Print ISSN: 2319-2003 | Online ISSN: 2279-0780

IJBCP International Journal of Basic & Clinical Pharmacology

DOI: http://dx.doi.org/10.18203/2319-2003.ijbcp20183486

Original Research Article

# Prescribing pattern and drug utilization study in inpatients of department of Orthopaedics in a rural teaching hospital of Ujjain, Madhya Pradesh, India

**Ruchi Baghel[1], Sandeep K. Adwal[1]*, Vivek Singh[2], Ashutosh Chourishi[3]**

[1]Department of Pharmacology, [2]Department of Orthopaedics, R.D. Gardi Medical College, Ujjain, Madhya Pradesh, India
[3]Department of Pharmacology, Govt. Medical College, Shivpuri, Pradesh Province, India

**Received:** 27 June 2018
**Accepted:** 26 July 2018

***Correspondence to:**
Dr. Sandeep K. Adwal,
Email: adwalsandeep@yahoo.co.in



## ABSTRACT

**Background:** Drug utilization study can increase our understanding of how drugs are being used. This study was done to evaluate the current drug prescribing trend in management of indoor patient of orthopaedic department and to comment on rationality of the prescribed medicines.
**Methods:** This is a prospective observational study conducted for 12 months, in Chandrikaben Rashmikant Gardi Hospital, a 600 bedded tertiary care rural based, teaching hospital. Total 611 patients were included in this study.
**Results:** Total 5416 drugs were prescribed in 611 prescriptions. Average number of drugs per prescription was 8.86. Average duration of prescription was 10.7 days. Percentage of drugs prescribed by generic name was 28.8%. Percentage of encounter with an Antibiotic prescribed was 60.23% i.e. out of 611 prescriptions antibiotics were prescribed in 368. Percentage of encounter with an Injection prescribed was 63% which means out of 611 prescriptions, injectables were prescribed in 385. Percentage of drugs prescribed from National Essential Medicine List was 52.63%. Percentage of drugs prescribed from WHO model List was 32.46%. Diclofenac (14.25%) was most commonly prescribed drug. Incidence of polypharmacy was quite high in context of Analgesics. Almost 40% of prescriptions had 2 drugs. Orally prescribed Analgesics were 62.6%, Injectables 34.38% and Topical 3.02%.
**Conclusions:** This study reveals that the pattern of prescription in terms of rationality is poor. Special attention needs to be given to the irrational prescribing in terms of polypharmacy and long duration. Continuing medical education regarding appropriate use of drugs, knowledge of adverse effects and standard prescription guidelines will play pivotal role in rational prescription of drugs.

**Keywords:** Drug utilization, Prescribing pattern, Rational use

## INTRODUCTION

The principal aim of drug utilization research is to facilitate the rational use of drugs in populations. For individual patient, the rational use of a drug implies the prescription of a well-documented drug at an optimal dose, together with the correct information, at an affordable price. Without knowledge of how drugs are being prescribed and used, it is difficult to initiate a discussion on rational drug use or to suggest measures to improve prescribing habits. Information on the past performance of prescribers is the linchpin of any auditing system. Drug utilization research in itself does not necessarily provide answers, but it contributes to rational drug use in important ways. Drug utilization research can increase our understanding of how drugs are being used as follows:[1]

- It can be used to estimate the numbers of patients exposed to specified drugs within a given time period. Such estimates may either refer to all drug

users, regardless of when they started to use the drug (prevalence) or focus on patients who started to use the drug within the selected period (incidence).
- It can describe the extent of use at a certain moment and/or in a certain area (e.g. in a country, region, community or hospital). Such descriptions are most meaningful when they form part of a continuous evaluation system, i.e. when the patterns are followed over time and trends in drug use can be discerned.
- Researchers can estimate (e.g. on the basis of epidemiological data on a disease) to what extent drugs are properly used, overused or underused.
- It can determine the pattern or profile of drug use and the extent to which alternative drugs are being used to treat particular conditions.
- It can be used to compare the observed patterns of drug use for the treatment of a certain disease with current recommendations or guidelines.
- It can be used in the application of quality indicators to patterns of drug utilization.

