

Epidemiological Study for Utilisation of Different Antibiotics in Different Genders

R. Kasi Rao, Konda. Ravi Kumar, M. N Naveena,
B. Nagamani* and SK. Khyrun Baji

Department of Pharmaceutical Sciences, Hindu college of Pharmacy,
Amravati road, Guntur Andhra Pradesh, India.

ABSTRACT

Antibiotics are commonly prescribed to treat infection. But if antibiotics are not used rationally then there will be increase chances of resistance of bacteria as well as increase in the total cost of treatment. This study was conducted to see the antibiotics utilization pattern. And To assess the prescriptions for the WHO prescribing indicators. Drug utilization review (DUR) programs are being conducted with the aim of improving the appropriateness of prescriptions. This study was a prospective intventional and survey based study. The obtained data was examined and the data was analysed by using SPSS software. 425 patient's data was obtained of which 73.4% (312 Patients) were male and 26.6 % (113) were female. A total of 672 medicines (antibiotics) were prescribed to 425 patients. Mean \pm SEM of medicines prescribed was 1.56 ± 0.05 . Out of 672 medicines, 500(74.4%) medicines were prescribed from NEML. The most frequently prescribed antibiotic was ceftriaxone, followed by Metronidazole. Study shows that there was good prescribing from National Essential Medicines List and use of injections was very high (92%).72.62% medicines were prescribed by generic name. Majority of medicines were prescribed as injections followed by infusions and tablets. There is no significant prescribing differences between male and female patient groups.

Keywords: Antibiotics, DUR, SPSS, NEML, Genders, Patients.

INTRODUCTION

Prescription drugs constitute an important component of health care. However, drugs can only benefit to patients if they are used appropriately which involves that physicians prescribe them according to evidence.

Drug utilization review (DUR) programs are being conducted with the aim of improving the appropriateness of prescriptions.¹ The appropriateness of prescriptions is evaluated after the drug has been dispensed and by performing patient follow-up. The patient may then benefit from any corrective action. Such action may take the form of individual feedback from a pharmacist to the physician. DUEs have traditionally focused on drugs with frequent side-effects, high price tags or complicated dosing regimens. Drug Utilization Review (DUR) programs help to ensure that prescriptions for patients are appropriate, medically necessary, and not likely to result in adverse medical consequences.² This objective is of assuring beneficiaries access to cost-effective, high quality health care. DUR programs use professional medical protocols, computer technology, and data processing to assist in the management of data regarding the prescribing and the dispensing of prescriptions. By comparing actual drug use to predetermined standards, DUR can detect inappropriate and/or unnecessarily costly drug therapy. Programs can be designed to monitor individual drugs, or drug classes, as well as to monitor drug use in specified diseases. DUR programs should be carefully planned by the medical and pharmacy staff to include the drugs considered to be most problematic, if not used correctly.³ Drug utilization review (DUR) has been undertaken for as long as pharmacists have been practicing their profession. Pharmacy education has traditionally stressed the importance of the 3R's (right drug, right dose, and right time).DUR promised to reduce or eliminate serious preventable drug-related morbidity, but it has yet to reach its full potential. DUR is a technique used by prescription drug program administrators and PBMs to manage drug utilization. DUR is "a process used to assess the appropriateness of drug therapy by engaging in the evaluation of data on drug use in a given health care environment against predetermined criteria and standards."⁴ The effectiveness of DUR programs has yet to be established. The few evaluation studies of those programs conducted

until now have been criticized for lack of rigor. In general, there are no adequate control groups and prior trends in the quality of prescribing is not taken into account.^[5]The present study was designed to avoid those limitations to improve the quality of physician drug prescriptions in hospital settings.

MATERIALS AND METHODS

This study was conducted in St. Joseph's Hospital, a multispecialty hospital in Guntur which is 250 bedded tertiary care teaching hospitals providing health care services. The research approach adopted in this study was a prospective interventional and survey based study. This study was conducted for a period of six months from April 2016 to September 2016. This study includes both male and female patients of age group 20-80 years. A Patient, who meets the following criteria was enrolled where Inclusion criteria. Exclusion criteria were children below age of 20 years and pregnant ladies. The details of cases, including patient name, age, sex, past medical history and other relevant information was collected. We have analysed data using SPSS.

