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PRESCRIBING PATTERN OF NON-STEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDS) IN ORTHOPAEDIC DEPARTMENT IN TERTIARY CARE HOSPITAL

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ABSTRACT

OBJECTIVE: To assess the prescribing pattern of non-Steroidal anti-Inflammatory drugs (NSAIDS) in orthopaedic department in tertiary care hospital. **MATERIALS AND METHODS:** A prospective observational study was carried out in 120 patients for a period of 6 months in a tertiary care hospital. The data was collected in the suitable self-designed proformas. Patient prescribed with NSAIDS of bone and joint were used for the study. Patient demographics data, NSAIDS, prescribing pattern of specific disease of orthopaedics were analysed. **RESULTS:** From our study we found that (56.67%) patients were female. The greatest number of patient (26.67%) belongs to age group 51-60 years. Aceclofenac (23.43%) were the most frequently used drug. The combination of Aceclofenac and Paracetamol are most commonly used. Arthritis (12.63%) was found to be most common diagnosis. **CONCLUSION:** In this study, most of the patients received NSAIDS for symptomatic relief. The drugs were mostly prescribed as oral dosage form. The use of selective NSAIDS were found to be least prescribed (12.63%) whereas non-selective NSAIDS was found to be highly prescribed (87.36%). Monotherapy is preferred over two or three drug therapy. The prescribed drugs were mostly given by brand names (88.66%) and least given by generic name.

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INTRODUCTION

Non-steroidal anti-inflammatory drugs (NSAIDs) are a group of structurally unrelated organic acids that have analgesic, anti-inflammatory and anti-pyretic properties. NSAIDs are most commonly prescribed drugs in clinical practice.¹ The WHO defines pain as “an unpleasant sensory or emotional experience associated with actual or potential tissue damage or described in terms of such damage”.² Inflammation is defined as “a response to injury which is characterized by pain, swelling, heat, redness and loss of function”.

Drug utilization research (DU) was defined by WHO in 1977 as the marketing, distribution, prescription, and use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences. The aims of DU being to monitor evaluate and if necessary, suggest modifications in the prescribing behavior of medical practitioners to make medical care rational and cost effective.³ They provide insight into the efficiency of drug use. DU provides feedback to the prescriber and to create awareness among them about rational use of medicines.⁴ This study would help in improving quality of prescription for rational use of drugs.

Non-steroidal anti-inflammatory drugs (NSAIDs) are drugs having analgesic, antipyretic and anti-inflammatory effects which were most widely used class of drugs in the world and are used as over the counter drugs. The mediators of pain, inflammation and fever are prostaglandins; in addition they also play a role in protecting gastric mucosa, platelet and renal function. NSAIDs act by interfering with the production of these prostaglandins by inhibiting the enzyme cyclooxygenase [COX], resulting in relieving of pain and inflammation which is a desired action. In addition to this protection in gastric mucosa, renal and platelets functioning they exhibit undesired actions.

COX is available in two types i.e. COX-1 and COX-2.^[5,6] The COX-1 enzyme is involved in controlling physiological functions such as stomach mucus production and kidney water excretion as well as formation of platelet but COX-2, is involved in producing prostaglandins which are responsible for inflammation, pain and fever.

Due to undesirable effects of NSAIDs i.e. gastrointestinal and renal toxicity, it has major clinical limitation. This undesirable effect is associated with the ability of NSAIDs to inhibit COX-1 in the GIT. COX-2 inhibitors are thought to act by selectivity blocking COX-2, thereby reducing pain and inflammation, but not blocking COX-1. Standard NSAIDs are known to block both COX-1 and COX-2, reducing inflammation but at the same time blocking the protective role of COX-1, thus producing adverse effects, particularly on the gastric mucosa, hence the selective COX-2 inhibitors are potential NSAIDs without producing gastro toxicity and was sufficient to produce the desirable therapeutic effects by inhibition of selective COX-2.^[7,8]

According to the selectivity for inhibition of the two major isoforms of cyclooxygenase (COX) enzyme, the NSAIDs are classified as follows:

➤ Non-selective COX inhibitors –

Aspirin, Diclofenac, Ibuprofen, Indomethacin, Mefenamic acid, Naproxen, Paracetamol, Piroxicam

➤ Preferential COX2 inhibitors –

Ketorolac, Meloxicam, Nabumetone, Nimuselide

➤ Highly selective COX2 inhibitors-

Celicoxib, Rofecoxib⁹

NSAIDs are usually indicated for the treatment of acute or chronic conditions where pain and inflammation are present. Example; Pyrexia, Rheumatoid arthritis, Gout, Dysmenorrhoea, Metastatic bone pain, Migraine, Postoperative pain, Antiplatelet, etc. Research continues into their potential for prevention of colorectal cancer, and treatment of other conditions, such as cancer and cardiovascular disease.

NSAIDs provides symptomatic relief from pain and swelling in chronic joint disease such as that occurs in osteoarthritis and rheumatoid arthritis and in more acute inflammatory condition such as sports injuries, fractures, sprains and other soft tissues injuries. NSAIDs are associated with certain adverse drug reactions such as; allergic reactions, skin reactions, gastrointestinal effects, renal complications, alteration of hepatic enzyme levels and rarely hepatopathies. These effects are dose-dependent, and in many cases severe enough to pose the risk of ulcer perforation, upper gastrointestinal bleeding, and death, limiting the use of NSAIDs therapy. Many of these events are avoidable; a review of physician visits and prescriptions estimated that unnecessary prescriptions for NSAIDs were written in 42% of visits.¹⁰

Non-steroidal anti-inflammatory drugs have shown an 80% increase in the risk of myocardial infarction with both newer Cox-2 antagonists and high dose of traditional anti-inflammatory compared with placebo. Incidence of cardiovascular risk has posed some questions on the cardiovascular risk safety profile of the whole class.¹¹ The risk of serious gastrointestinal complications in NSAIDs users is four times as high as that in non-users. Upper GIT bleeding is the most common serious complication of NSAIDs use. Renal ADRs is due to changes in renal haemodynamics (blood flow), mediated by prostaglandins, which are affected by NSAIDs. By blocking these prostaglandin-mediated effects, NSAIDs ultimately may cause renal impairment. It may ultimately cause salt and fluid retention, hypertension, interstitial nephritis, nephrotic syndrome, renal failure. Although not direct teratogens, NSAIDs are not recommended during pregnancy, particularly during the third trimester. They may cause premature closure of the foetal ductus arteriosus and renal ADRs in the foetus, also they are linked with premature birth.¹²

Orthopaedics department of the hospital is a very important unit where various drugs, antibiotics, NSAIDs, gastric ulcer protective drugs are routinely given, patients remain admitted for a long period approximately 2-3 weeks, sometimes even longer. Most of the patients are there due to fractures, requiring NSAIDs and muscle relaxants and on regular basis. They suffer also from peptic ulceration and other side effects from irrational use drugs.¹³

Irrational use of drugs in the department of orthopedics leads to development of various adverse effects in patients, leading to increased morbidity and morbidity, increased expenditure. Irrational prescribing is a global problem. According to WHO "Rational use of drugs requires that patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time, at the lowest cost to them and their community".¹⁴

REVIEW OF LITERATURE

Juno JJ et al., conducted study on Non-steroidal anti-inflammatory drugs in a teaching hospital. It was a prospective observational study which was conducted to assess the usage of NSAIDs. A total of 268 patients were involved during the study period. Various NSAIDs were prescribed among the study population that includes Diclofenac (23.8%) which was found to be the maximum utilized NSAIDs followed by Aceclofenac (7.7%) and Flurbiprofen (6.7%), whereas Naproxen (0.7%) was the least prescribed NSAIDs. The most commonly preferred fixed dose combination was Diclofenac with Paracetamol. Maximum number of patients who were prescribed with NSAIDs belongs to the age group of 31-49 (41.8%). Above all, 109(40.6%) patient's complaint of back pain followed by knee pain 37(13.9%) and neck pain 18(6.7%). Based on clinical diagnosis, maximum NSAIDs were prescribed for fracture 73(23.2%) and inter vertebral disc prolapsed 62(23.1%). Oral NSAIDs were prescribed for 3.9% of patients, whereas 20.5% with intramuscular NSAIDs and 16.4% with topical NSAIDs. Diclofenac is the most commonly prescribed non-selective NSAIDs among the study population and Nimesulide was only selective NSAIDs prescribed.¹⁵

Jyothi R et al., conducted study on prescribing pattern of NSAIDs in orthopaedic department at a tertiary care hospital. It was a prospective observational study which was conducted to assess the prescribing pattern of NSAIDs. A total of 100 prescriptions were collected and analyzed. NSAIDs were prescribed for osteoarthritis (20%), rheumatoid arthritis (3%), non-traumatic musculoskeletal pain (30%), post-traumatic conditions (27%), post-operative pain (9%), alkalizing spondylitis (4%), degenerative disease of spine (6%) and neuralgia (1%). The NSAIDs commonly prescribed were Aceclofenac (43%), Etodolac (25%), Diclofenac (15%), Etoricoxib (12%) and ibuprofen (5%). Fixed dose combinations (FDCs) of NSAIDs with adjuvants included paracetamol (57.14%), Serrapeptidase (25.97%), chlorzoxazone (13%) and theocolchicoside (3.89%). Oral formulation of NSAIDs were prescribed in all the patient, supplemented by topical formulation as gel/creams in 10% of the subjects, the dosing frequency was BID(68%), OD(25%), TID(1%) and SOS(6%) and duration of administration ranged from 5-15 days. Other class of drugs used concomitantly were PPIs (Proton Pump Inhibitors), Calcium supplements, multivitamins, anti-microbial, immunosuppressant and glucosamine.¹⁶

Humaira F et al., conducted study on prescription pattern of NSAIDs in patient with acute musculoskeletal pain. It was a prospective study of prescriptions of 306 patients with musculoskeletal pain presenting in orthopaedic outpatient department of Owaisi health and research center during the period of January 2014 to August 2015. Patient particulars, history and clinical findings were obtained using the study Performa. Data collected was analyzed by frequency and percentage. Frequency of NSAIDs prescription in this study was 96%, diclofenac (70.7%) was the commonest NSAIDs prescribed. Selective COX-2 inhibitors weren't prescribed. Combination of paracetamol and tramadol (77%) was commonest FDC prescriptions. High frequency of Great Point Averages co-prescription (94%) was noted of 7 different NSAIDs prescribed, two drugs (diclofenac and paracetamol) falls with duodenal ulcer in 90% segments mainly constituted by non-selective NSAIDs.¹⁷

Taruna S et al., conducted study on prescribing pattern of NSAIDs in orthopaedics OPD of a tertiary care teaching hospital in Uttaranchal. It was a prospective study which was planned and conducted in the department of pharmacology and in orthopaedics OPD of a tertiary care teaching hospital. In a one year period from 2003 to 2004, a total of 300 patients were included in the study and their prescriptions were analyzed. A total of 796 drugs were prescribed, out of which 724 were oral, 72 were topical. Out of 796 drugs, total number of systemic NSAIDs used were 487(67.3%) of these 277(56.8%) were used as monotherapy and 210 (43-12%) were used as fixed dose combination (FDC). Among monotherapy 56.3% were non-selective and 43.6% were selective NSAIDs. Diclofenac sodium (38.98%) followed by ibuprofen and piroxicam were the conventional older NSAIDs commonly used and among newer selective COX-2 inhibitors valdecoxib (25.3%) and rofecoxib (13.4%) were most commonly prescribed.¹⁸

Khairani AK et al., conducted study on utilization pattern of NSAIDs at a primary health care in Malaysia. Non-steroidal anti-inflammatory drugs (NSAIDs) are among medications most commonly prescribed and used worldwide mainly in the developed countries. Variation in terms of drug utilization pattern and adverse events may exist in different population and healthcare centers. The study was to determine consumption pattern of NSAIDs at the Klang health district primary healthcare clinics in Malaysia. A retrospective cohort study of medical records of patients prescribed with NSAIDs over a period of 12 months (January to December, 2013). Records of 852 eligible patients were included for the study. Based on the WHO Defined Daily Dose (DDD), the most commonly used NSAIDs were Diclofenac (1.5725), Mefenamic Acid (1.4108), Ibuprofen (0.0166) and Meloxicam (0.0016). Up to 17.6% of the NSAIDs users, had chronic diseases such as diabetes mellitus hypertension and other cardiovascular diseases. 1.8% to 22.9% of NSAIDs users were concurrently taking antihypertensive, whereas, 8.6% experienced potential drug-drug interaction with NSAIDs. The NSAIDs utilization pattern among the patients at the primary healthcare clinics is appropriate based on the symptoms presented. However, concomitant administration with other drugs and use in patient with chronic disease poses risks of adverse drug reaction and drug-drug interaction.¹⁹

Manish J et al., conducted a prospective study on DU pattern of NSAIDs patient attending orthopaedics OPD of a tertiary care hospital. This study was to analyze the prescribing pattern of NSAIDs in patients attending Orthopaedics OPD and to analyze the correlation between the use of selective COX-2 inhibitors and older conventional NSAIDs in the pattern of current practice. This Prospective study was conducted on Patients visiting Orthopaedics OPD of Pacific Medical College and Hospital, Udaipur, during 6 months study period. Individual data was collected in a preformed format and was analyzed on parameters such as demographic profile and NSAID's usage pattern. 180 patients were selected on the basis of inclusion and exclusion criteria.