Studies on the utilization of drugs in the orthopaedics department are lacking in hospitals in India. Such studies are necessary to obtain baseline data on drug use and create a database for comparison with future studies. Hence, to give continuation to the effort of promoting Rational Use of Drugs (RUD) we have planned the present study.

This study is aimed at assessing the drug prescribing trends in inpatients of orthopaedics department and recommend changes to improve prescribing pattern, if required.

### *Objectives*

- To study the current drug prescribing trend in management of indoor patient of orthopaedic department.
- To comment on rationality of the prescribed medicines.

## METHODS

A prospective observational study was conducted from in Chandrikaben Rashmikant Gardi Hospital, a 600 bedded tertiary care rural based, teaching hospital attached to Ruxmaniben Deepchand Gardi Medical College, Ujjain, Madhya Pradesh.

The protocol was prepared and presented to Human Research Ethics Committee of the institute and approved by the same.

### *Study site*

The study was conducted in Department of Pharmacology, R.D. Gardi Medical College in collaboration with Department of Orthopaedics, Chandrikaben Roopchand Gardi Hospital (C.R.G.H), Ujjain.

### *Study population*

Patients admitted to orthopaedics wards during the study period.

Data was collected from Case files of Inpatients. Total 611 patients were included in this study. Patients who were admitted to orthopaedics ward, C.R. Gardi Hospital were included in this study.

### *Inclusion criteria*

Patients of all ages and both sexes were included.

### *Collection of data*

The study was conducted for indoor patients. Relevant data of all 611 patients was collected from wards. Each patient included in the study was followed up every day till patient was discharged from the ward and their case files were reviewed for gathering necessary information as per the Data Collection form.

## RESULTS

There were more male participants 73.16% (n=447) compared to the female group 26.84% (n=164). More patients were from the age group >60 years 25.70% (i.e. 104 males and 53 females). There were 23.08% patients from age group 21-30 years and the least from the age group <20 years 11.62% (i.e. 60 male and 11 female patients). A total of 5416 drugs were prescribed. A brief description of the demographic data is presented.

### *Demographic data*

Table 1 shows the frequency distribution of the demographic data with respect to gender and age group of total patients observed during study period. (Table 1)

**Table 1: Age and sex wise distribution of total patient observed.**

| Age group | Male | Female | Total | Percentage |
|---|---|---|---|---|
| <20 years | 60 | 11 | 71 | 11.62% |
| 21-30 years | 121 | 20 | 141 | 23.08% |
| 31-40 years | 63 | 16 | 79 | 12.92% |
| 41-50 years | 58 | 29 | 87 | 14.24% |
| 51-60 years | 41 | 35 | 76 | 12.44% |
| >60 years | 104 | 53 | 157 | 25.70% |
| Total (Percentage) | 447 (73.16%) | 164 (26.84%) | 611 | 100% |

There were more male 73.16% (n=447) compared to the female group 26.84% (n=164). More patients were from the age group >60 years 25.70% (i.e.104 males and 53 females). There were 23.08% patients from age group 21-30 years and the least from the age group <20 years 11.62% (i.e. 60 male and 11 female patients).

**Table 2: Various diagnosis for which patients were admitted.**

| Diseases | Percentage |
|---|---|
| Fracture | 58.43 (n=357) |
| PIVD | 15.87 (n=97) |
| Dislocation | 5.25 (n=32) |
| Pott's Spine | 5.89 (n=36) |
| Rheumatoid Arthritis | 4.58 (n=28) |
| Osteoarthritis | 1.96 (n=12) |
| Others | 8.02 (n=49) |

Patients were most commonly admitted due to fractures in various body parts (58.43%). Next common cause was PIVD which constituted 15.87% of patients.