RESULTS

The results presented below are for 425 patients data obtained from the inpatient ward of Medicine department of St. Joseph's Hospital, Guntur.

Profile of the patients

Out of 425 patients 73.4% (312 Patients) were male and 26.6 % (113) were female. The results were shown in the Tab.1.

Tab.1: Average age of the patients

-	Number of patients	Average age \pm SEM	Range
Global	425	43.55 \pm 0.11	20 – 80 yrs.
Male	312	44.39 \pm 0.12	20 – 80 yrs.
Female	113	41.25 \pm 0.21	20 – 72 yrs.

All the patients were divided into six age groups – 20 to 29 yrs (group A), 30 to 39 years (B), 40 to 49 years (C), 50 to 59 years (D), 60 to 69 (E) and above 70 years (F). The results were show in the Fig.1

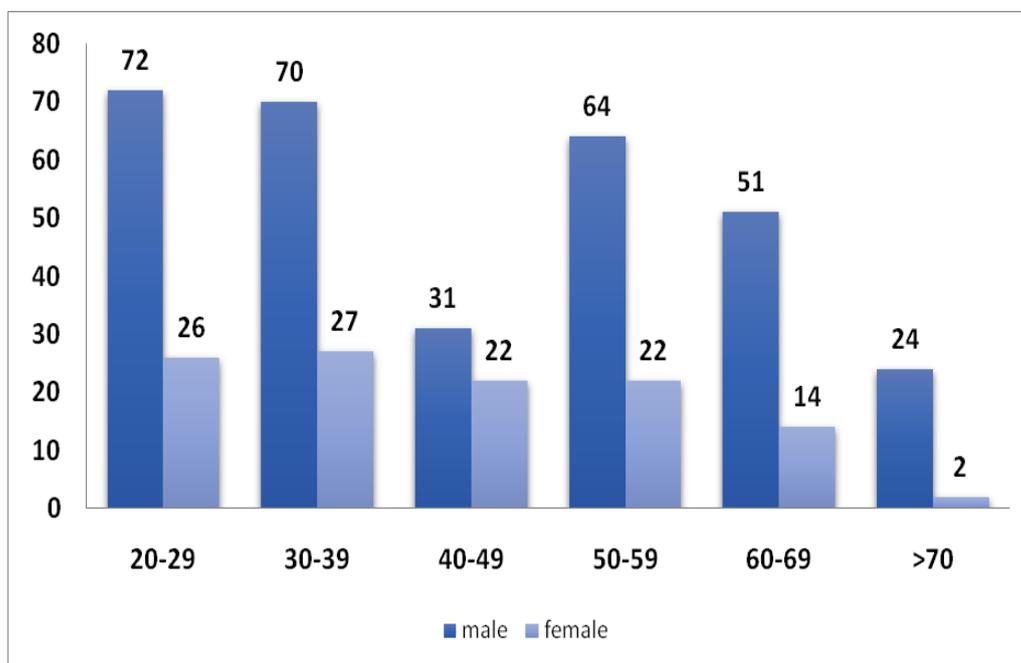


Fig.1: Age distribution of the patients

Prescribing indicators

The prescribing indicators were calculated for all the patients and for the six age groups to determine any differences in prescribing between these age groups.

Average number of medicines (antibiotics) per prescription

A total of 672 medicines (antibiotics) were prescribed to 425 patients. Mean \pm SEM of medicines prescribed was 1.56 ± 0.05 . Mean \pm SEM of medicines prescribed for male patients were 1.57 ± 0.06 , while for female patients it was 1.52 ± 0.09 . For different age groups average number of medicines per prescription was 1.76, 1.57, 1.69, 1.53, 1.21 and 1.46 respectively for group A, B, C, D, E and F. It can be noted that average number of medicines per prescription was highest for age group 20 to 29 yrs. It was found that in most of the prescriptions one antibiotic was prescribed.

Percentage of medicines prescribed from NEML

Out of 672 medicines, 500(74.4%) medicines were prescribed from NEML.

Percentage of medicines prescribed by generic name

There was a good tendency of prescribing by generic name. 72.62% (488 medicines) were prescribed by generic name and antibiotics constituted the major proportion of medicines prescribed by generic name.

