

DISCUSSION

This study revealed high prescribing rate of NSAIDs among the prescribers in UITH and more number of women were prescribed NSAIDs than men. Majority of the prescribed drugs were from essential drug list. However, generic prescribing of NSAIDs was found to be low. Although prescribing drugs with brand names have the advantages of defining the drug precisely and reproducibly not only the active ingredient(s) but also the exact formulation and the supporting data (Collier, 1988) but generic prescribing allows for any suitable drug, rather than a particular brand of drug, to be dispensed. This can lead to cost savings because cheaper alternatives can be prescribed. It may avoid delay because the pharmacist can dispense a wider range of alternative preparations, rather than being limited to one which may not be available. For these reasons, prescribers are encouraged to improve on their adherence to generic prescribing in order to allow the patients achieve from the aforementioned benefits of generic prescribing particularly in the midst of economic downturn the country is experiencing.

Diclofenac tablet was found to be the most commonly prescribed NSAID. This is at variance with a review study carried out by Bushra and Aslam where ibuprofen was found to be most commonly prescribed NSAID. The prescribing durations for most drugs

were for short duration with low multiple NSAIDs prescribing (Bushra and Aslam, 2010).

There is widespread assumption that women consult more frequently for all symptoms or conditions than men and men more reluctant to consult which may result in health care providers assuming that women have a lower level of symptom severity before deciding to consult (Hunt *et al*, 2011). Studies have also shown that some common pain conditions, including migraine and tension-type headache, facial pain, and abdominal pain, population-based studies indicate higher prevalence rates in adult women than in adult men (LeResche, 1999).

Prescribing from essential drug list and in generic are some of the World Health Organization specification for rational drug use. WHO proposed 100% compliance to Essential medicine and generic prescribing (WHO, 2015). The results obtained indicated good compliance with prescribing from EDL but poor in generic prescribing of less than 50%. A study carried out at University of Jos Teaching Hospital showed that 70.2% of prescribed drugs were in generic. Drugs prescribed from the hospital formulary which is always in accordance with EDL were 88% (Ndukwe *et al*, 2013). A similar study carried out in Hawassa, South Ethopia obtained 98.7% and 96.6% in generic prescribing and Essential Drug List prescribing respectively (Desalegn, 2001).

Prescribing duration of most of the NSAIDs (56%) were for short course therapy (less than seven days) while about 20% were more than three weeks, although majority of those on long term were cardioprotective dose of aspirin 75mg. Gastrointestinal side effects of NSAIDs increases with increased duration of use and high doses have been found to be responsible for gastrointestinal and renal toxicity of NSAIDs (Crowe *et al*, 2015; Russel, 2001). Also, low dose aspirin has not been found to be safe in their ability to induce or complicate peptic ulcer diseases (Johnell and Fastbom, 2008)

Despite the fact that 21% of prescribed NSAIDs were for long time duration and about 7% of the prescriptions contained multiple NSAIDs, less than 1% of patients were co-prescribed gastroprotective agent(s) which was at variance with standard guideline for appropriateness of use of NSAIDs in preventive measures for gastrointestinal side effects (Dubois *et al*, 2004)

Although some studies have identified gender difference in pain perception and response to analgesic use (Richardson and Holdcroft, 2009), this study has not observed any gender difference in duration of NSAIDs prescribed which could indicate a different level of use of NSAIDS for their pain management. This was consistent with the findings of Sanfélixa and his group carried out in primary care where no gender difference was observed in prescription pattern of prescribed medicines (Sanfélixa *et al*, 2008).

Diclofenac was found to be the most widely prescribed analgesic/ anti-inflammatory NSAID which was consistent with a study carried out in South Western Nigeria in Physiotherapy department of three tertiary heath facilities (Teslim *et al*, 2014). This is also similar to the result of Owusu-Ansah carried out in Ghana (Owusu-Ansah, 2009). Studies also emphasized the critical role of pharmacists in ensuring rational use of drugs by dissemination of drug information to guide patients, physicians, and policy makers (Soleymani *et al*, 2013).

CONCLUSION

The prescribing rate of NSAIDs was high in the study center with associated multiple NSAIDs use. There was low incidence of co-prescribing with gastroprotective agents despite existence of long prescribing duration of non- selective cox inhibitors. The compliance with generic prescribing was also low.

ETHICAL CONSIDERATION

Ethical approval was obtained from the University of Ilorin Teaching Hospital Ethical Research Committee with reference number ERC/2014/101343.

ACKNOWLEDGEMENT

The authors acknowledge the support of the management of the UITH for making data available for this research.

FUNDING

This work was self- funded. No fund was obtained from an individual or organization.

CONFIDENTIALITY

Ethics of confidentiality in patients' data handling was strictly adhered to.

REFERENCES

Abebe W (2008). Herbal medication: potential for adverse interactions with analgesic drugs. *Journal of Clinical Pharmacy and Therapeutics* 27(6): 391–401.

Abraham NS, El-Serag HB, Johnson ML, Hartman C, Richardson P, Ray WA, Smalley W (2005). "National adherence to evidence-based guidelines for the

prescription of nonsteroidal anti-inflammatory drugs,"*Gastroenterology* 129 (4): 1171–1178..

Akande TM, Ologe M, Medubi GF (2009). Antibiotic prescription pattern and cost at University of Ilorin Teaching Hospital, Ilorin, Nigeria. *International Journal of Tropical medicine* 4(2): 50-54.

Berardi RR and Welage LS (2005). Petic Ulcer Diseases In: Pharmacotherapy: A Pathophysiologic Approach 6th ed. DiPiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM (eds); *McGraw-Hill, New York. pp 275-279*

Bushra R, Aslam N (2010). An Overview of Clinical Pharmacology of Ibuprofen *Oman Med J*. 25(3): 155–1661.

Catella-Lawson F, Reilly MP, Kapoor SC (2001). Cyclooxygenase inhibitors and the antiplatelet effects of aspirin. *N. Engl. J. Med.* 345:1809-1817.

Cavazos JM, Naik AD, Woofter A, Abraham NS (2008). "Barriers to physician adherence to nonsteroidal antiinflammatory drug guidelines: a qualitative study,"*Alimentary Pharmacology and Therapeutics* 28 (6): 789–798.

Cheetham TC, Levy G, Niu F, Bixle FR (2009). Gastrointestinal safety of nonsteroidal antiinflammatory drugs and selective cyclooxygenase-2 inhibitors in patients on warfarin. *Annals of Pharmacotherapy* 43(11): 1765–1773.

Chowdhury SS, Hasan M, Rahman KJ, Waheed TB (2012). Study on the use pattern of NSAIDs in some General and specialized hospitals of Bangladesh. *International research journal of Pharmacy*: 2012; 3(2): 152-155.

Collier J (1988). The cases for and against prescribing generic drugs: generic prescribing benefits patient. *BMJ*297: 1596-1598.

Conaghan P.G (2012). A turbulent decade for NSAIDs: update on current concepts of classification, epidemiology, comparative efficacy, and toxicity, Rheumatol Int 32:1491–1502.

Crowe SE, Feldman M, Grover S (2015). Grover S. Patient information: Peptic ulcer disease (Beyond the Basics) available online at https://www.uptodate.com/contents/peptic-ulcer-disease-beyond-the-basics assessed last on15/11/20116.

Cryer B (2005). NSAID-Associated Deaths: The Rise and Fall of NSAID-Associated GI Mortality. *The American Journal of Gastroenterology* (2005) 100, 1694–1695.

da Costa BR, Reichenbach S, Keller N, Nartey L, Wandel S, Jüni P, Trelle S (2016) Effectiveness of non-steroidal anti-inflammatory drugs for the treatment of pain in knee and hip osteoarthritis: a network meta-analysis. Lancet. Available online at https://www.pharmacist.com/article/effectiveness-nsaids-treatment-pain-knee-and-hip-osteoarthritis Last assed on the 5th Sept; 2017.

Desalegn AA (2001). Assessment of drug use pattern using WHO prescribing indicators at Hawassa University teaching and referral hospital, south Ethiopia: a cross-sectional study. *Postgrad Med J.* 77:82-88 doi:10.1136/pmj.77.904.82

Dubois RW, Melmed GY, HenningJM, Laine L (2004). Guidelines for the Appropriate Use of Non-Steroidal Anti-Inflammatory Drugs, Cyclo-Oxygenase-2-Specific Inhibitors and Proton Pump Inhibitors in Patients Requiring Chronic Anti-Inflammatory Therapy. *Alimentary Pharmacology & Therapeutics* 19(2): 1-5

Gul S, Ayub M (2014). Prevalence of prescribing pattern of more than one NSAID in Pakistan. *Journal of Scientific and Innovative Research* 3(2): 148-154.

Hunt K, Adamson J, Hewitt C, Nazare I (20011). Do women consult more than men? A review of gender and consultation for back pain and headache. *J Health Serv Res Policy* 16(2): 108–117

Johnell K, Fastbom J (2008). Concomitant use of gastroprotective drugs among elderly NSAID/COX-2 selective inhibitor users: a nationwide register-based study. *Clin Drug Investig.* 28(11):687-95.

Kaufman DW, Kelly JP, Wiholm BE (1999). The risk of acute major upper gastrointestinal bleeding among users of aspirin and ibuprofen at various levels of alcohol consumption. *American Journal of Gastroenterology* 94 (11):3189–3196.

LeResche L (1999). Gender considerations in the epidemiology of chronic pain. In: Crombie IK, Croft PR, Linton SJ, eds. Epidemiology of Pain. *Seattle: IASP Press*: 43-52

Lewis SC, Langman MJS, J. R. Laporte, JNS, Matthews MD, Wiholm BE (2002). Dose-response relationships between individual nonaspirin nonsteroidal anti-inflammatory drugs (NSAIDs) and serious upper gastrointestinal bleeding: a meta-analysis based on individual patient data, *British Journal of Clinical Pharmacology* 54(3): 320–326.

Louie SG, Park B, Yoon H (2003). Biological response modifiers in the management of rheumatoid arthritis. *Am. J. Health. Syst. Pharm*. 60:346-355.

Ndukwe HC. Ogaji JI, Comfort N (2013). Drug use Pattern with Standard Indicators in Jos University Teaching Hospital Nigeria. *West African Post Graduate Journal of Pharmacy* 24(1): 88-93

Owusu-Ansah SA (2009). Analgesics use at polyclinic outpatient Department of Komfo Anokye teaching Hospital, A project thesis submitted in partial fulfillment of M.Sc, Pharmaceutical Sciences. Kwame Nkrumah University of Science and Technology, Faculty of Pharmaceutical Sciences. Kumasi.

Richardson J, Holdcroft A. Gender differences and pain medication. Womens Health (Lond). 2009. 5(1):79-90. Available online at ttps://www.ncbi.nlm.nih.gov/pubmed/19102644

Risser A, Donovan D, Heintzman J, Page T (2009). NSAID Prescribing Precautions. *Am Fam Physician*. 80(12):1371-1378.

Russell RI (2001). Non-steroidal Anti-inflammatory Drugs and gastrointestinal damage—problems and solutions. *Postgrad Med J*. 77(904): 82–88.

Saeed MS, Alkhoshaiban AS, Al-Woraf YMA, Long CM (2014). Perception of self-medication among university students in Saudi Arabia. *Archives of Pharmacy Practice*. 5(4):149.

Sanfélixa J, Palopb V, Rubiod E, Gosalbese V, Martínez-Mirf I (2008). Gender influence in the quantity of drugs used in primary care *Gaceta Sanitaria* 22(1): 11–19.

Sherazi BA, Mahmood KT, Amin F, Zaka M, Riaz M, Javed A (2012). Prevalence and Measure of Self Medication. *Journal of Pharmaceutical Sciences and Research*. 4(3): 1774-1778

Soleymani F, Ahmadizar A and Abdollahi MA (2013). Survey on the factors influencing the pattern of medicine's use: Concerns on irrational use of drugs. *J Res Pharm Pract*.; 2(2), 59–63.

Taylor R, Lemtouni S, Weiss K, Pergolizzi JV (2012). Pain Management in the Elderly: An FDA Safe Use Initiative Expert Panel's View on Preventable Harm Associated with NSAID. *Therapy Current Gerontology and Geriatrics Research*.196159:1-9. doi:10.1155/2012/196159

Teslim OA, Vyvienne M, Olatokunbo, OM, Oluwafisayo, AJ, Mlenzana, NB, Shamila M, Nesto M, Grace M (2014). Side effects of non-steroidal anti-inflammatory drugs: The experience of patients with musculoskeletal disorders. Am J Health Res 2: 106-212. *Am J Health Res* 2: 106-212.

Tulner LR, Frankfort SV Gijsen GJPT, Van Campen PCM, CKoks CHW Beijnen JH (2002). Drug-drug interactions in a geriatric outpatient cohort: prevalence and relevance. *Drugs and Aging.*25(4): 343–355.

Wells, B G.; DiPiro, JT.; Schwinghammer TL.; Hamilton, CW (2006). Pharmacotherapy Handbook, 6th Edition. *McGraw-Hill* pp 550-557

World Health Organization (2015). The role of Pharmacists in the health care system: Essential medicines and Health Products Information Portals, Geneva.

World Health Organization (2017). Guide to Good Prescribing. Action Programme on Essential Drugs Geneva available online at http://apps.who.int/medicinedocs/en/d/Jwhozip23e/5.4.html. Last assessed on 5th September 2017.