***WHO prescribing indicators***

Data of all the 611 patients was collected and analysed for the Prescribing Indicators. Total 5416 drugs were prescribed in 611 prescriptions. Average number of drugs per prescription was 8.86. Average duration of prescription was 10.7 days. Percentage of drugs prescribed by generic name was 28.8%. Percentage of encounter with an Antibiotic prescribed was 60.23% i.e. out of 611 prescriptions antibiotics were prescribed in 368. Percentage of encounter with an Injection prescribed was 63% which means out of 611 prescriptions, injectables were prescribed in 385. Percentage of drugs prescribed from National Essential Medicine List was 52.63%. Percentage of drugs prescribed from WHO model List was 32.46%.

**Table 3: Prescribing indicators.**

| Prescribing indicators | |
|---|---|
| Average numbers of drugs per encounter | 8.86 |
| Percentage of drugs prescribed by generic name | 28.8% |
| Percentage of encounter with an Antibiotic prescribed. | 60.23% |
| Percentage of encounter with an Injection prescribed | 63% |
| Percentage of drugs prescribed from Medicine List | 52.63% |
| Percentage of drugs prescribed from WHO model List | 32.46% |

Figure 1 shows various drugs comprising DU 90% segment. Diclofenac (14.25%) was most commonly prescribed drug followed by Vit. B1+B2+Niacinamide (13.1%), Calcium+D3+B12 (11.5%), Famotidine (11.3%), Ranitidine (7.95%) and Amikacin (4.4%).

***Analysis of antibiotic use***

Total number of antibiotics prescribed were 852. Antibiotics were prescribed in 368 patients. Out of which 277 patients (75.3%) of them were prescribed two antibiotics. Four antibiotics in 69 patients (18.7%) have been prescribed and single antibiotic in 22 patients (6.0%). Average number of antibiotic per patient was 2.3 and average duration of antibiotic prescription is 7.8 days.

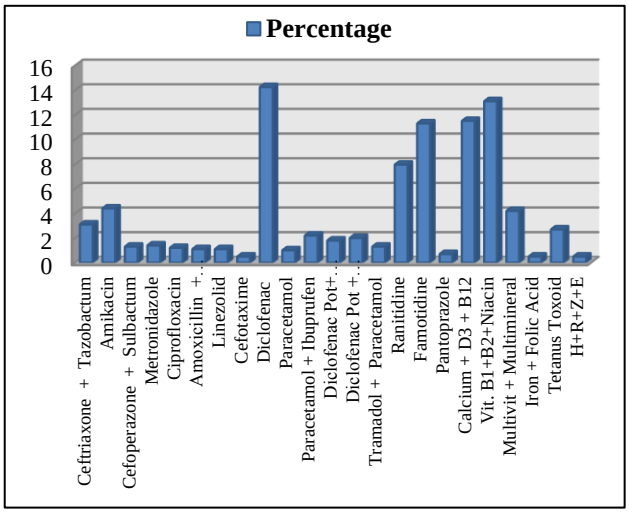


**Figure 1: Drugs constituting DU90% segment.**

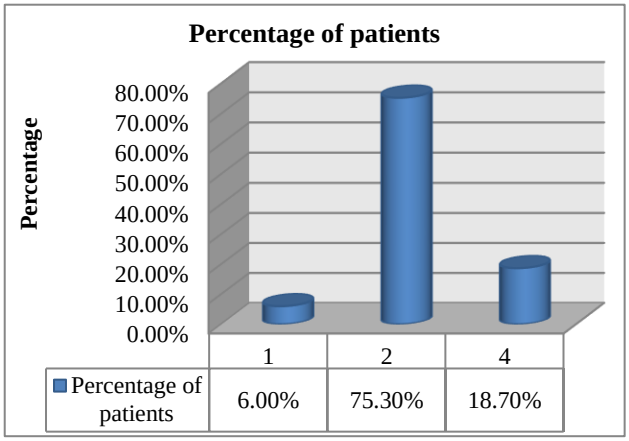


**Figure 2: Number of antibiotics prescribed per encounter.**

***Analysis of analgesic use***

Total number of Analgesics prescribed were 1368 which is 25.25% of total drugs. Average number of analgesics per prescription was 2.24 drugs per prescription.