Percentage encounter with an injection prescribed

Use of injection was very high and percentage encounter with an injection prescribed was 92 % (391 cases).

Other parameters**Top ten medicines**

Ceftriaxone was the most frequently prescribed medicine (217 cases) followed by metronidazole (65 cases). The results were shown in the Fig.2.

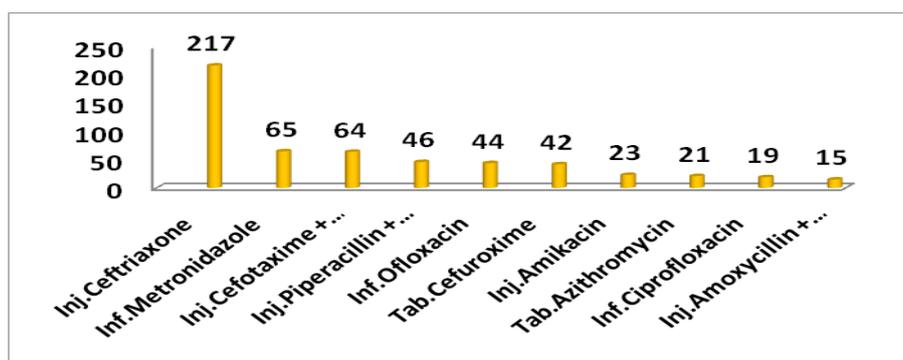


Fig. 2: Top ten medicines

Usage of antimicrobial agents

Antibiotics were used in all cases and 31 different antimicrobial agents were prescribed. In more than 28 % of cases, shown in Tab.2 and Ceftriaxone was prescribed which was followed by Metronidazole.

Tab.2: Usage of antimicrobial agents

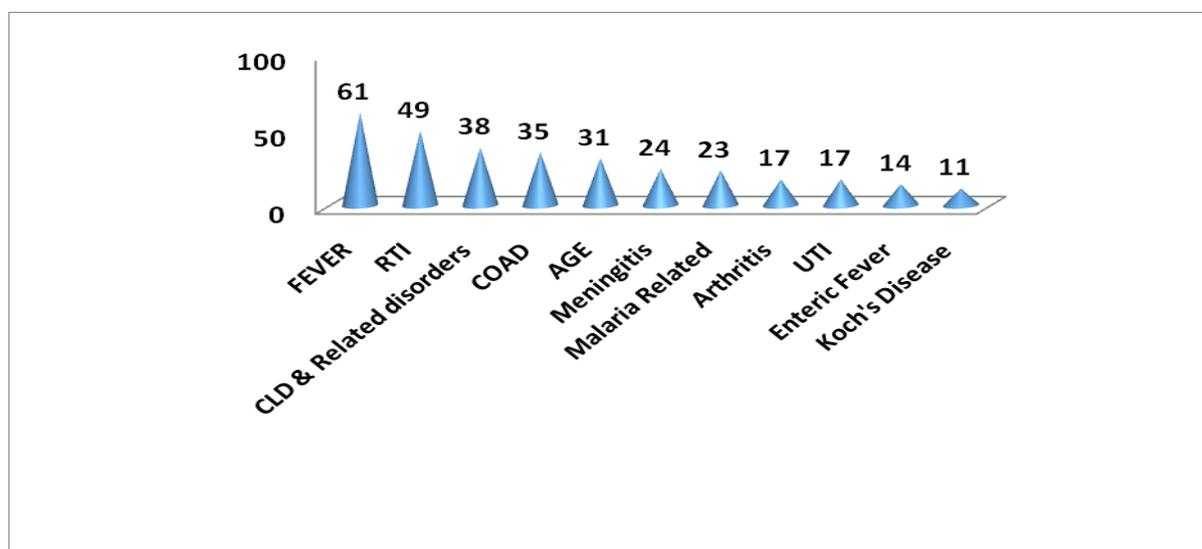
Antibiotic	Patients	%
CEFTRIAZONE	217	28.52
METRONIDAZOLE	65	10.38
CEFOTAXIME + SULBACTUM	64	8.47
PIPERACILLIN + TAZOBACTUM	46	8.47
OFLOXACIN	44	6.28
CEFUROXIME	42	5.74
AMIKACIN	23	4.92
AZITHROMYCIN	21	3.01
CIPROFLOXACIN	19	2.73
AMOXICILLIN + CLAVULANIC ACID	15	2.19

Diagnostic Characteristics of the Patients

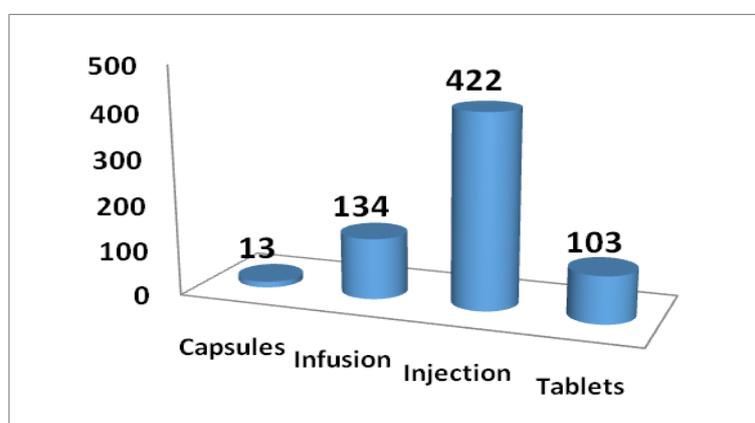
Antibiotics were used in patients with different diseases based on the Diagnostic characteristics of the patients. The results were shown in the Tab.3 and Fig.3.

Tab. 3: Diagnostic characteristics of the patients

DIAGNOSIS	TOTAL	FEMALE	MALE
FEVER	61	21	40
RTI	49	11	38
CLD & RELATED DISORDERS	38	12	26
COAD	35	6	29
ACUTE GASTRO-ENTERITIS	31	9	22
MENINGITIS	24	8	16
MALARIA RELATED	23	6	17
ARTHRITIS	17	6	11
UTI	17	7	10
ENTERIC FEVER	14	4	10
KOCH'S DISEASE	11	1	10

**Fig. 3: Diagnostic characteristics of the patients****Utilization of different dosage form**

A significant number of medicines were prescribed as injection followed by infusion and tablet. Results were shown in Fig.4.

**Fig. 4: Utilization of different dosage form**

Prescribing differences between male and female patients

On correlating data with respect to male and female patients it was found that there was no difference in prescribing between the two groups with respect to number of drugs prescribed ($p = 0.573$).

DISCUSSION

As mentioned previously, WHO has selected a core of drug use indicators to assess the scope of improvement in rational drug use in clinical practice. Regarding the use of antibiotics, relatively high levels of availability and consumption in developing countries have led to higher incidence of inappropriate use and greater level of resistance than in developed countries.

St. Joseph's hospital with its Total-6 units reflects all patients attending Medicine IPD and the prescriptions of patients prescribed with antibiotics are included in the sample. Therefore, data reported in this study may be easy to compare to other studies in India as well as other developing countries. The main finding in this study was that the international differences in the hospital use of antibiotics were not in the intensity of use, but in the prescription preferences. The wards of similar medical specialities used similar number of antibiotics, but from different pharmacological subgroups and, thus, with different microbiological activities. Other comparable features of this study includes,

Type of use of Antimicrobials

The type of use of antimicrobials in our study is similar to that in developing countries as most of the antibiotics were prescribed empirically. Ideally, the selection of antibiotic drugs should be based on the microbiological data on bacterial sensitivity and on prevalence of resistance in the respective hospitals. This consensus is well recognized, but difficult to adhere to, as illustrated by the empirical initial treatment with antibiotics in 85% of infection cases shown in a recent survey in the 5 largest European countries. Rational prescribing can only be expected if the prescriber is aware of the most likely infecting agent⁶.

Site of Infection

Most of the prescribers in their study based therapy only on the anatomical site of putative infection and lower respiratory tract was the most frequently targeted site. Apparently this holds true for this study and also that by Kulshrestha and Agarwal.⁷

Route of administration

Route of administration of an antimicrobial is influenced by the site and severity of infection as well as the cost of the treatment⁸. Since, this study was conducted in in-patient setting most of the antibiotics were prescribed as injectable forms (injections and infusions).

Use of individual antimicrobial agents

This kind of statistic forms the most important index of ongoing antimicrobial audit programs as it indicates the changes in pattern of usage and in susceptibility patterns of microbes and also the introduction of newer antimicrobials. The pattern of use observed, in that ceftriaxone was the most frequently prescribed, is a clear departure from that recorded in other Indian studies of this nature all of whom quote penicillin-group on top⁹. Obviously, this is due to the wider choice of drugs now available as well as the settings where and the time period when these studies were conducted. Since ceftriaxone has a broad spectrum of activity including Enterobacteriaceae and is the β -lactum antibiotic of choice for most cases of hospital-acquired aerobic sepsis,¹⁰ it justifies its position on top. Also, ceftriaxone requires less frequent dosing and may offer cost and convenience benefits.

This study has strengths and limitations. As a strength, this study was conducted in the context of current clinical practice with no attempt from the investigators to impose the selection of the drug or to enhance compliance of pharmacist in delivering DUR interventions.

The Limitations Emergence of bacterial resistance was not investigated and the DUR study lasted only four months. The effect of this type of DUR could therefore have been greater if assessed a program implemented on a longer term.

CONCLUSION

The important findings of the study are, a total of 425 patient's data was collected during the period and analysed for WHO recommended prescribing indicators. Study shows that there was good prescribing from National Essential Medicines List and use of injections was very high (92%). 72.62% medicines were prescribed by generic name. Majority of medicines were prescribed as injections followed by infusions and tablets. There is no significant prescribing differences between male and female patient groups.

Instead of conducting a descriptive, prospective DUR, a concurrent DUR with direct feedback to prescribers seems effective to improve the appropriateness with regard to the indication for use. Nevertheless, it may have negative effects on other component of the quality of the prescriptions. Since the effect of DURs varies with both the type of interventions conducted and the criterion applied, there is a need for further research in other settings and with other drugs.

REFERENCES

1. Introduction to drug utilization research. WHO International Working Group for Drug Statistics Methodology, WHO Collaborating Center for Drug Statistics Methodology, WHO Collaborating Center for Drug Utilization Research and Clinical Pharmacological Services; 2003; Geneva, Switzerland: WHO. 2003.
2. Jean-Pierre Gregoire, Jocelyne Moisan, Louise Potvin, Isabelle Chabot, Rene Verreault and Alain Milot. Effect of drug utilization reviews on the quality of in-hospital prescribing: a quasi-experimental study *BMC Health Services Research*. 2006;6:33.
3. Thomas R Fulda, MA Alan Lyles, ScD MPH, BSPHarm, Mark C Pugh, Pharm D and Dale B. Christensen. PhD Current Status of Prospective Drug Utilization Review *J Manag Care Pharm*. 2003;10(5):333-31.
4. Manual of drug utilization by Folke Sjoqvist, M.D., Ph.D., Donald Birkett, Ph.D.
5. Drug Utilization Review- a Canadian process and methodology for studies of community based drug therapy: Canada's Research Based Pharmaceutical Companies; 2001.
6. Moss F, McNeil MW, McSwiggan DA and Miller DL. Survey of antibiotic prescribing in a district general hospital. *Lancet*. 1981;2:349-52.
7. Kulshrestha S, Agarwal KK. Survey of pattern of antimicrobial uses in a teaching hospital. *Indian J Pharmacol*. 1984;16 (Suppl 1):39.
8. Srishyla MV, Naga Rani MA, Damodar S, Venkataraman BV and Nandakumar HJ. A preliminary audit of practice: antibacterial prophylaxis in general surgery in an Indian hospital setting. *Indian J Physiol Pharmacol*. 1994;38:207-10.
9. Kumar H, Gupta U, Garg KC and Agarwal KK. A study of trend of drug usage in a hospital unit. *Indian J Pharmacol*. 1986;18:50.
10. Vishwanathan N, Gandhi IS, Shashindran CH and Adithan C. Drug utilisation study of antimicrobial agents. *Indian J Med Res*. 1981;74:772-8.