ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Prescription Pattern Analysis of Medicines in the Orthopaedics Department of a Tertiary Care Hospital.

Gnana Chaitanya C, Deekshitha P, Divya Sree P, Anusha T, Sharuk VK, and Samuel Gideon George P*.

Department of Pharmacy Practice, Sri Venkateswara College of Pharmacy, RVS Nagar, Chittoor - 517127

ABSTRACT

Using an appropriate medicine at a right dose, for a right duration, to the right patient, at the right time forms the basis of the concept of rational drug use. Prescribing without complying with the standard guidelines of treatment is often considered irrational in today's scenario where pharmacotherapy of diseases is often evidence based. This study was conducted to analyze the prescription pattern of medicines and to monitor drug interactions in the orthopedics inpatient wards of a tertiary care hospital where analgesics and antibiotics form the mainstay of treatment. 80 patients who fulfilled the inclusion criterion where enrolled into the study. Antibiotics were found to be the highly used class of drugs (23%). The mean (SD) number of drug interaction per prescription was found to be 1.2 (0.04). Severe drug interactions were observed in 19 (23.75%) of prescriptions. Irrational use of medication is a potential risk factor that predisposes patients to potential adverse reactions and idiopathic drug related events. Identified errors and drug related safety issues were reported to respective health care providers for necessary interventions. Such a clinical pharmacy oriented approach can potentially minimize the risk of drug related untoward events increasing the overall quality of therapy and therapeutic outcomes.

Keywords: Antibiotics, adverse events, orthopedics, rationality

Corresponding author
P. Samuel Gideon George
Assistant professor
Department of Pharmacy practice
Sri Venkateswara College of Pharmacy
Chittoor, Andhra Pradesh – 517 127
Email: drgeorge@svcop.in

ISSN: 0975-8585

INTRODUCTION

The quality of treatment provided relies on safe and effective therapy at a minimal cost [1]. Using multiple drugs to obtain high efficacy predisposes the patient to serious adverse events (SAE) or toxicity whereasrestricting the use of a drug while it is intended often leads to therapeutic failure [2,3]. Higher cost of therapy leads to patient non-adherence which causes inadequate response to therapy [4]. Thus using an appropriate medicine at a right dose, for a right duration, to the right patient, at the right time forms the basis of the concept of rational drug use. Prescribing without complying with the standard guidelines of treatment is often considered as irrational in today's scenario where pharmacotherapy of diseases is often evidence based [5]. Hence this study was conducted to analyze the prescription pattern of medicines in the orthopedics inpatient wards of a tertiary care hospital where analgesics and antibiotics form the mainstay of treatment. Inappropriate use of antibiotics leads to emergence of antibiotic resistant strains possessing a global threat of antibiotic apocalypse [6]. Similarly, irrational use of other medicines increases the chances of SAE or treatment failure which increase the length of hospital stay, levies additional costs and affects the quality of therapy [7]. In addition, irrational drug usage and poly-pharmacy increase the probability of drug interactions which may have negative effects on the therapy [8]. For instance, co-administration of an inhibitor of CYP450 with its substrate increases the risk of substrate toxicity whereas co-administration of an inducer of CYP450 with its substrate increases the risk of failure of substrate response [9]. Thus rationalizing pharmacotherapy by complying with the management guidelines and monitoring for drug interactions tends to minimize the incidence of treatment failure and adverse drug events increasing the overall therapeutic outcomes.

MATERIALS AND METHODS

This was conducted as a prospective observational study in the orthopedics inpatient wards of a tertiary care hospital for a period of six months. Consent from the hospital authorities was obtained prior to accessing clinical data and medical records. The protocol was clearly explained to all patients and written informed consents were obtained before enrolling into the study. Data was collected in specially designed case report form.

Inclusion Criterion

Patients admitted into the hospital with orthopedic complications with complaints of fracture irrespective of their age and gender whose duration of stay in the hospital is greater than 2 days.

Exclusion Criterion

Pregnant females, lactating women and unwillingness to participate in the study

Drug Interaction Analysis

Presence of probable drug interactions in the prescriptions was determined using Lexicomp (http://online.lexi.com/) [10]. Drug interactions were categorized into mild, moderate and severe based on their severity.

Statistical Analysis:

All statistical analyses were performed using graph pad prism 7.01. Presence of statistically significant difference between two groups was analyzed using student T test and difference in incidence between groups was analyzed using chisquare test-confidence interval of 95% was maintained throughout the study.

RESULTS AND DISCUSSION

A total of 80 patients who fulfilled the inclusion criterion where enrolled into the study out of which 58 (72.5%) were male 22 (27.5%) were female. The mean (SD) age in the studied population was found to be 49.46 (20.53) years. The mean (SD) age in females was found to be higher than that of males with values of 52.86 (18.66) and 48.17 (24.47) years respectively ($P<0.05$). Age wise distribution of studied patients is shown in **Figure 1.**The**m**ean (SD) duration of hospital stay was found to be 8.5(4.28) days. Mean (SD) duration of

hospital stay was found to be high in males than females with values of 8.62 (4.38) and 8.18 (3.97) days respectively. Statistically significant difference in incidence of marital status was found between male and female patients (P<0.05). 55 (68.7%) patients were non-smokers where as 25(31.3%) had significant history of smoking. 24(30%) of patients were alcoholic where as 56 (70%) had no history of alcohol. Median drugs per prescription was 8 in males where as it was 7 in females.

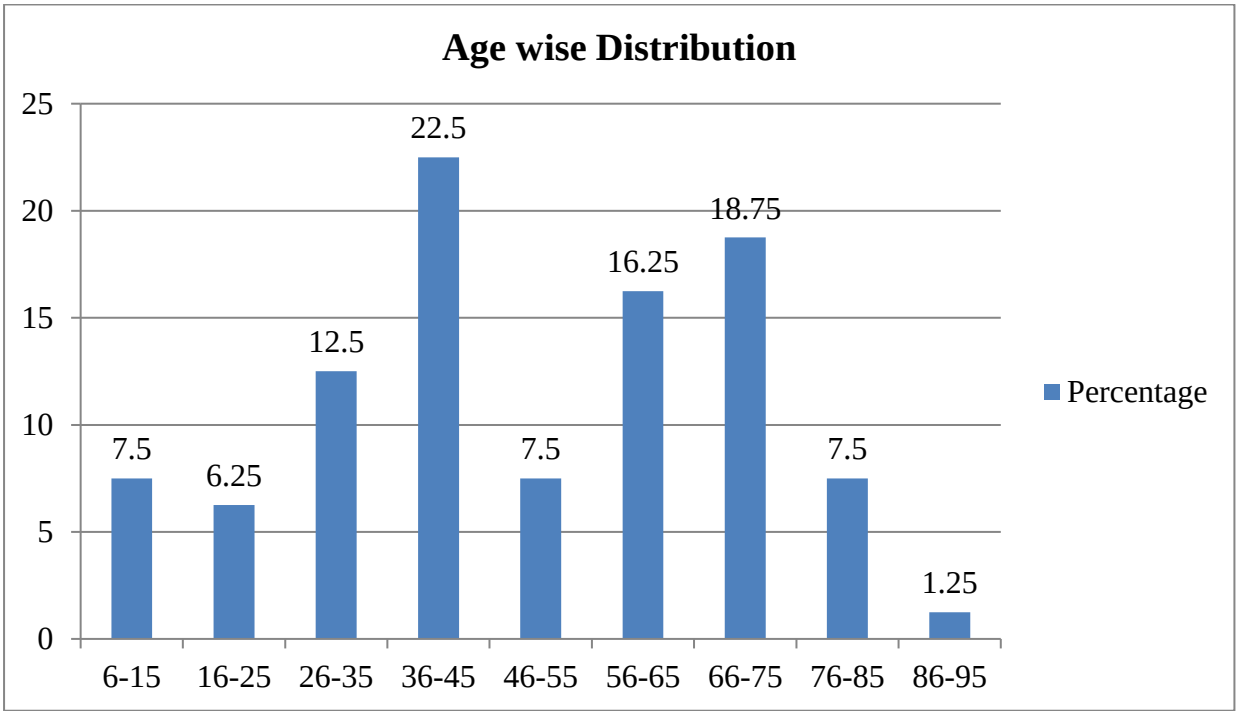

Fig 1: Age wise distribution

Six hundred and twenty five drugs were used on the total study population of which males have received 457 (73.12%) of drugs and females have received 168 (26.28%) of drugs. No statistically significant difference was found in mean (SD) number of drugs received by males and females with values of 7.87 (2.67) and 7.63 (2.88) respectively.

Diabetes mellitus and hypertension were found to be the common co morbidities observed in the study population. Distribution of patient data based on their co morbidities is shown in **Table 1**.

Table 1: Distribution based on Co-morbidity

S. No.	Co morbidity	No. of Patients (%)
1	Diabetes mellitus	11 (13.75)
2	Hypertension	8 (10)
3	Bronchial asthma	4 (5)
4	COPD	2 (2.5)
5	Ischemic Heart Disease	3 (3.75)
6	Epilepsy	1 (1.25)

Patients received medications both for primary diagnosis and underlying co morbidities. NSAIDS, antihistamines and opioid analgesics were used symptomatically in fracture management whereas antibiotics were used for prophylaxis of fracture site and systemic infections. Patients received oral hypoglycemics, insulin, anti-hypertensives and other medication for chronic diseases and other co morbidities. Distribution of different class of drugs used is shown in **Table 2**.

ISSN: 0975-8585

Table 2: Drug Class based Distribution

S. No	Drug Class	No. of Prescriptions	Percentage
1	Antacid	117	20.9302
2	NSAIDS	126	22.5403
3	Oral hypoglycemics	4	0.71556
4	Insulin	3	0.53667
5	Antihypertensives	15	2.68336
6	Antibiotics	129	23.0769
7	Supplements	68	12.1646
8	Antiemetics	9	1.61002
9	Neuropathic pain	4	0.71556
10	Antihistamines	5	0.89445
11	Antiasthmatic	1	0.17889
12	Coagulant	1	0.17889
13	Antianxiety	1	0.17889
14	Local anaesthetic	4	0.71556
15	Antiepileptic	1	0.17889
16	Anti anginal	2	0.35778
17	Others	69	12.3435

Antibiotics were found to be the commonly used class of drugs. Prophylactic antibiotic use has been a common therapeutic strategy for prevention of fracture site and other nosocomial infections. Various evidence based studies have demonstrated the potential role of antibiotics in prevention of systemic and site infections in patients with different form of fractures [11, 12]. Using short course, narrow spectrum antibiotics where found to be effective and safe for prophylaxis of Gustilo grade I and II open fractures [13]. However, in our current study broad spectrum antibiotics such cephalosporins and aminoglycosides were found to be commonly used for prophylaxis of infection. 10% of patients have received ceftriaxone, 5.54% patients have received amikacin, 2.14% have received cefotaxime and 1.78% has received other broad spectrum antibiotics including amoxicillin and tazobactum. Among the NSAIDS, diclofenac was found to be extensively used in 10.1% of the population whereas aceclofenac and ibuprofen were used in 6.26% and 0.17% respectively. Though diclofenac and aceclofenac are potential NSAIDS for management of bone pain, they have comparatively high risk of GI bleeding when compared to ibuprofen which was least used in our study population. The relative risk of gastrointestinal (GI) bleeding was 1.0 for ibuprofen whereas patients treated with diclofenac and aceclofenac displayed a higher relative risk of 1.8 [14]. Aspirin was used in 0.17% patients with ischemic heart disease (IHD) at a dose of 150 mg. 0.35% patients with IHD received concomitant sublingual isosorbide dinitrate. Patients who were started on NSAIDS concomitantly received proton pump inhibitors (PPI) and H_2receptor antagonists (H_2RA). Pantoprazole and ranitidine were the only anti-ulcer agents each being used in 10.55% of the study population. Though PPI's and H_2RA's were used equally among patients who received NSAIDS, various randomized controlled trials (RCT) have reported lesser rate of ulcer recurrence in patients who received PPI than H_2RA. The rate of NSAID induced ulcer recurrence has been reported to be 5.2% with omeprazole, 10% with misoprostol and 16.3% with ranitidine suggesting that H_2RA do not confer longer protection in patients receiving NSAIDS [15, 16]. Patients who did not respond to standard NSAID regimens or those with history of neuropathic pain were either started on opioid analgesics or anti-depressants or anticonvulsants. Pregabalin was the anti-convulsant used in 0.71% patients with significant signs of neuropathic pain. Patients started on pregabalin strongly responded to therapy with significant decrease in pain score as evaluated by the Leeds assessment of neuropathic symptoms and signs (LANSS) scale [17]. 0.17% of patients who received amitriptyline did not demonstrate significant decrease in pain when compared to patients who received pregabalin. 11.7% patients were treated with tramadol for adjuvant pain management. 0.53% patients with complaints of lower back ache received thiocolchicoside. Phenytoin was used in 0.17% of the population with long term history of generalized tonic – clonic seizures. 0.17% of patients

who presented with complaints of severe pain over the fracture or implant site received lidocaine for local anesthesia.

Patients with prior history of diabetes mellitus were either on or were started on metformin (2.35%), glibenclamide (0.89%) and sub-cutaneous insulin (0.71%). Among the anti-hypertensives amlodipine and nifedipine were used extensively at rates of 2.35% and 0.17% respectively. 0.17% patients have received furosemide. The lack of usage of ACE inhibitors and other class of anti-hypertensives could be attributed to the fact that patients with comorbid hypertension were above the age of fifty five years and were hence started on calcium channel blockers and diuretics [18].0.37% patients with bronchial asthma received inhaled salbutamol compliant with the NICE guidelines that recommends inhaled short acting bronchodilator therapy whereas patients diagnosed with comorbid COPD did not received any medication [19]Chlorpheniramine was found to be the commonly used anti-allergy medication used in 0.71% patients followed by cetirizine which was received by 0.35% patients indicated for allergic rhinitis, urticaria and other systemic reactions. Other medications that were used in the study population were chymotrypsin (7.69%), serratiopeptidase (0.17%), ondansetron (1.61%), tranexamic acid (0.17%) and alprazolam (0.17%). Among the supplements 3.57% patients received calcium whereas 0.37% patients received multivitamin capsules.

86.25% prescriptions were found to be compliant with the standard treatment guidelines (STG) whereas 13.75% prescriptions were deviant from the STG and were termed 'irrational'. However, no significant adverse reaction or drug related effect was observed in the prescriptions that were found to be irrational.

The mean (SD) number of drug interaction per prescription was found to be 1.2 (0.04). Severe drug interactions were observed in 19 (23.75%) of prescriptions. Classification of the observed drug interactions based on their severity is shown in **Table 3.**

Table 3: Classification of Drug Interaction based on Severity

S. no	Magnitude of Interaction	No. of Drug Interactions
1	Severe	20
2	Moderate	93
3	Mild	54

The severe drug interactions that were observed were serotonin syndrome and increased risk of seizures that occurred due to interactions between ondansetron – tramadol and lidocaine – tramadol respectively. Though such severe drug interactions were not observed in the patients, they were reported to the physicians for further interventions. No significant adverse drug reaction was observed in any patient throughout the study.

CONCLUSION

Irrational use of medication is a potential risk factor that predisposes patients to potential adverse reactions and idiopathic drug related events. Besides compromising patient safety, such events may either cause hospital admissions or may prolong the length of hospital stay levying additional health care costs. In the current study prescriptions were monitored for guidelines compliance, adverse drug reactions and possible drug interactions. Identified errors and drug related safety issues were reported to respective health care providers for necessary interventions. Such a clinical pharmacy oriented approach can potentially minimize the risk of drug related untoward events increasing the overall quality of therapy and therapeutic outcomes.

ACKNOWLEDGEMENT

The authors are thankful to the management of Sri Venkateswara College of Pharmacy and RVS Institute of Medical Sciences for providing excellent research support and facilities.

REFERENCES

[1] Peter JP, Thomas N, Scott Z, Marlene M, Haya R. IJNS 2011: 48: 347–358

[2] Jay WS, Larry GS, Leighton EC, Ann Intern Med ;1966: 65(4)
[3] Natalie H. Brit. med. J7. 1969; 1: 536-539
[4] Sunanda K, Fadia S. Dig Dis Sci 2008; 53:1020–1024
[5] Foppe JW. Pharm World Sci 2008: 30:293
[6] Acar J, Röstel B. Rev. sci. tech. Off. int. Epiz 2001: 20 (3): 797-810
[7] Aileen C. intqhc 1996;5:172-179
[8] Wenhui M, Shenglan T, Wen C. Pharmacoecon. Outcomes Res. 2013: 13(6), 693–696
[9] Slobodan R, Frederick JDC. Drug-Metab-Rev 2010: 29:1-2, 413-580
[10] Maureen SRN. CIN journal 2008; 26(1): 23-30
[11] Braun R. Enzler MA, Rittmann WW. Jorthotrauma 1987; 1(1) :12-17
[12] Ong CKS, Lirk P, Tan C, Seymour RA. Clin Med Res 2007; 5(1): 19–34.
[13] Carl JH, Charles AA, Soumitra RE. Surgical Infections Volume 7(4) , 2006
[14] Angel L. Rheumatology 2010;49:ii3–ii10
[15] Neville DY, Zsolt T, Laszlo J, Istvan R, John MH, Christoffel JVR, Anthony JS, Christopher JH. N Engl J Med 1998; 338:719-726.
[16] Hawkey CJ, Karrasch JA, Szczepanski L, Walker DG, Barkun A, Swannell AJ, Yeomans ND. N Engl J Med 1998;338:727-734
[17] Bennett M. Pain 2001; 92: 147-157.
[18] Paul AJ, Suzanne O, Barry LC, William CC, Cheryl DH, Joel H; Daniel TL, Michael LL, Thomas DM, Olugbenga O, Sidney CS, Laura PS, Sandra JT, Raymond RT,Jackson TW, Andrew SN, Eduardo O. jama 2013
[19] Halpin D. Thorax 2004;59:181–182