Incidence of polypharmacy was quite high in context of Analgesics. Almost 40% of prescriptions had 2 drugs, 28% had 3 drugs and 8% had >3 drugs prescribed. Orally prescribed Analgesics were 62.6%, Injectables 34.38% and Topical 3.02%. Analgesics prescribed as FDC were 41.8%. Prescriptions with two or more oral preparations were 35.68%.

Gastro protective Agents were coprescribed in all instances to reduce or prevent the gastrointestinal irritation caused by NSAIDs.

**Table 4: Patterns of use of NSAIDs.**

| Category | Number of patients/ drugs (Percentage) |
|---|---|
| Incidence of polypharmacy (n=611) | |
| One drug | 146 (24%) |
| Two drugs | 244(40%) |
| Three drugs | 171(28%) |
| >Three drugs | 50(8%) |
| Route of administration (n=1368) | |
| Oral | 856(62.60%) |
| Injection | 470(34.38%) |
| Topical | 41(03.02%) |
| Percentage of Fixed dose combinations (n=1368) | 573(41.8%) |
| Percentage prescription with two or more oral preparation (n=611) | 218(35.68%) |
| Co prescribed with Gastro protective agent (n=611) | 100% |

## DISCUSSION

This is a prospective observational study conducted for 12 months, in Department of Orthopaedics, Chandrikaben Rashmikant Gardi Hospital, Ujjain, M.P. A total of 611 prescriptions were observed during the study period. A total of 5416 drugs were prescribed.

It was observed that majority of patients were in the age group of >60yrs 25.70% (104 males and 53 females) followed by 23.08% patients from age group 21-30 years. A greater proportion of older persons have been also seen in patients in previous studies done in northern India.[2]

A possible reason could be the high proportion of old people develop age related bone changes which make them prone to fractures after trivial trauma. The next peak in age group of 21-30 years may be because this age group is more active and communicating therefore there are more chances for them to meet accidents.

Sex wise distribution of patients shows that male patients (447 out of 611) were found more than females (164) in this study. Male dominance was also found in the studies done by Gupta et al.[2] This may be due to male dominance in society, as they are involved in outdoor activities and are earning members of the family, thus they are more exposed to trauma.

The most common diagnosis in our study, for which patients were admitted was Fracture of different parts of body. The commonest indications were low back ache and spondylosis in study done in Nepal.[3] This may be because only out patients were included in their study.

The average number of drugs per prescription is an important parameter while doing a prescription audit. Average number of drugs per prescription was 8.86. The mean number of drugs was higher than that reported in a previous study.[4] A hospital based study in India had reported a mean number of two drugs.[5] The mean number of drugs was more than two in other studies reported in the literature.[2,6]

Low (28.8%) generic prescription of the drugs, especially at the tertiary level health facility could reflect the dominating influence of pharmaceutical companies. Our findings regarding generic prescribing are contrary to those of several studies carried out in other countries, while being similar to that of various studies carried out in India and the neighboring countries.[7-11,13-18] Generic prescribing is to be encouraged as it works out to be cheaper for the patient and the possibility of drug errors is reduced.

Antibiotics were prescribed in 60.23% of encounters respectively. In a previous audit of prescriptions, antibiotics were prescribed in 47.8% of encounters.[19] In Nigeria, antibiotics were prescribed in 50.3% of Encounters.[20] The use of injections (63% of encounters) in our study was very high compared to that observed by Rehan et al.[21] But due to different patient populations the values are not comparable. The higher number of encounters with an antibiotic or injection prescribed is a warning sign and has to be discouraged. Out of total 5416 drugs, 52.63% of drugs were prescribed from the National Essential Medicine List. In a previous study at primary healthcare facilities in the Kaski district, the percentage of drugs prescribed from the Essential drug list varied from 70.9% to 74%.[22]

The low rate of prescribing of essential drugs is a matter of concern. Excessive use of multivitamin and combination preparations may be one of the factors responsible. It must be noted though that Essential drugs are primarily meant for primary healthcare systems while we studied drug utilization in a tertiary care hospital. Prescribing from WHO List was even lower (32.46%). The extensive use of the Diclofenac, which is not on the WHO list, may be contributory factor.