Around 417 drugs were prescribed, out of which 302 were oral, 39 were topical. Out of 417 drugs, total number of systemic NSAID's used were 302 [72.2%]. Out of these 185 (56.2%) were used as monotherapy and 144 (43.7%) were used as fixed dose combinations (FDC). Among monotherapy 103 (55.68 %) were non-selective and 82 (44.32 %) were selective COX inhibitors. The result of this study suggests that the frequent use of selective COX-2 inhibitors although conventional non-selective NSAIDs topped the list of various selective and non-selective NSAIDs. Concomitant gastro protectives were also used. Fixed dose combinations were also prescribed.²⁰

Ajay k et al., conducted drug utilization study of co-administration of NSAIDs and gastro protective agents in an orthopaedics outpatient department of a tertiary care hospital in west Bengal. Non-steroidal anti-inflammatory drugs (NSAIDs) are the commonly prescribed analgesic in the orthopaedics department. NSAIDs are prescribed for a long period in both acute condition (like fracture of bones, muscle injury, postoperative procedures etc.) or chronic conditions like osteoarthritis. However, they have many adverse effects, especially gastrointestinal toxicity when use regularly. For this reason, NSAIDs are frequently co-prescribed with gastro protective agents. Common gastro-protective agents are proton pump inhibitors (PPI), H2 blockers, sucralfate, antacids and misoprostol (prostaglandin analogue). A cross-sectional, drug utilization study was conducted. Prescriptions were collected from patients attending the orthopaedic outpatient department. The prescription pattern of NSAIDs, gastroprotective agents or co-administration of NSAIDs and gastroprotective agents were analyzed. A total of 977 prescriptions were studied; in which 928 prescriptions contained NSAIDs with gastroprotective agents (97.92%). The most common gastroprotective agents combined with NSAIDs was H2 receptor blockers (60.56%), followed by proton pump inhibitors (21.65%), while antacids are prescribed least (17.78%). Misoprostol or sucralfate were not used at all. NSAIDs are commonly co-prescribed with gastroprotectiveS agents in high percentage.²¹

Bhaskar R et al., conducted study on prescription pattern of analgesics in OPD at a tertiary care hospital. Analgesics are the most common class of drugs prescribed for various conditions in the orthopedics outpatient department (OPD). This study is performed for a better understanding of analgesics prescribing pattern in orthopedics and to correlate the use of selective cyclooxygenase-2 (COX-2) inhibitors, conventional non-steroidal anti-inflammatory drugs (NSAIDs), and opioid analgesics in practice in the present scenario. Pain was quantified using numeric rating scale. A total of 300 prescriptions were analyzed. 800 drugs were prescribed with an average of 2.6 drugs per prescription. Out of these, 62.3% were NSAIDs, 15.4% were opioid analgesics and 22.3% were gastroprotective agents. 61% of the NSAIDs were prescribed as monotherapy and 39% were prescribed as fixed drug combination (FDC). The ratio of selective to non-selective NSAIDs is 1.3:1. The results of the present study show frequent use of selective COX-2 inhibitors, although non-selective NSAIDs topped the list of various selective NSAIDs, non-selective NSAIDs, and opioid analgesics. This suggests that gastrointestinal safety was an important concern while prescribing these drugs. Many FDCs were found to be irrational.²²

Kholoud Z Q et al., conducted study on prescribing pattern of NSAIDs in outpatient clinics at royal rehabilitation center in king Hussain medical center. A total of 25,692 prescriptions were reviewed. Collected data includes: percentage of each type of NSAIDs, dosage form, percentage share for each selective and non-selective NSAID, and concomitant therapy with gastroprotective agent. 52% of the collected prescriptions contain NSAIDs. 76% of the prescriptions are for women and 24% are for men. Age of patients included in the prescription ranges between 16 and 80 years, with a mean of 59.3± 15.8 years. Indications for NSAIDs are 58.3% for osteoarthritis, 12.1% for rheumatoid arthritis, and 20.1% for orthopedics pain. Additionally, 96.4% of prescriptions are for conventional NSAIDs, while only 3.6% prescriptions are for the selective COX-2 inhibitors. Furthermore, diclofenac topped the list with 83.74% of prescriptions of NSAIDs. Concomitant therapy with gastroprotective agents was reported in 71.2% of prescriptions. Famotidine is the most prescribed gastroprotective agents followed by antacid and omeprazole. Diclofenac was the most prescribed NSAIDs as a result of its low price and availability in different dosage forms. Conventional NSAIDs combined with a gastroprotective agent is the most appropriate first-line NSAIDs therapy for many patients to minimize the occurrence of gastrointestinal toxicity.²³

Goel R K et al., carried out a study on prescribing pattern of drugs in the outpatient department of a tertiary care hospital in Ghaziabad, U.P. A total of 500 prescriptions were collected and analyzed. Total number of drugs prescribed was 1450 out of which 564 drugs were prescribed by generic names. Average number of drugs was 2.9327 drugs were fixed dose combinations while only 595 were from essential drug list. The mean number of drugs per prescription should be as low as possible otherwise there is increased risk of drug interaction, bacterial resistance, non-compliance and increase in cost.²⁴

Singh V et al., conducted study on current trends of prescribing pattern of NSAIDs in an orthopaedics OPD at a tertiary care hospital. The data was collected from the out-patient case sheets of the patients who were attending Orthopedic out-patient departments (OPDs) for a period of 6 months. NSAIDs were prescribed to 48.19% of the patients. Coxibs and Non-Selective NSAIDs accounted for 1.51% and 45.71% respectively. Monotherapy was given to 14.39% and FDCs accounted for 19.29%. Diclofenac 11.77 %, was the commonest prescribed NSAIDs in monotherapy while Paracetamol 15.12% in FDCs. Maximum number (97.66%) of patients were co-prescribed gastro protective drugs (GPDs) commonest being Rabepazole 12.19%. The use of Coxibs have decreased to great extent because of reports of cardiovascular adverse effects. The conventional non-selective NSAIDs are generally co prescribed with gastro protective drugs.²⁵

Niyaz A et al., conducted study on drug utilization pattern of patient using NSAIDs in south Delhi hospital. The study was a simple randomized prospective survey study. This prospective study was carried out for a period of six months in selected areas of South Delhi region. Randomly selected 300 subjects were selected. During the six-month study period, total of 300 patients were enrolled as per the inclusion and exclusion criteria. Among the 300 study patients 157 (52.3%) were male and 143 (47.6%) were females. It was observed that maximum number 83 (27.6%) were in the age range of 31-40 years followed by 68 (22.6%) patients in the range of 41-50 years.

During the study, it was observed that Aryl acetic acid derivatives (Aceclofenac, Diclofenac) were the most frequently prescribed drugs category (52.5%) followed by Paracetamol (26.6%), Ibuprofen (10.5%), Nimesulide (6.26%), Lornoxicam (4%). Among the individual drugs aceclofenac was the most commonly prescribed drug (32%), followed by Paracetamol (26%), Ibuprofen (10.5%), and Nimesulide (6.26%) & combination therapy was preferred therapy. 143 (47.6%) of total patients showed a good adherence with the prescribed treatment. Adherence was found to be slightly better in females (24.3%) than in male (23.3%). NSAIDs users were more prevalent in middle age groups (40yrs) patients and in male. Aryl acetic acid (Diclofenac & Aceclofenac) was the most frequently prescribed drug followed by Paracetamol, Ibuprofen and Nimesulide, Lornoxicam as combination therapy.²⁶

Jayakumari S et al., conducted study on prescription pattern analysis of anti-inflammatory drugs in general medicine and surgery department at tertiary care hospital. The objective of this research was to evaluate and analyze the prescription pattern of anti-inflammatory drugs given in the general medicine and surgery department at a tertiary care hospital. The entire study was planned to be carried out for a period of six months. Total 84 patients were included in this study and was carried out in a 300 bedded tertiary care hospital. The patients admitted to the general medicine and surgery department were included in this study, of which patients given with anti-inflammatory drugs were recorded and analyzed for prescribing practice and rational use. The majority of the patients were admitted to general medicine ward rather than surgery ward, and the non-steroidal anti-inflammatory drugs (NSAIDs) were highly prescribed to the age group of 41-60 y. And about 88.89 % of non-NSAID injection, 11.11% of NSAID injection were prescribed. The prescribed drugs were mostly given by generic names (81.52%) and least by brand name (18.48 %).²⁷

Akshay S et al., conducted study on drug utilization pattern of NSAIDs in outpatient department of orthopaedics at a tertiary care hospital. A prospective observational study was planned on 200 patients after obtaining IEC approval visiting Orthopedics OPD. The drug utilization pattern was recorded on proforma. Assessment of pain relief was done by using 11-point numeric metric scale (Visual Analogue Scale). The total number of males & females were 92 (46 %) & 108 (54 %) respectively. Out of a total of 200 patients, 177 (88.5 %) patients were in the 18-64 years age group (non-elderly) with the rest 23 (11.5%) present in the > 65 years age category (elderly). A total of 200 prescriptions after analysis showed that out of 200 patients, 98 % were on non-selective NSAIDs & 2 % on preferential & selective NSAIDs. Aceclofenac alone or with Paracetamol is the most common prescribed drugs.²⁸

Nagla A et al., conducted study on prescription pattern of drugs given to patients admitted in orthopaedics wards of a rural medical college at a tertiary care hospital. A retrospective cross-sectional study was planned on approximately 221 patients admitted in indoor wards of the orthopedic department. The data was analyzed considering WHO drug prescription parameters and results were analyzed statistically. Out of the 224 patients, 135(60.2%) were male and 89(39%) were female. Most common cause of admission to orthopaedics ward was fractures of long bones(75%). The most common age group was 20-40 years of age (61%). Patients had 5.1 drugs given per prescription. Most common drug to be prescribed was Analgesics (30.8%) followed by antibiotics (26.3%). Most common Analgesic were Non- opioid (NSAIDs)(82.3%) followed by opioid ie. Tramadol (17.6%). Most common NSAIDs was diclofenac sodium (71%) followed by paracetamol(34.6%). Of the total Patients 17.3% received gastric ulcer preventive omeprazole (81.3%) followed by ranitidine, H2 blocker (18.6%).²⁹

Ayan P et al., conducted study on prescription pattern of analgesics in orthopaedics outpatient department at a tertiary care hospital in silchar, Assam. A prospective, observational, non-interventional, hospital based study was carried out for the period of three months between April 2013 and June 2013 in the out-patient department of Orthopedics at Silchar Medical College and Hospital. Adult patients (>18years) of either sex who visited the outdoor for the first time and prescribed with analgesic drugs were included in the study. A total of 300 prescriptions were analyzed. Of these, 81.3% were NSAIDs, 18.7% were opioid analgesics. 73.7% contained non-selective NSAIDs, 7.6 % had selective NSAIDs. 55.3% of the NSAIDs were prescribed as monotherapy and 44.7 % were prescribed as fixed dose combination (FDC). 65.3% of the prescription contained Proton pump inhibitor (PPI).³⁰

Elsy M et al., conducted study on prescribing pattern of analgesics in orthopaedics department of tertiary care teaching hospital in Kerala. A cross sectional study was conducted in the Department of Pharmacology and Orthopaedics of a tertiary care teaching hospital in Kerala between January 2008 and March 2008. The aim of the study was to analyze the prescribing pattern of NSAIDs in patients admitted in Orthopaedics ward and to correlate the use of selective COX-2 inhibitors and conventional NSAIDs in practice. The results suggest frequent use of conventional non-selective NSAIDs. Use of selective COX 2 inhibitors was less. There was increased use of non-selective NSAIDs for the acute management.³¹

Mohanraj R et al., conducted study on prescribing patterns of NSAIDs in outpatient department of an orthopaedic specialty hospital. The current retrospective study of eight months duration was performed to assess the prescribing pattern of Nonsteroidal anti-inflammatory medications utilized in outpatient department of an orthopedic specialty hospital in resource limited background of Andhra Pradesh, India. In 150 prescriptions of our study, osteoarthritis (40%) was a predominant presenting complaint for which NSAIDs were prescribed, and major population reported was female patients (54.6%). Total number of nonsteroidal anti-inflammatories found in the 150 prescriptions was 368; prescribed from highest to lowest were aceclofenac (24.73%), diclofenac (21.20%), paracetamol (20.11%), chlorzoxazone (13.31%), ibuprofen (9.78%), Piroxicam (6.35%) and tramadol (4.62%). The type of NSAIDs therapy was found more in FDCs 64%, followed by monotherapy (29.33%) and polytherapy (6.67%), in which 39.58% FDCs constituted aceclofenac + paracetamol. The study showed substantial use of FDC of NSAIDs which is may not achieve desired health outcome in patients, thus their quality of life remains unimproved or results in therapy failure and increased economic burden, has combining two NSAIDs is irrational Thus widespread use of irrational FDCs must be condensed.³²

Indranil B et al., conducted study on Prescribing pattern in orthopedics outpatient department of a medical college in India. A cross-sectional study was conducted at a tertiary care medical college in West Bengal. A total of 837 prescriptions were analyzed with an average number of drugs per prescription being 2.57. Among the drugs, non-steroidal anti-inflammatory drugs were most commonly prescribed (64.14% [1383/2156]) followed by anti-ulcer drugs (13.58% [293/2156]), centrally acting muscle relaxants (21.4% [323/1516]), multivitamins and minerals (9.09% [196/2156]), and others (antibiotics, anti-gout drugs, etc.,) (5.12% [110/2156]). Drugs were prescribed in the generic name in 35.72% (770/2156) of prescriptions. A total of 71.56% (1543/2156) of drugs were prescribed from national essential medicine list. Antibiotics were prescribed in 53 encounters (53/2156 [2.46%]) and 93 prescriptions (4.38%) mentioned administration of injectable. The frequency of drug administration and the duration of treatment was mentioned in 87.81% (1893/2156) and 82% (1768/2156) of the prescriptions, respectively.³³

S Kumar et al., conducted evaluation of prescribing pattern of NSAIDs in south Indian teaching hospital. The present study was aimed to appropriateness of NSAIDs use with secondary objectives of assessment of co-prescription with gastro-protective agents, the nature and severity of adverse drug reactions and drug-drug interactions with an intention to prevent the inappropriate use of NSAIDs. A prospective study was carried out in 400 in-patients of various departments of the hospital during the 6 months period. Out of 400 patients, 237 were male and 163 were females, in which most of the patients (63.5%) were belonging to age group of 21-50 years. The major complaint of the patient was arthritic pain (25.5%). Most of the patients (77%) were prescribed single NSAID as monotherapy in different dosage forms, although some patients were prescribed with combination of Aceclofenac + Paracetamol (13.75%). The preferential COX-2 inhibitors were widely prescribed (84.5%) as compared to non-selective COX inhibitor (15.5%). Among various NSAIDs prescribed, Diclofenac (45.90%) and Aceclofenac (15.96%) were mostly prescribed. NSAIDs were mostly prescribed by parenteral route (36.31%). Most of the patients were co-prescribed NSAIDs with gastro-protective agents (80.5%). In the study, moderate drug interactions were found between NSAIDs and antibiotics and no adverse drug reactions were reported during the study. The study concluded that, prescription of NSAIDs was found to be rational. Education program, counselling program, alertness of community pharmacy regarding OTC drugs can be helpful to minimize harmful effect of the drug to patients.³⁴

Shaikh U et al., conducted study on Prescription trends in department of orthopedics at tertiary care teaching hospital. The present article is to find out the prescription trends in Mamata Medial College, Khammam in Department of Orthopedics. Prescriptions from both OPD as well as IPD were collected and analyzed with the following parameters: Average number of drugs per prescription, Percentage of drugs prescribed by generic name, Dosage frequency and Duration of treatment, Disease distribution, percentage of drugs prescribed from essential drugs list or formulary. Number of drugs per prescription varied from 1 to 6 with average of 2.133. Dosage forms were recorded in 95% of prescriptions. The frequency of drug administration was recorded in 100% prescriptions whereas only 82% of prescriptions mentioned regarding duration of the treatment. Antimicrobials (15.64 %) and NSAIDs (40.13%) constituted the most routinely prescribed drugs among all the classes. Also, most of the antimicrobials have been prescribed parent rely (95%). Suggestions were given to the doctors to prescribe drugs among the hospital formulary to reduce the economic burden to the patients since percentage of drugs prescribed among hospital formulary was only 79.93%.³⁵

Ashalatha R et al., conducted study on prescribing pattern of NSAIDs in orthopaedic outpatient department at a tertiary care hospital. 100 prescription duplicate collected and analyzed prospectively for the pattern of NSAIDs prescription for arthritic and non-arthritic conditions; the drug formulation, route, frequency, duration of admission and concomitant medications results. NSAIDs were prescribed for nontraumatic musculo skeletal 35% pain, 25% post traumatic pain, 20% osteoarthritis, 10% postoperative pain, 3% ankylosing spondylitis, 6% degenerative disease of spine, 1% neuralgia. The NSAIDs commonly prescribed were Aceclofenac 45%, Etodolac 20%, Diclofenac 24%, and Ibuprofen 11%. Fixed dose combination of NSAIDs with adjuvants was prescribed in. The adjuvants, included are paracetamol 55.6%, serratopeptidase 32.8%, chlorzoxazone 9.1%, thiocolchicoside 2.5%. Oral formulations of NSAIDs were prescribed in all patients, supplemented by topical formulations as gel/cream in 15% of subjects. The dosing frequency was BID (65%), OD (25%), TID (2%), SOS (8%). Duration of administration ranged from 5-15 days. other classes of drugs used concomitantly were proton pump inhibitors, calcium supplements, Multivitamins, Antimicrobial, Immunosuppressant, and Glucosamine. NSAIDs were prescribed empirically for various arthritic and nonarthritic conditions, frequently as fixed dose combinations [FDC]s with various adjuvants as per the standard guide lines.³⁶

AIMS AND OBJECTIVES

AIM

To assess the prescribing pattern of NSAIDs in orthopedic department in teaching hospitals.

OBJECTIVES

- ❖ To analyze the demographic characteristics of patients.
- ❖ To analyze the pattern of NSAIDs prescribing such as diagnosis, NSAIDs formulations, dose, route of administrations, frequency, duration of administrations, combinations and average number of drugs per prescriptions.
- ❖ To analyze the selective COX-2 inhibitors and conventional NSAIDs in current practices.
- ❖ To calculate the percentage of drugs prescribed by the generic name and brand name.

METHODOLOGY

STUDY SITE:

This observational study was carried out in In-patient & outpatient Department of Sapthagiri Institute of Medical Science & Research Center.

STUDY DESIGN:

This is a prospective and observational study conducted over six months period.

STUDY DURATION:

- Planning - 1 months
- Data collection - 3 months
- Interpretation and thesis writing -2 months

STUDY POPULATION:

Patients who visited the orthopaedics department of Saphthagiri Institute of Medical Science & Research Center, Bangalore and satisfying the inclusion/exclusion were enrolled in the study.

SAMPLE SIZE

patients visiting orthopaedic department.

STUDY CRITERIA:**INCLUSION CRITERIA:**

- Patient attending orthopedic department with prescription containing NSAIDs.
- Patient of either gender.
- Patients from all age group

EXCLUSION CRITERIA:

- Patients visiting departments other than orthopedic department
- Patients visiting orthopedic department with prescriptions not containing NSAIDs
- Patients having prescription of NSAIDs from departments other than orthopedics
- Pregnancy and lactating women will be excluded from the study.

SOURCE OF DATA:

- ❖ Patient data collection form.
- ❖ Prescriptions of patients.
- ❖ Patient medication chart review.
- ❖ Verbal communication with patient.

STUDY MATERIALS**PATIENT DATA COLLECTION FORM:**

Data will be collected by using a self-designed data collection form from orthopedic department which consists of details like age, sex, diagnosis, therapeutic data including name, dose, duration and frequency of drugs and other relevant information.

STUDY PROCEDURE

- Patients prescribed with any NSAIDs medications irrespective of clinical indication either as monotherapy or in combination are included in the study.
- New as well as follow up cases from all age group of both genders are included in the study.
- The data is collected in a proforma which included the demographic details, medical history, personal history, family history, social history, clinical diagnosis and treatment prescribed.
- The entire data collected was entered in Microsoft excel sheet for analysis of results later.
- The entire data was analyzed using appropriate statistical methods (Microsoft, excel).

EVALUATION CRITERIA:

The prescribing pattern of NSAIDs in orthopedic department in a teaching hospital was evaluated.

STATISTICAL ANALYSIS:

Statistical Analysis was performed using MS Excel, and the results was statistically analyzed using appropriate statistical method (MS Excel).

RESULTS

This study includes 120 patients from the department of orthopaedics. The study was conducted from Oct 2016 to March 2017, at Saphthagiri Medical College and Hospital, a tertiary care hospital in Bangalore.

AGE DISTRIBUTION OF PATIENT

Out of 120 patients included in the study, majority of patients, 32 (26.67%) belonged to age group of 51-60 years.

Table 1: Age Distribution Of Patients.

Age Distribution (in year)	No. of patients	Percentage %
<10	6	5%
11-20	8	6.67%
21-30	13	10.83%
31- 40	15	12.5%
41-50	26	21.65%
51-60	32	26.67%
61-70	18	15%
71-80	2	1.67%
Total no. of patients	120	100%

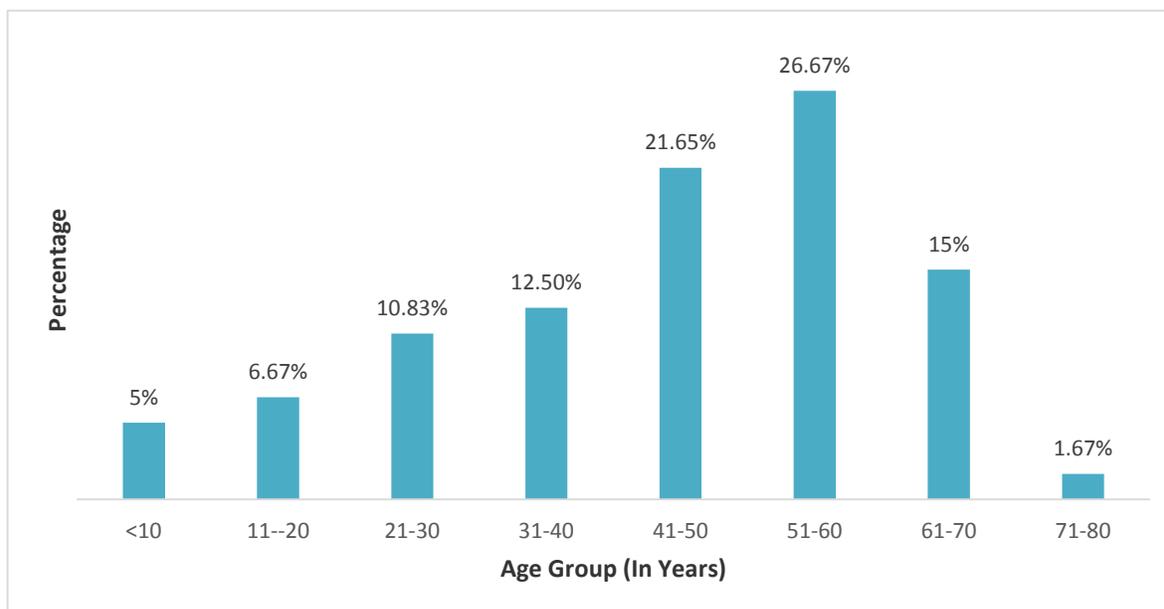


Figure: 1 Age distribution of patients.

Gender distribution of patients

Out of 120 patients included in this study, 52 (43.33%) patients were male and 68 (56.67%) patients were female. The number of female was comparatively high.

Table:2 General Distribution of Gender.

Gender	Number Of Patients	Percentage
Male	52	43.33%
Female	68	56.67%
Total	120	100%

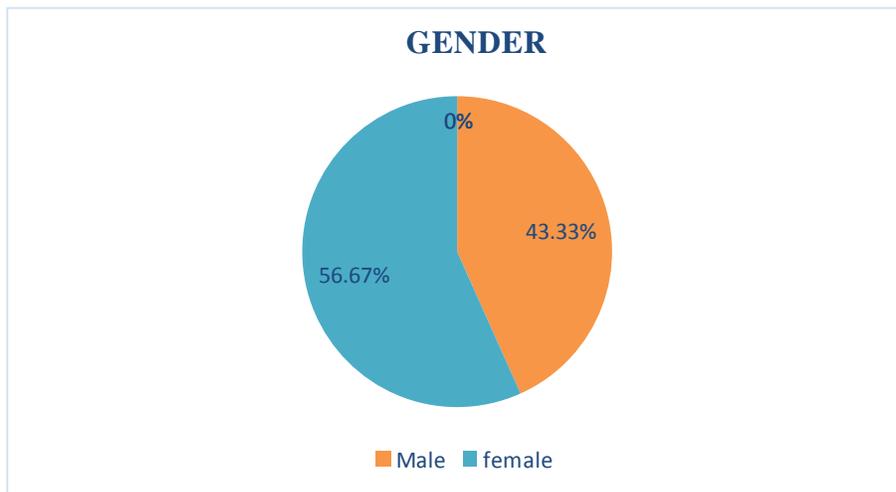


Figure :2 General Distribution of Gender.

Gender distribution in age groups

The maximum numbers of patients were in the age range of 51-60 comprising of 14(29.17%) males and 18 (25%) females. Age group of 41-50 consisted of 7(14.58%) males and 19 (26.39%) females. Age group of 61-70 consisted of 6 (12.5%) males and 18 (16.67%) females.31-40 age group consisted of 5 (10.42%) males and 10(13.89%) females.21-30 age group consisted of 7(14.58%)males and 6(8.33%) females.11-20 age group consisted of 6(12.5%) males and 2(2.78%) females. 0-10 age group consisted of 2(4.17%) males and 4(5.56) females. 71-80 age group consisted of 1(2.08%) male and 1(1.39%) female.

Table 3: Distribution of Gender in Age Group:

Age (Years)	male		female		Total	Percentage
	n	%	n	%		
0-10	2	4.17	4	5.56	6	5%
11-20	6	12.5	2	2.78	8	6.67%
21-30	7	14.58	6	8.33	13	10.83%
31-40	5	10.42	10	13.89	15	12.5%
41-50	7	14.58	19	26.39	26	21.65%
51-60	14	29.17	18	25	32	26.67%
61-70	6	12.5	12	16.67	18	15%
71-80	1	2.08	1	1.39	2	1.67%
Total	48	100%	72	100%	120	100%

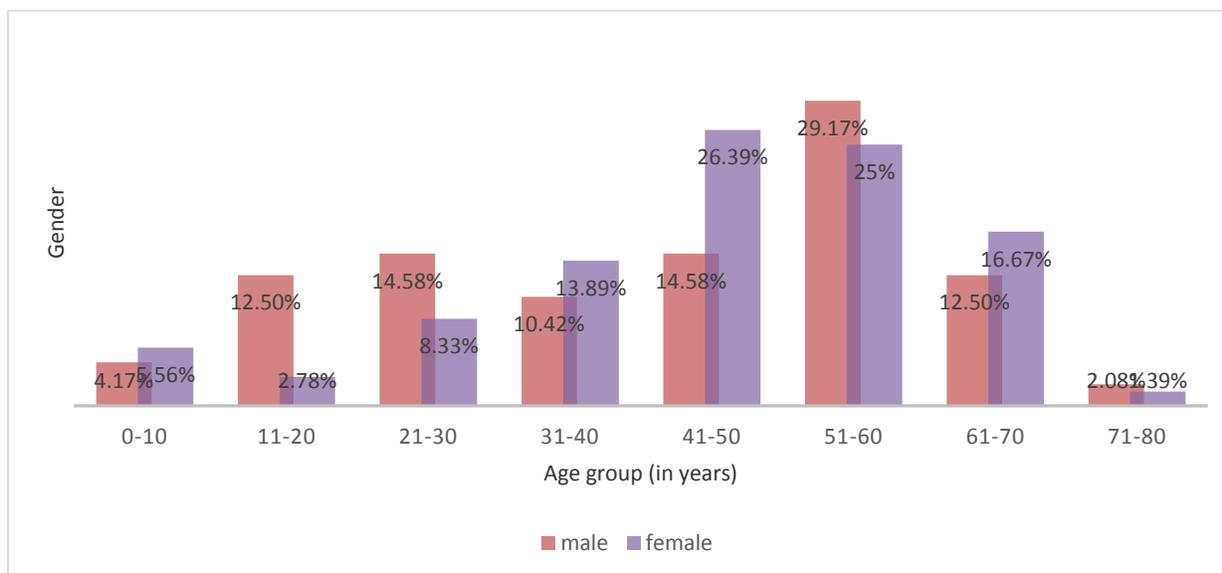


Figure:3 Distribution of Gender in Age Group.

DISTRIBUTION OF PATIENT BETWEEN IP AND OP

In 120 case enrolled, 100 (83.33%) were out-patients, whereas 20 (16.67%) were inpatients.

Table 4: Distribution Of Patients In IP&OP Department.

Type of consultation	Number of patients	Percentage
IP	20	16.67%
OP	100	83.33%
Total	120	100%

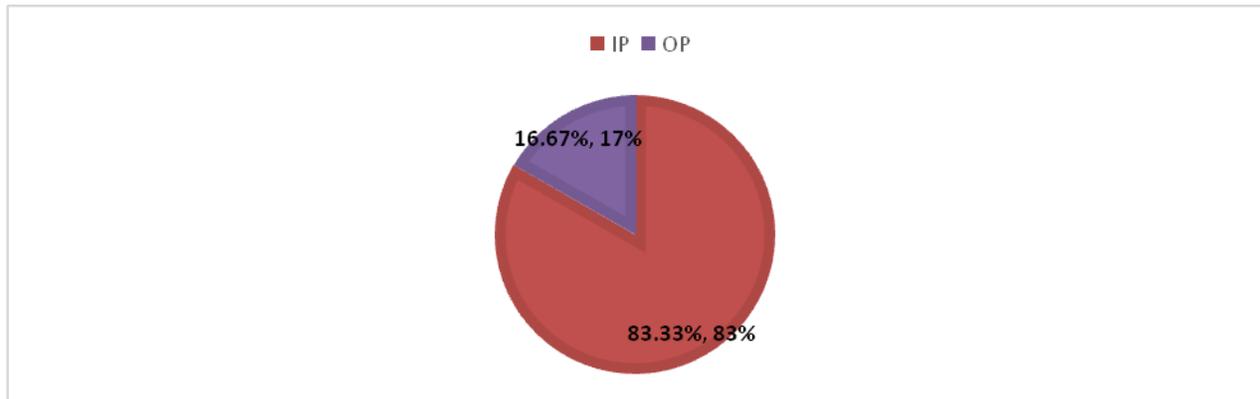


Figure: 4 Distribution of patients in IP & OP department.

Distribution of new cases and follow up cases

Out of 120 cases enrolled, 114(95%) were new cases and the remaining 6 (5%) were follow up cases.

Table :5 distribution of new cases and follow up cases.

Cases status	Number of patients	Percentage
New cases	114	95%
Follow up cases	6	5%
Total	120	100%

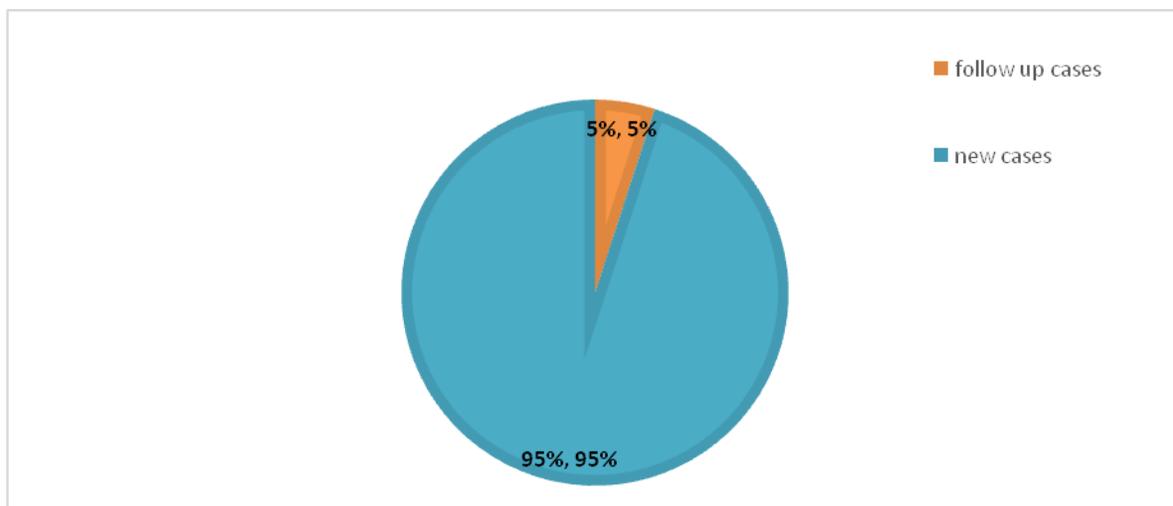


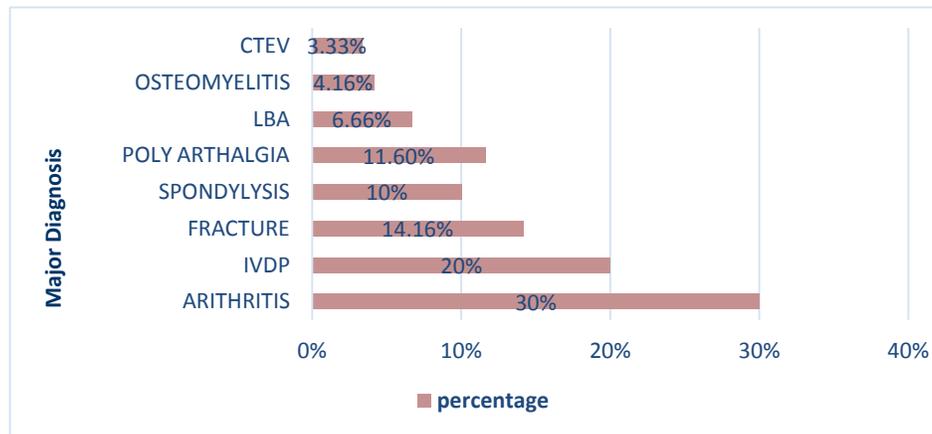
Figure : 5 Distribution of new case and follow up cases.

Distribution of major diagnosis

Out of 120 patients, the most common diagnosis was Arthritis(30%). Other diagnoses included IVDP(23.33%), spondylitis(13.33%), polyarthralgia (11.66%), osteomyelitis(10%), lower back ache (8.33%), CTEV (3.33%).

Table 6: The Percentage Of Major Diagnosis.

Major diagnosis	Number of patients	Percentage
Arthritis	36	30%
IVDP	24	20%
Spondylitis	12	10%
Fracture	17	14.16%
Polyarthralgia	14	11.67%
LBA	8	6.66%
osteomyelitis	5	4.16%
CTEV	4	3.33%
Total	120	100%

**Figure 6: The percentage of major diagnosis.**

General prescription pattern of drugs prescribed in orthopaedics

General prescription pattern of all NSAIDs prescribed in orthopaedics for 120 patients in the study was reviewed. A total 370 drugs were prescribed, at an average rate of 3.08 drugs per prescription. NSAIDs non-selective 49.19% and selective (3.24%) were the bigger class of drugs prescribed, followed by gastro protective (24.86%), multi vitamin and minerals (7.3%) .and other drugs like antibiotic,anti-diabetic,anti-hypertensive, anti-histaminic etc. formed the remaining (15.41%).

Table 7: Distribution of prescribing drugs.

Class of drugs	No. of drugs prescribed	Percentage
Non- selective NSAIDs	182	49.19%
Selective NSAIDs	12	3.24%
gastro protective	92	24.86%
Multivitamin and minerals	27	7.3%
Others drugs	57	15.41%
Total	370	100%

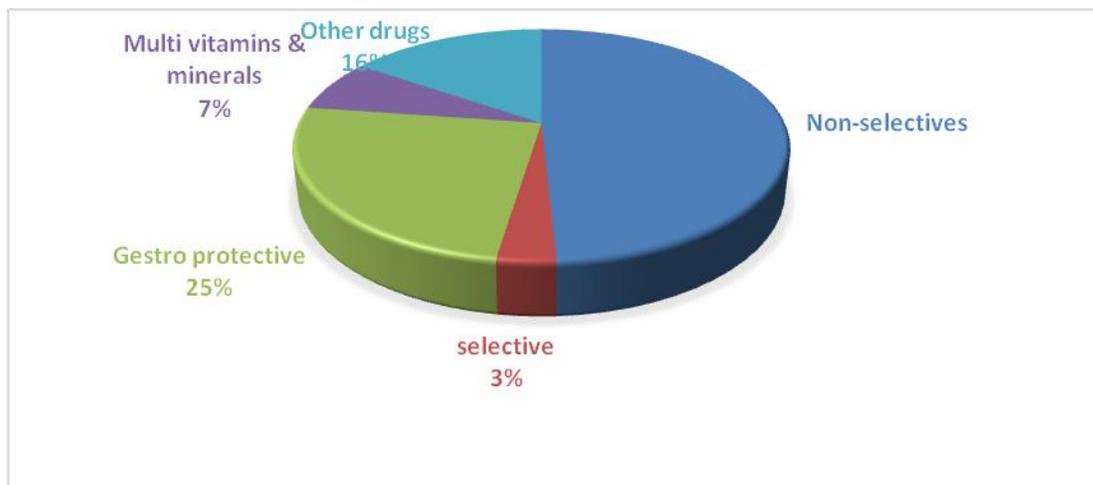


Figure:7 Distribution of prescribing drugs.

Pattern of drugs used in Orthopaedic

Total no.of prescriptions=120

Total no.of drugs used = 370

Average no. of drugs per prescription = 3.08

Total no.of systemic NSAIDs

➤ as monotherapy-22

➤ as FDC-27

Total no. of oral NSAIDs

➤ FDC NSAIDs -72

➤ Monotherapy NSAIDs -73

Total no.of non-selective NSAIDs = 182

Total no.of selective NSAIDs = 12

Total no.of gastro protective agents = 92

Total no. of other drugs = 57

Total no. of vitamins and minerals =27

DETAILS OF FDC (fixed dose combination)

Table No:8 Distribution Of FDC Drugs.

Drugs	No.of drugs	Percentage
NSAIDs +NSAIDs (Aceclofenac + paracetamol)	52	52.52%
NSAIDs+ proteolytic enzyme (Aceclofenac +paracetamol+ serratiopeptidase)	26	26.26%
Diclofenac+ serratiopeptidase	2	2.02%
NSAIDs +muscle relaxants	4	4.04%
Aceclofenac+ chlorzoxazone+ paracetamol		
Acelofenac +paracetamol +tizanidine	3	3.03%
NSAIDs + opioids	12	12.12%
Paracetamol + tramadol		
Total	99	100%

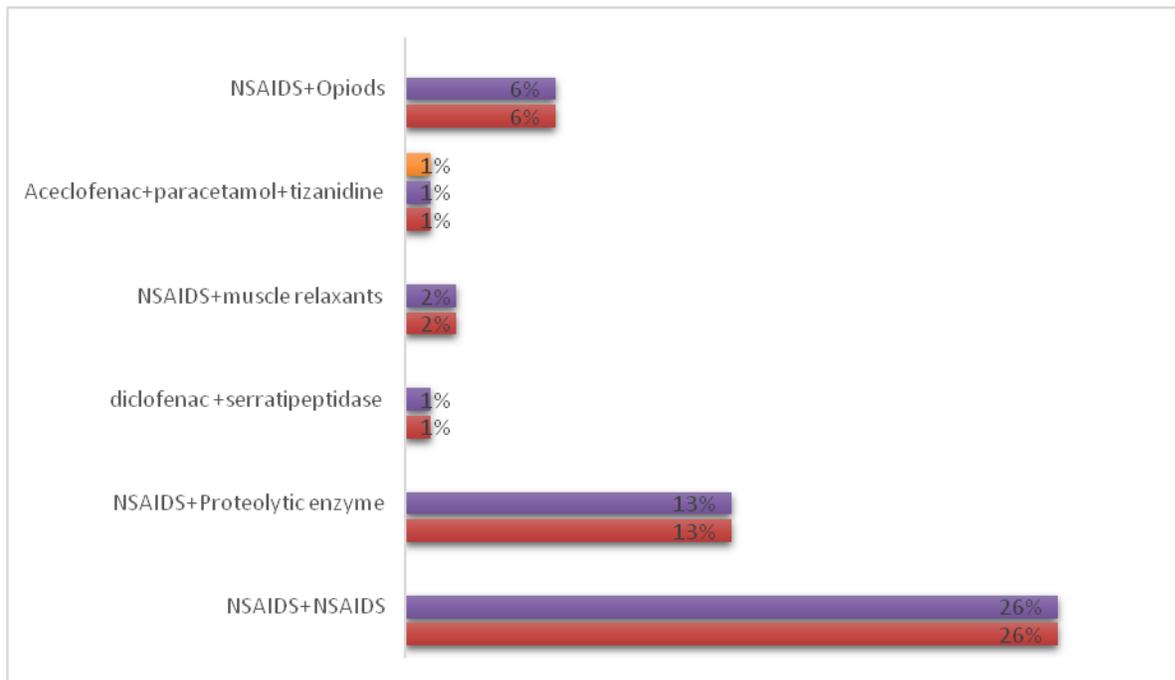


Figure:8 Distribution of FDC drugs.

Comparison of selective and non-selective NSAIDs

Out of 95 total selective & non- selective NSAID, non-selective NSAIDs is (87.16%) and selective is (12.63%).

Table no: 9 Comparison of selective and non-selective.

Selective	Name of the drugs	No. of prescribed drugs	Percentage
	Celecoxib	8	66.667%
	Etoricoxib	4	33.33
	Total	12	100%
Non-selective	Aceclofenac	38	45.78%
	Paracetamol	12	14.45%
	Diclofenac	28	33.73%
	Naproxen	5	6.02%
	Total	83	100%

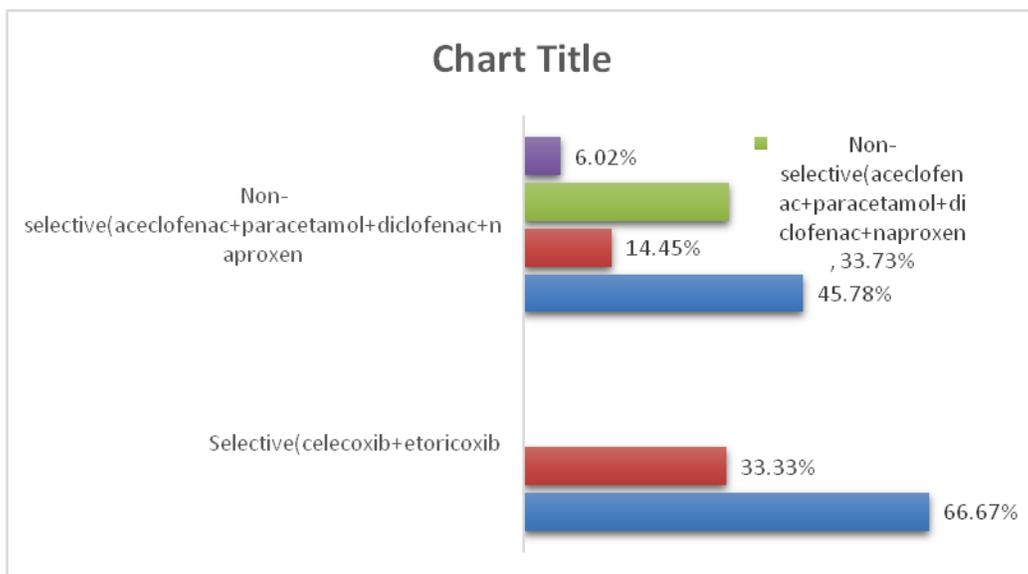


Figure: 9 Comparison of selective & non-selective NSAID.

General Distribution of drugs in generic name and brand name

Table no:10 Generic Name Wise Distribution.

Generic name	No. of drugs prescribed	Percentage
Paracetamol	2	9.09%
Aceclofenac	4	18.18%
Diclofenac	4	18.18%
Celecoxib	8	36.36%
Etoricoxib	4	18.18%
Total	22	100%

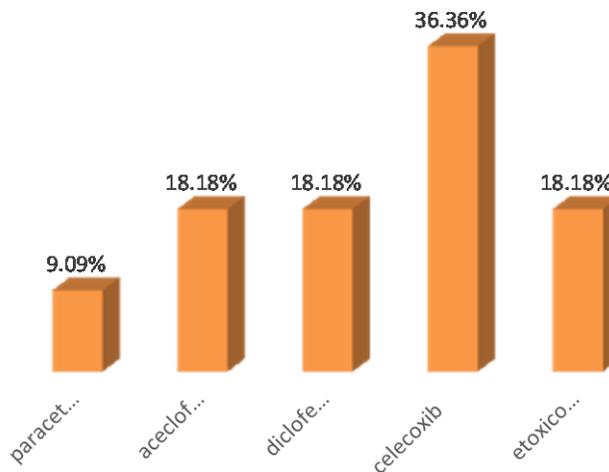


Figure : 10 Distribution of drugs in generic name.

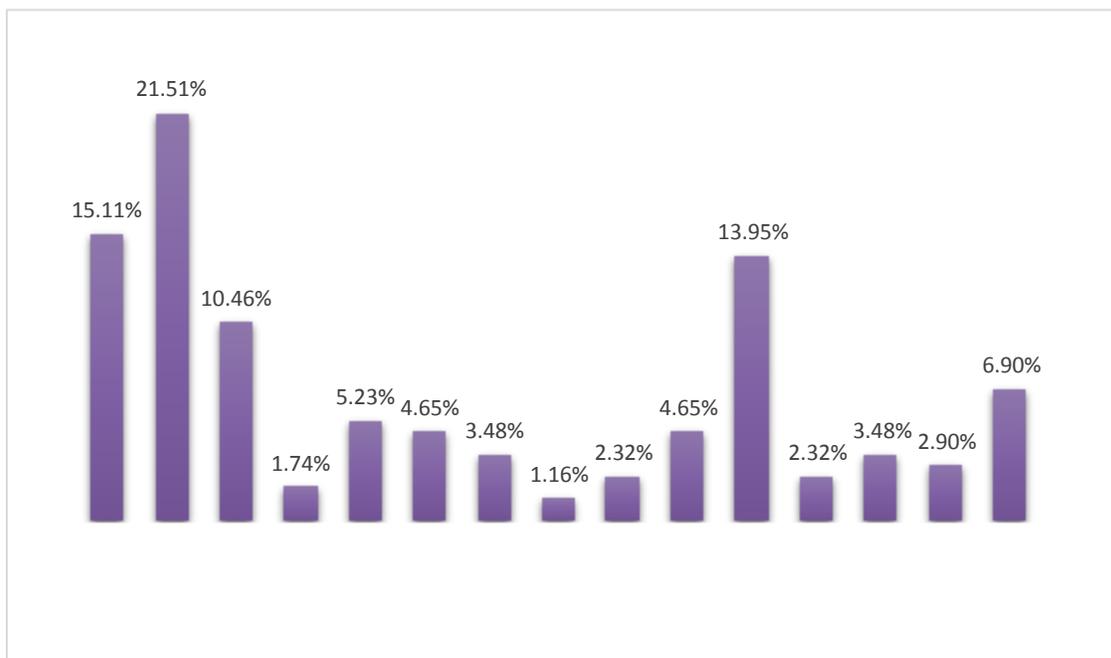


Figure:11 Brand name wise distribution.

Distribution of NSAIDs in spondylosis

Out of 20 NSAIDs prescribed in spondylosis,(aceclofenac+ paracetamol) was the most commonly prescribed (40%), aceclofenac(20%), diclofenac (15%), aceclofenac+ paracetamol + tizanidine (15%) and naproxen (10%).

Table :12 Distributions of NSAIDs in spondylosis.

Drugs	No of drug prescribed	Percentage
Acelofenac	4	20%
Diclofenac	3	15%
Naproxen	2	10%
Acelofenac + paracetamol	8	40%
Acelofenac +paracetamol+tizanidine	3	15%
Total	20	100%

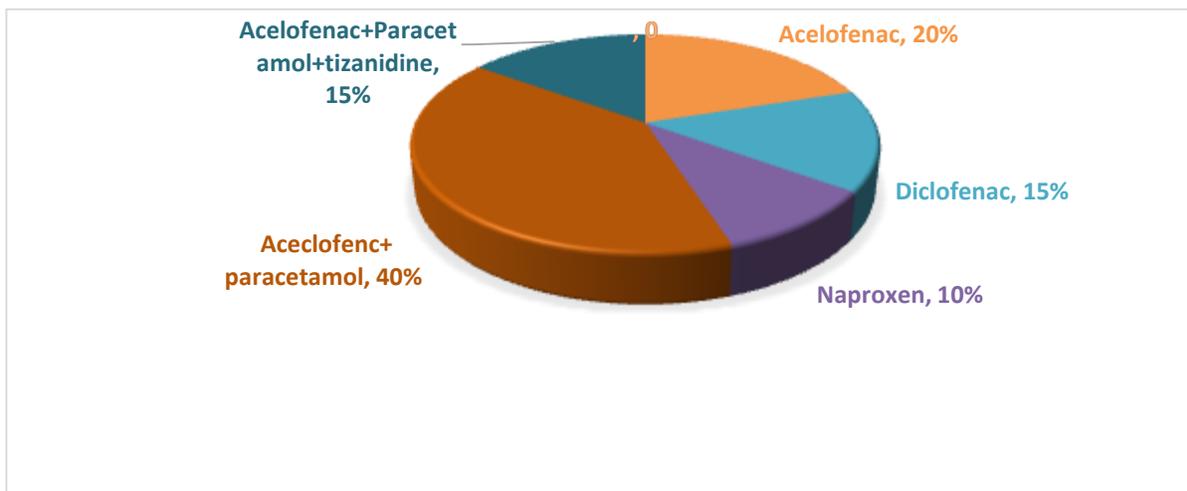


Figure:12 Distribution of NSAIDs in spondylosis.

Table: 13 Distributions of NSAIDs in IVDP.

Drugs	No. of drug prescribed	Percentage
Acelofenac	3	9.09%
Diclofenac	6	18.18%
Acelofenac + paracetamol	14	42.42%
Acelofenac + paracetamol +serratiopeptidase	8	24.24%
Paracetamol+tizanidine	2	6.06%
Total	33	100%

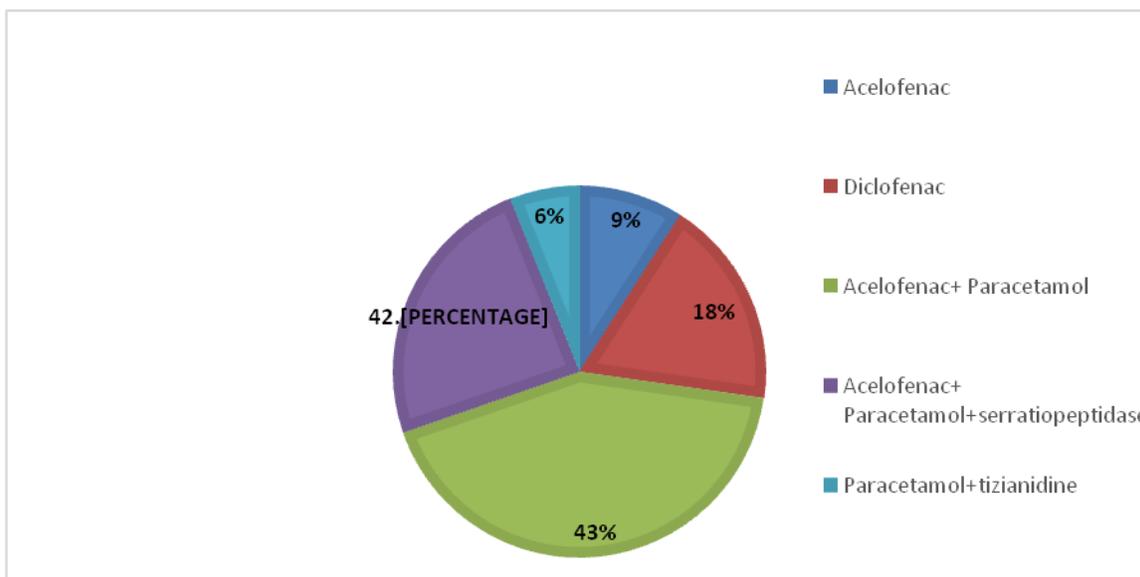


Figure:13 Distribution of NSAIDs in IVDP.

Distribution of NSAIDs in arthritis

Out of 64 NSAIDs prescribed, aceclofenac was the most prescribed (23.43%), followed by aceclofenac+paracetamol (15.62%), Diclofenac (10.54%), aceclofenac+paracetamol+serratiopeptidase (9.37%), celecoxib (9.37%), aceclofenac+paracetamol+celecoxib (6.25%), paracetamol +tramadol (6.25%) and etoricoxib (6.25%).

Table:14 Distribution of NSAIDs in arthritis:

Drugs	No of drugs prescribed	Percentage
Aceclofenac	15	23.43%
Diclofenac	7	10.94%
Paracetamol	5	7.81%
Naproxen	3	4.68%
Aceclofenac +paracetamol	10	15.62%
Aceclofenac +paracetamol + serratiopeptidase	6	9.37%
Aceclofenac +paracetamol+ celecoxib	4	6.25%
Paracetamol+ tramadol	4	6.25%
Etoricoxib	4	6.25%
Celecoxib	6	9.37%
Total	64	100%

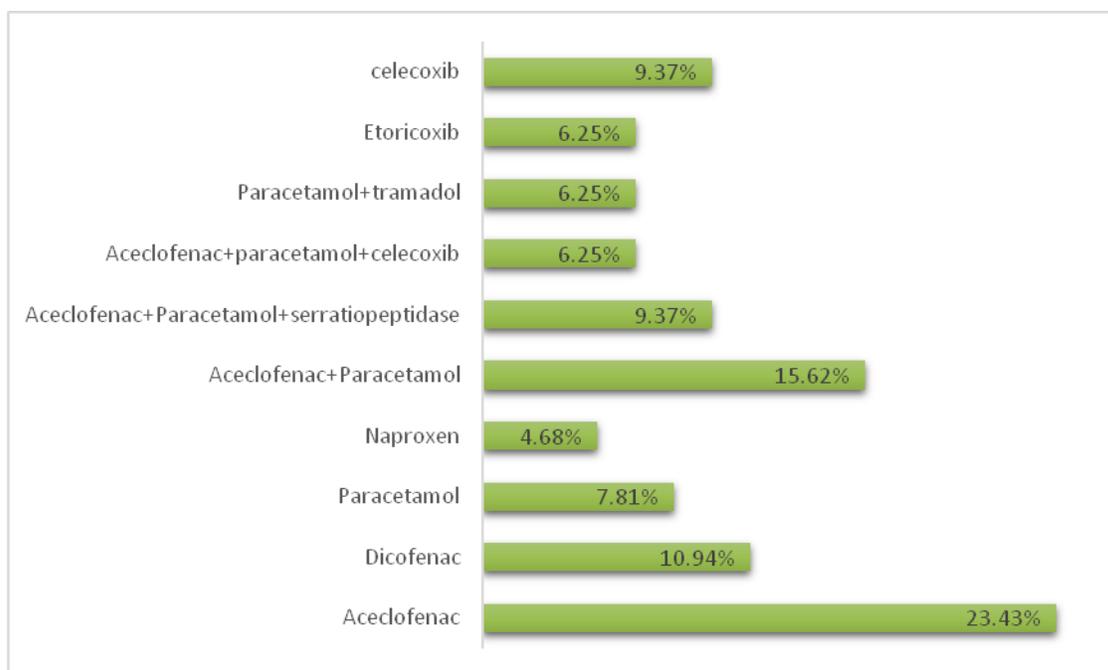


Figure:14 Distribution of NSAIDs in arthritis.

Distribution of NSAIDs in LBA (lower back ache)

Out of 12 NSAIDs prescribed in LBA (lower back ache), aceclofenac (33.33%) was the most prescribed, followed by aceclofenac +paracetamol (25%), paracetamol+ tizanidine (25%) and diclofenac (16.66%).

Table:15 Distribution of NSAIDs in LBA .

Drugs	No. of drugs prescribed	Percentage
Aceclofenac	4	33.33%
Diclofenac	2	16.66%
Aceclofenac + paracetamol	3	25%
Paracetamol + tizanidine	3	25%
Total	12	100%

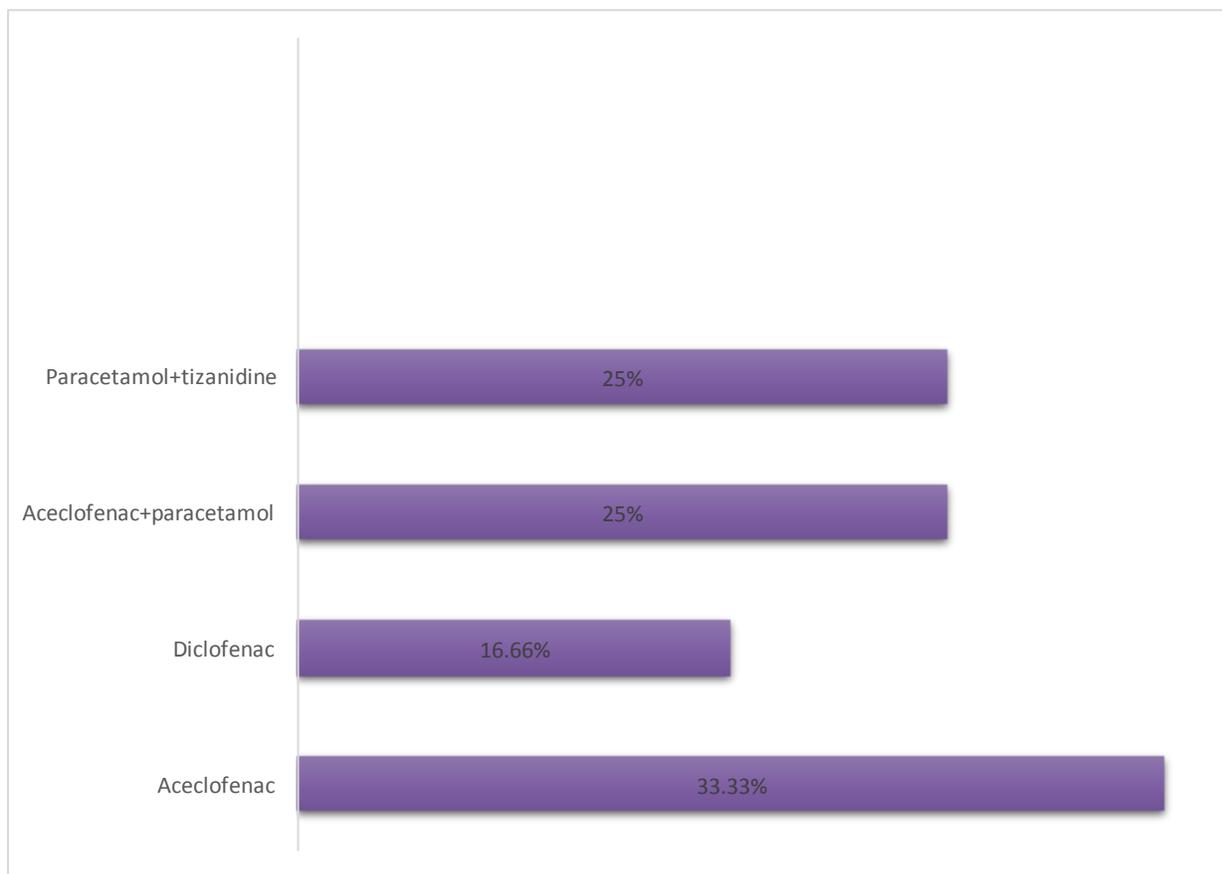


Figure:15 Distribution of NSAIDs in LBA.

Table:16 Distribution of NSAIDs in fracture.

Drugs	No of drugs prescribed	Percentage
Aceclofenac	4	13.33%
Diclofenac	3	10%
Acelofenac+ paracetamol	8	26.66%
Acelofenac + paracetamol +serratiopeptidase	12	40%
Paracetamol+ tizanidine	3	10%
Total	30	100%

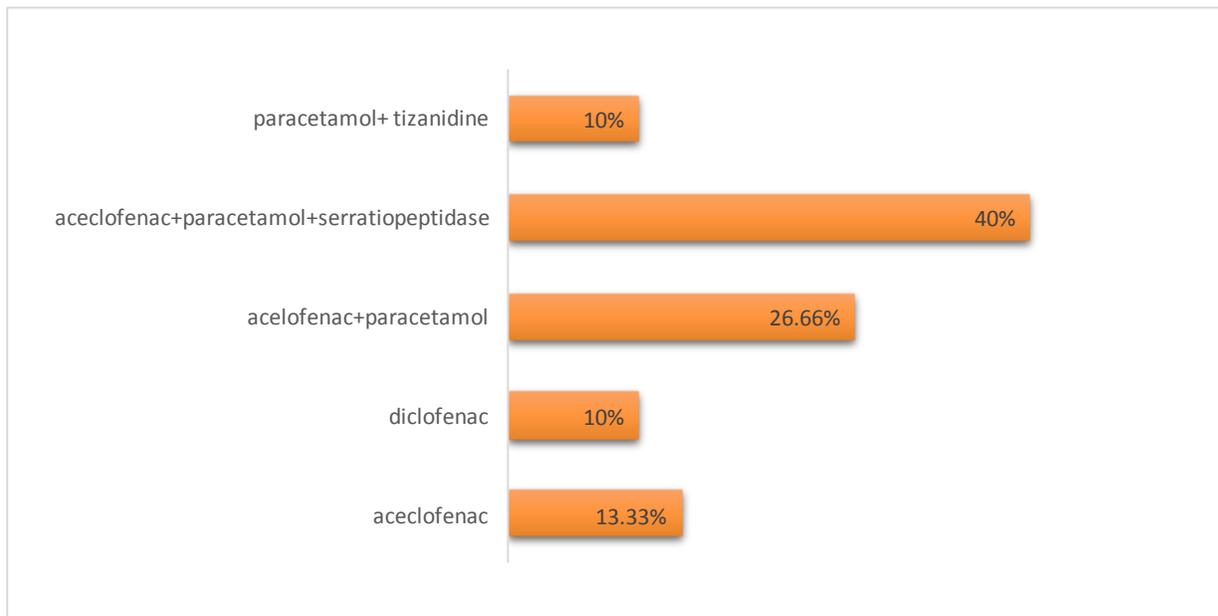


Figure : 16 Distribution of NSAIDs in fracture.

Distribution of NSAIDs multiple joint pain (polyarthralgia)

Out of 24 NSAIDs prescribed, aceclofenac was the most prescribed (33.33%), followed by aceclofenac+ paracetamol (25%), diclofenac (20.83%) and paracetamol (12.5%).

Table 17: Distribution of NSAIDs in poly arthralgia.

Drug	No.of drugs prescribed	Percentage
Aceclofenac	8	33.33%
Paracetamol	3	12.5%
Diclofenac	5	20.83%
Aceclofenac +paracetamol	6	25%
Total	24	100%

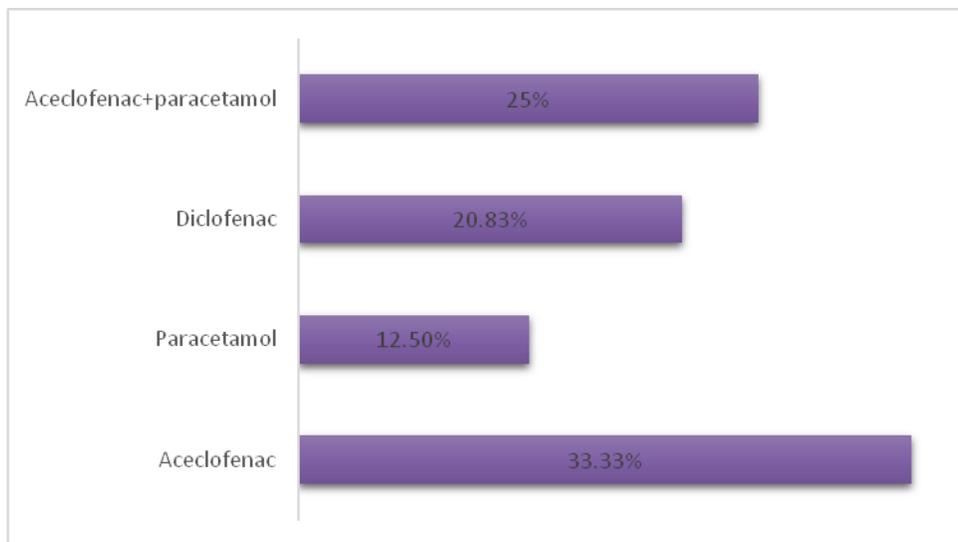


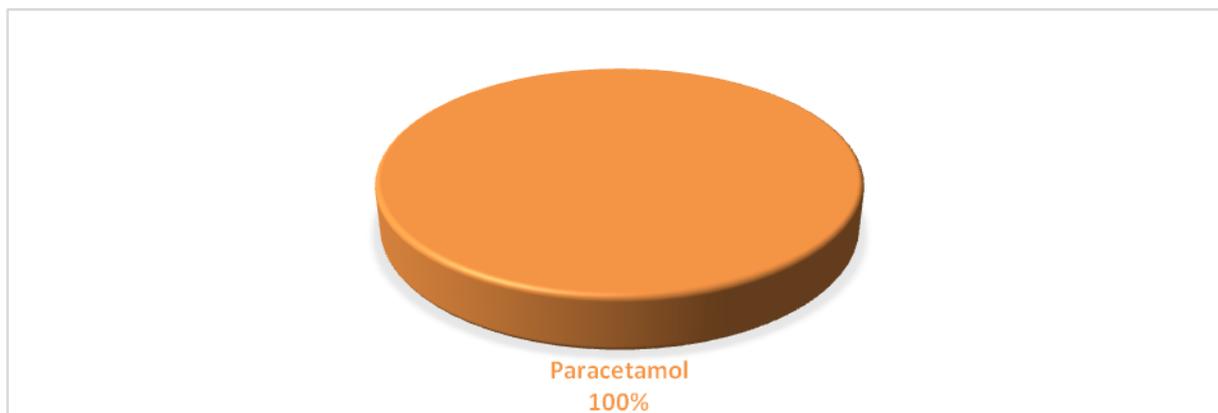
Figure: 17 Distribution of NSAIDs polyarthralgia.

Distribution of NSAIDs in CTEV

Out of 4 NSAIDs in CTEV, the most highly prescribed drug was paracetamol (100%).

Table: 18 Distribution of NSAIDs in CTEV.

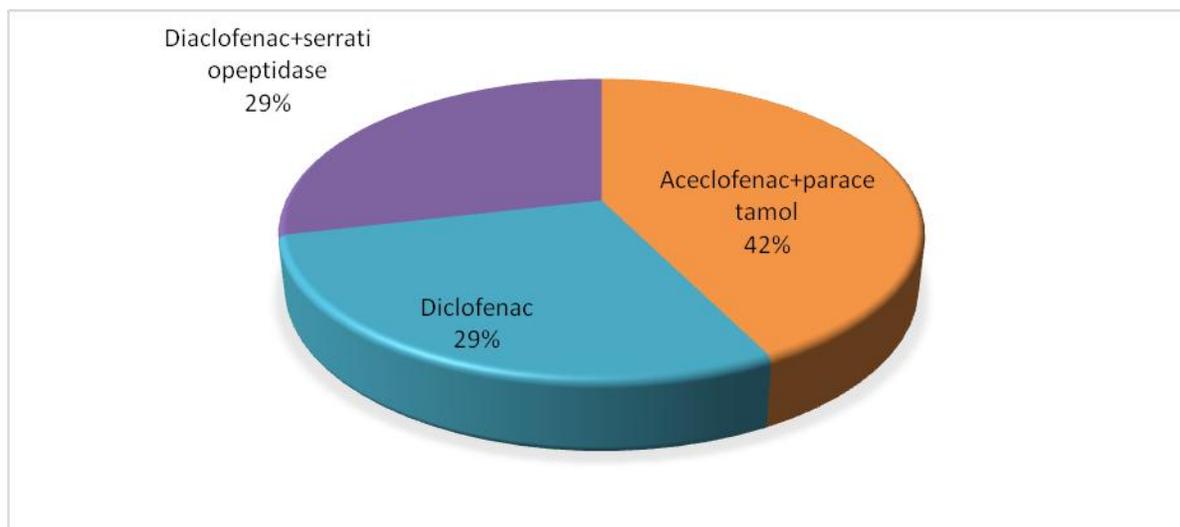
Drugs	No. of drugs prescribed	Percentage
Paracetamol	4	100%
Total	4	100%

**Figure: 18 Distribution of NSAIDs in CTEV.****Distribution of NSAIDs in osteomyelitis**

Out of 7 NSAIDs prescribed in osteomyelitis, aceclofenac+ paracetamol (42.5%) was highly prescribed, followed by diclofenac (28.57%) and diclofenac + serratiopeptidase (28.57%).

Table 19: Distribution of NSAIDs in osteomyelitis.

Drugs	No. of drugs prescribed	Percentage
Aceclofenac+ paracetamol	3	42.5%
Diclofenac	2	28.57%
Diclofenac + serratiopeptidase	2	28.57%
Total	7	100%

**Figure: 19 Distribution of NSAIDs in osteomyelitis.**

In- patient	No.of NSAIDs	percentage	Out-patient	No.of NSAIDs	Percentage
100	152	77.83%	20	43	22.15%

Prescribing pattern of NSAIDs In-patient and out- patient

Out of 120 prescriptions, In-Patient was 100 and no. of NSAIDs used was (77.83%) and out-patient was 20 and no. of NSAIDs used was (22.17%)

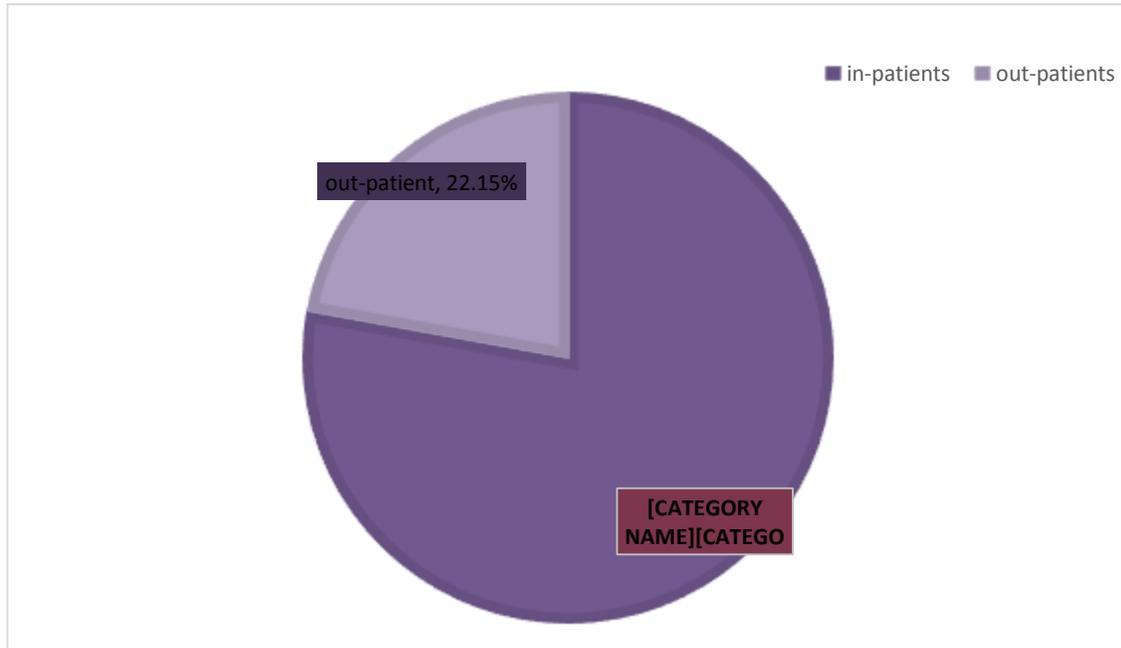


Figure:20 Distribution of in-patient & out-patient pattern of prescribing NSAIDs.

Polypharmacy for total patients

Table: 21 Distribution of drugs in orthopaedic department.

S.N	No. of prescription	Drugs prescribed	No. of drugs	Percentage
1	46	Two drugs	92	24.87%
2	39	Three drugs	117	31.62%
3	19	Four drugs	76	20.54%
4	11	Five drugs	55	14.86%
5	5	Six drugs	30	8.10%
Total	120		370	100%

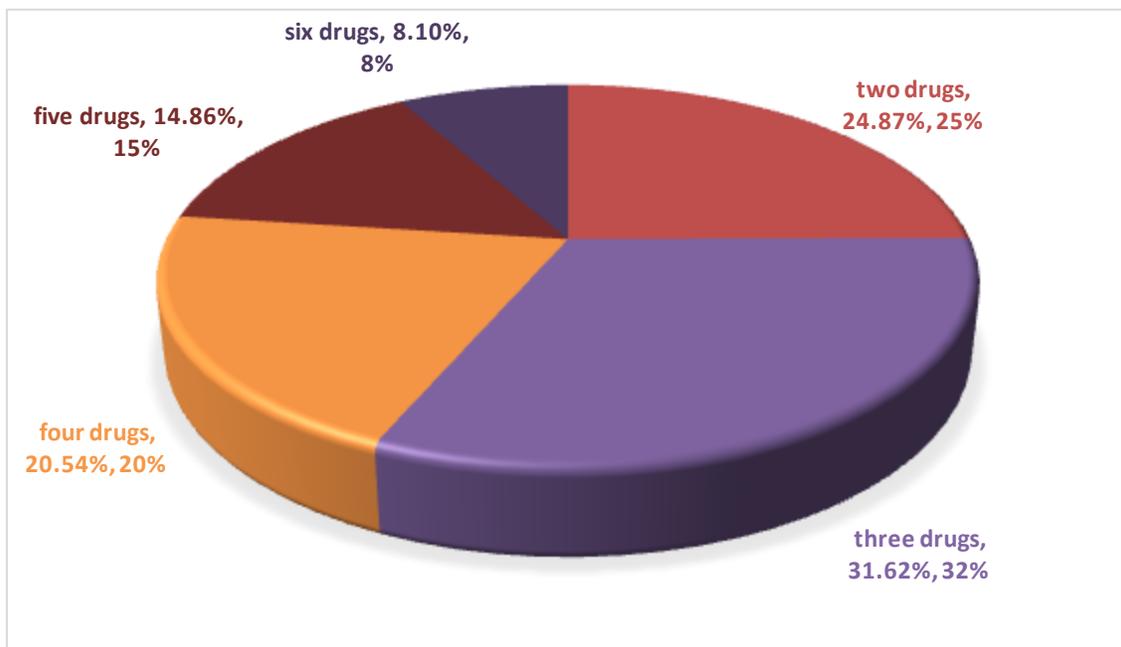


Figure: 21 Distribution of drugs in orthopaedic department.

Distribution of NSAIDs (Dose, Frequency, Route of administration) in Orthopaedics patients**Table no.22 distribution of NSAIDs(dose, frequency, route of administration) in orthopedics patient.**

NSAIDs	DOSE	FREQUENCY	ROUTE OF ADMINISTRATION
Tab.Dolo 650	650 mg	TID	ORAL
Tab. Ultracet	Aceclofenac 100mg Tramadol 37.5 mg	BID	ORAL
Tab. Naxdom	500mg	BID	ORAL
Inj.Diclo	50mg	BID	IM
Tab.Dolowin Plus	Aceclofenac 100mg Paracetamol 500mg	BID	ORAL
Syp.Calpol	Paracetamol 250 mg	TID	ORAL
Tab.Zerodol	Aceclofenac 100mg	BID	ORAL
Tab.Zerodol P	Aceclofenac 100mg Paracetamol 500mg	BID	ORAL
Tab. Zerodol SP	Aceclofenac 100mg Serratiopepdease15mg Paracetamol 500 mg	BID	ORAL
Tab. Zerodol MR	Aceclofenac 100mg Paracetamol 500mg Tizanidine 2mg	BID	ORAL
Inj.Dynaper	Diclofenac 50 mg Paracetamol 325 mg	BID	IM
Tab.Hifenac	100mg	BID	ORAL
Tab.Hifenac P	Aceclofenac 100mg Paracetamol 650 mg	BID	ORAL
Tab.Hifenac MR	Aceclofenac 100mg Paracetamol 500 mg Chlorzoxazone500mg	BID	ORAL
Tab.Signoflam	Aceclofenac 100mg Paracetamol 325mg Serratiopepdease 15mg	BID	ORAL
Inj.Zerodol	150mg	BID	IV
Tab.Tolpa D	Diclofenac 50mg Serratiopeptidase 10 mg	BID	ORAL

CONCLUSION

1. In this study most of the patients received NSAIDs for symptomatic relief. NSAIDs were mostly prescribed in the (51-60 year) age group and the mostly prescribed as oral dosage forms. Our study reveals that most commonly prescribed NSAIDs is Aceclofenac.
2. NSAIDs were prescribed for various arthritis and non-arthritis condition like spondylitis, IVDP, multiple joint pain, low back ache (LBA), CTEV, osteomyelitis, fractures frequently as FDCs with various adjuvants like serratiopeptidase, tramadol and skeletal muscle relaxants. Various other medications were prescribed concomitantly namely gastroprotective agents, multivitamins and minerals (as nutritional supplements).
3. The use of selective NSAIDs was found to be least prescribed (12.63%) whereas non-selective NSAIDs was found to be highly prescribed (87.36%). Monotherapy is preferred over two or three drug therapy.
4. WHO suggests that drug utilization studies are needed in every health care setting. Data are useful for preparing essential drug lists and standard treatment protocol. For a developing country like India, a National drug policy is needed to rationalize the drug use. To achieve it is very important to determine drug use pattern and monitor drug use profile over time. Proper awareness among the prescribers seem to be necessary for rational and cost-effective prescribing individual to patients needs and to avoid irrational combinations.
5. The prescribed drugs were mostly given by brand names (88.66%) and least by generic name (11.34%). It is also essential to encourage and promote generic prescribing to reduce the cost of therapy.

DISCUSSION

This study provides data on the current prescribing pattern of NSAIDs in the orthopaedic department in Saphthagiri Medical college and Hospital, Bangalore, a tertiary care teaching hospital.

A total of 120 patients prescribed with any of the NSAIDs medications irrespective of clinical indication were included in the study. The duration of the study was six months. Majority of the cases enrolled were in-patient (83.33%), whereas the rest were out-patient (16.67%). (Table no.1)

The assessment of drug utilization pattern is an important tool for clinical, educational and economic purposes. Drug utilization studies aim to provide the feedback to the prescribers and to create awareness about rational use of medicines. Out of 120 patients included in the study, (43.33%) were females and (56.67%) were males. (Table no.2) The number of female patient was comparatively high. However, in the prospective observational study carried out by Nagla A et al.²⁹, in Indore, MP, India. Male patients (60.3%) were more than female patients (39.7%) contrasting the findings of our study. It points to the fact of least correlation between NSAIDs use and gender when considering the general prescribing pattern of NSAIDs irrespective of clinical indications. Less sample size of our study limits relevant data on gender wise prevalence of NSAIDs use in specific clinical indications.

Most of the study patients (26.67%) belongs to the age group (51 -60) years, followed by age groups of 41-50 (21.65%), 61-70 (15%), 31-40 (12.5%), 21-30 (10.83%), 11-20 (6.67%), 0-10 (5%) and 71-80 (1.67%). (Table no. 3) This finding is similar to the findings of Bhaskar R et al.²², in his study in Bengaluru, Karnataka, India. Out of 120 cases enrolled, 95% were new cases and remaining 5% were follow up cases. (Table no. 5)

Out of 120 patients, (30%) were diagnosed arthritis, IVDP (20%), spondylitis (10%), multiple joint pain (11.67%), osteomyelitis (4.16%), LBA (6.67%), CTEV (3.33%), fracture (14.16%). (Table no. 6)

A total of 370 drugs were prescribed. NSAIDs non-selective (49.19%), selective (3.24%) were the biggest class of drugs prescribed followed by gastroprotective agents (24.86%) and multivitamins and minerals (7.30%). Drugs like antibiotics, anti-hypertensive formed remaining (15.41%) drugs. (Table no. 7)

From our study, it is evident that non-selective NSAIDs are more preferred over selective NSAIDs. Out of 194 NSAIDs drugs, total number of systemic NSAIDs used were 49 (25.25%). Out of these 22(11.34%) were used as monotherapy and 27(13.97%) were used as fixed dose combinations(FDC). Total number of oral NSAIDs are 145(74.74%). Out of these 73(37.62%) were used as monotherapy and 72(37.12%) were used as fixed dose combinations (FDC). (Table no. 8) sAceclofenac (33.29%) was the most commonly NSAIDs prescribed. Celecoxib (4.12%) was the selective NSAIDs prescribed. Combination of aceclofenac and paracetamol (26.80%) was commonest FDC prescriptions. This finding is similar to findings of Jyothi R et al.¹⁶, in her prospective observational study in Bangalore-90, Karnataka. Recent reports from population based studies indicate increase risk of myocardial and congestive cardiac failure in patients prescribing rofecoxib and celecoxib. Due to these risk, selective NSAIDs are least prescribed.

Prescribing combination of analgesics may have adverse health outcomes and also may not lead to improvement in efficacy.³⁷ There are several studies which describes that the danger of rigorous drug reactions causing damage to liver and kidney are higher in reported cases of simultaneous use of two NSAIDs.^[38,39] It is evident from our study that mostly fixed dose combinations (FDC) of drugs are employed containing two or three drugs. The most preferred FDC was a combination of two NSAIDs. There are studies which demonstrate that prescribing two NSAIDs in a fixed dose combination does not necessarily lead to improvement in efficacy as they act via the same pathway, rather combination of a NSAIDs with an opioid analgesic is more fruitful.⁴⁰

Although the selective NSAIDs are costlier than non-selective NSAIDs, the cost of therapy per prescription to the patient is lower as the selective NSAIDs need not be complimented with concomitant therapy with gastroprotective agents. In setting such as the one we have used, the orthopaedic patient have to undergo relatively, a long-term therapy. Treatment with selective NSAIDs works out to be cost effective without any additional expense.

Initial trials showed superiority of cox-2 selective drugs over non-selective drug, but clinical experience has put their safety in question.⁴¹ The withdrawal of rofecoxib and valdecoxib by the manufacturing company, in lieu of causing cardiovascular side effects, has probably changed the prescribing pattern of NSAIDs.⁴²

The choice of COX-2 selective inhibitors for a particular patient should be based upon a number of factors including relative efficacy, toxicity, concomitant disease states, patients, age, renal function and cost.^[43,44]

The dosing frequency was TID for paracetamol (4.12%) and all other NSAIDs was prescribed as BID (95.87%).(Table no. 22) The prescribed drugs were mostly given by brand name (88.66%) and least by generic name (11.34%).(Table no.10,11) Generic prescribing is desirable to promote rational use of drugs and to minimize cost of therapy and dispensing errors. In most of the prescriptions the patient information regarding the timing of administration, or whether to take medication before/after food and regarding the possible side effects, were inadequate.

Clinical pharmacist works directly with medical professionals and patients, usually in a medical center, hospital. So, in present scenario clinical pharmacist especially PHARM.D should be appointed so that they can provide patient counselling regarding timing of administration or whether to take medication before/after food and regarding possible side effects.

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LIST OF ABBREVIATIONS

ADR	Adverse Drug Reaction
BID	Twice A Day
Cox-1	Cyclo-Oxygenase Enzyme -1
Cox-2	Cyclo-Oxygenase Enzyme-2
CTEV	Congenital Talipes Equinovarus
DDD	Defined Daily Dose
DUR	Drug Utilization Research
FDC	Fixed Dose Combination
GIT	Gastro Intestinal Tract
GPD	Gastro Protective Drugs
IEC	Intestinal epithelial cell
IM	Intramuscular
IP	In-Patients
IV	Intravenous
IVDP	Inter-Vertebral Disc Prolapse
IBA	Lower Back Ache
NSAIDs	Non-Steroidal Anti-Inflammatory Drugs
OP	Out-Patient
PPI	Proton Pump Inhibitors
SOS	If Necessary
TID	Thrice A Day
WHO	World Health Organisation

CONFLICT OF INTEREST

- Independent study founded and performed within Saptagiri Medical College and Research Centre.
- Approval by the relevant Institutional Ethical Review Boards.
- All datas were received, checked and analyzed independently at the institution with the help of guide.
- We declare that the information provided on this project are the best of knowledge, true, correct and complete.

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