DU 90% has been proposed as a single method for assessing the general quality of drug prescribing. It provides pertinent information on drug usage in patients. In the present study, Diclofenac is the major component of DU90% segment followed by multivitamins. Out of different Drugs prescribed in present study, Analgesics, Antibiotics, Gastroprotective agents and nutritional supplements are the major drug categories falling in DU 90%.

Average Antibiotic prescribed per patient was 2.3 and average duration was 7.8 days. However, in the present study, the low rate of antibiotic prescription does not indicate that the prescription pattern is better than in other countries, as no clinical determinants were documented in any prescription as criteria for justifying prescribing an antibiotic. It is worth noting that both under- and over-

prescribing of antibiotics pose important problems in clinical practice. Multiple drug prescription (polypharmacy) increases both the risk of drug-drug interactions and the incidence of adverse drug reactions, and it may also reduce compliance. In this study at least two antibiotics were prescribed in 75.3% of prescriptions which is substantially more than reported in most Western countries.

Prevalence of Analgesics (NSAIDs) was 25.25% which is same when compared to various other studies done in urban setup, which has showed varied Analgesics (NSAIDs) prevalence pattern. In St. John's Medical College and Hospital Bangalore, frequency of Analgesics (NSAIDs) prescription was 24.52%.[23] Similarly, study done in Dubai showed 23.4% of Analgesics (NSAIDs) prescription prevalence.[24] However, study done in Nepal showed very less Analgesics prescription prevalence (13.1%).[25]

Polypharmacy was seen with Analgesics also. About 40% of prescriptions had 2 Analgesics prescribed and 28% with 3 Analgesics prescribed, this may lead to increase in adverse drug effects.

In this present study average number of Analgesics per prescription was 2.24, which is less compared to studies conducted in Uttaranchal and Chandigarh, where Analgesic drug per prescription were 2.6 and 3 respectively.[2,26]

## CONCLUSION

This study reveals that the pattern of prescription in terms of rationality is poor.

There is an urgent need to develop standards of drug prescription and develop ways and means to ensure that they are adhered to. Special attention needs to be given to the irrational prescribing in terms of polypharmacy and long duration. This could be done by making it mandatory for the prescribers to attend regular continuing medical education (CME), so as to update their knowledge. Continuing medical education regarding appropriate use of drugs knowledge of its potential adverse effects and standard prescription guidelines will play pivotal role in rational prescription of drugs.

A check on the influence of pharmaceutical companies needs to be maintained in health institutions, to minimize their influence on the drug prescription. All these measures would go a long way in providing optimal, low cost, and effective medicines to the patients.

*Funding: No funding sources*
*Conflict of interest: None declared*
*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Baghel R, Adwal SK, Singh V, Chourishi A. Prescribing pattern and drug utilization study in inpatients of department of Orthopaedics in a rural teaching hospital of Ujjain, Madhya Pradesh, India. Int J Basic Clin Pharmacol 2018;7:1763-9.

**ANNEXURE**

***RUXMANIBEN DEEPCHAND GARDI MEDICAL COLLEGE***

Agar Road, Surasa, Ujjain (M.P.)

**Prescribing pattern and Drug Utilization Study in inpatients of Dept of Orthopaedics in a Rural Teaching Hospital of Ujjain (M.P.)**

**DATA COLLECTION FORM**

Hospital no. Date: Ward:

Initials: Age/Sex: Address:

Tel no.

Present illness & Diagnosis:

Past history of any chronic disease & treatment:

Date of surgery:

**PRESENT TREATMENT:**

**PRE-OPERATIVE:**

| S N | DRUG | (DOSE, ROA, FREQUENCY) | START DAY | END DAY |
|---|---|---|---|---|
| | | | | |

**POST – OPERATIVE:**

| S N | DRUG | (DOSE, ROA, FREQUENCY) | START DAY | END DAY |
|---|---|---|---|---|
| | | | | |

**NON-SURGICAL CASES:**

**Present treatment:**

| S N | DRUG | (DOSE, ROA, FREQUENCY) | START DAY | END DAY |
|---|---|---|---|---|
| | | | | |

Laboratory tests: