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A Study to Evaluate Prescribing Pattern of Antibiotics among the Inpatients of Medicine Department of a Tertiary Care Hospital



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HUMAN

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ABSTRACT

Background: Antibiotic abuse has been a major problem which needs to be controlled in all hospitals all over the world. Antibiotics have been prescribed irrationally without performing culture sensitivity tests, further giving rise to a much dangerous problem “Antibiotic Resistance”. This present study aims to assess the antibiotics practice in prescription and investigates if the current prescription patterns are meeting the World Health Organization (WHO) Criteria. **Method:** We have conducted a prospective observational study in General Medicine Department of tertiary care hospital in Hyderabad for over 6 months. A total of 250 patients were involved in the study and the data was extracted from medical case sheets and medication charts. **Results:** The ratio of females was more when compared to males in antibiotic prescription and most of the patients were in the age group of >60 years. More number of patients were not associated with any comorbidity. Most frequently prescribed antibiotic was found to be Cephalosporins. **Conclusion:** As the average number of drugs per encounter exceeded on unprecedented scale in the World Health Organization (WHO) prescribing indices, there is a need for promotion of rational use of medicines and use of educational initiatives to avoid antibiotic abuse.

INTRODUCTION

Antibiotics are the medications that can destroy or inhibit the growth of bacteria by either killing or inhibiting it^[1,2]. Currently, they are the most prescribed drugs in hospitals globally. Antibiotics play an important role in fighting against diseases^[3-5]. However, recently their benefit is facing a great problem due to antibiotic resistance. Antibiotic resistance stops an antibiotic from working effectively against bacteria^[6-7]. It is found that many organisms have become resistant to the most commonly available and effective agents due to inappropriate prescribing patterns^[8].

The antibiotics treatment regimens given to most of the patients were without culture sensitivity testing before prescribing, which lead to irrational prescribing^[9]. Irrational prescribing of medicine leads to serious morbidity and mortality as well as economic burden and also decrease in the quality of treatment; thus causing increased treatment cost, increased risk for adverse drug reaction, and emergence of resistance^[10]. Schedule H1 introduced in India under Drug and Cosmetics Act of 1945 to control the irrational antibiotics prescribe^[11].

To control the above problems and to ensure safe and effective therapy, antibiotic guidelines are necessary in hospital setup. By definition, "Antibiotic guidelines are standard set of guidelines for the treatment of infectious diseases based on local culture sensitivity data"^[12]. The World Health Organization (WHO) is promoting the rational use of drug by implementing standard treatment guideline.

Appropriate prescribing are based on good knowledge and understanding of the pathophysiology of disease, and knowledge of risks and benefits of the medicine^[13-14]. Appropriate use of drug by patients and adherence to instruction provided by the prescriber is an important part of successful rational drug use programme. Rational prescribing of antibiotics prevents antibiotic resistance and avoids polypharmacy^[15]. When antibiotics are prescribed for unnecessary conditions, there arise adverse problems. Adverse Drug Reactions can be prevented by proper monitoring.

It is extremely essential that institutions and hospitals should have an antibiotic policy and ensure that the best choices are made by well educated prescribers^[16]. Since pharmacist is the best link between the medication prescribed and the patient, better interaction between pharmacists and the patient lead to better patient knowledge about the disease and the drug use.

The aim of every country is to keep these essential medicines working for us, increase the health quality and decrease health care costs^[17-18]. To evaluate the situation of antibiotic use and prescription patterns in the field, the World Health Organization (WHO) has developed prescribing indicators for health care facilities^[19]. So, the current study was aimed to evaluate the use of antibiotics agents in a tertiary care hospital.

METHODOLOGY:

Materials and Methods-

STUDY DESIGN: - The present study is a prospective observational study.

STUDY SITE: - General Medicine Department of tertiary care Hospital.

STUDY DURATION: - 6 months

INCLUSION CRITERIA: - Patients of either sex of all ages admitted in General Medicine Dept. were included.

EXCLUSION CRITERIA: - Patients from the Outpatient Dept. of General Medicine and ICU/CCU were refrained from the study.

SAMPLE SIZE: - 250

SOURCE OF DATA: - The data was collected from the Medical case sheets and Medication charts.

STUDY PROCEDURE: - Patient's medical case sheets were received for Antibiotics prospectively in the Dept. of General Medicine of a tertiary care hospital.

STATISTICAL ANALYSIS:

During the study phase, categorical variables were described using frequencies (m, n, p, M, N) and percentage (%). Bar charts were created to show % of patients in each age group and % of class of antibiotics prescribed. Pie chart was created to show gender-wise distribution of all the patients included in the study. Donut chart was created to show the % of each drug formulation of antibiotic preferred. Semi-donut chart was created to show no. of antibiotics prescribed per prescription and % of patients associated and not associated with a comorbidity.

RESULTS:

In this prospective study, a total of 250 prescriptions of in-patients were analysed after screening for inclusion and exclusion criteria in General Medicine Department of a Tertiary Care Hospital. The prescription patterns of these patients were taken up for further evaluation.

Patient Demographics:

Upon distributing the patients according to their age, maximum no. of patients belonged to the age group of >60 years (n=50, 20%) as depicted in Table -1 and Figure-1.

Table No. 1:Age-wise Distribution Of Patients

AGE GROUP (in yrs)	n	n (%)
0-10	21	8.4%
11-20	24	9.6%
21-30	41	16.4%
31-40	31	12.4%
41-50	40	16.0%
51-60	43	17.2%
>60	50	20.0%
Total = 250		

*n=Total no. of patients in the study.

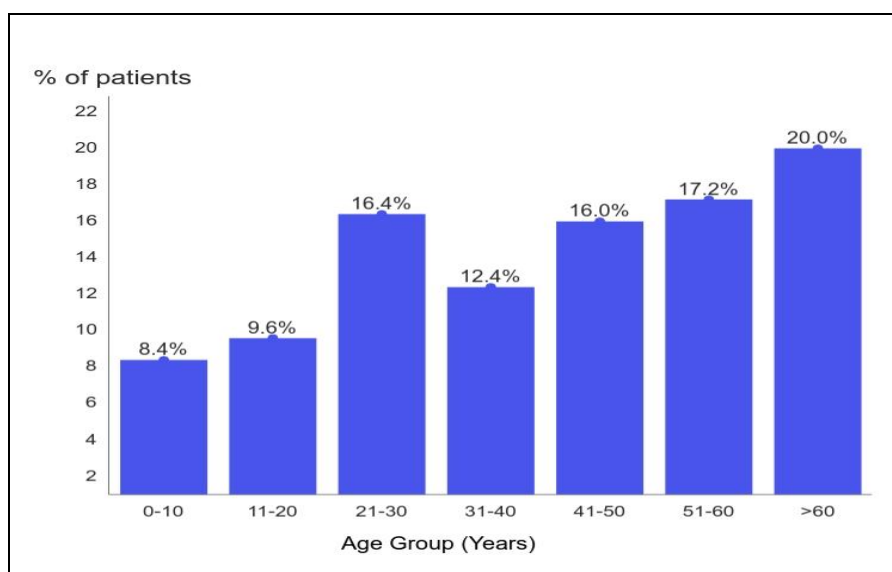


Figure No.1: Age-wise Distribution Of Patients

Upon distributing the patients according to their gender, majority of patients were females (n=129, 51.6%) as depicted in Table -2 and Figure-2. Ratio of males to females was found to be 121:129.

Table No. 2: Gender-wise Distribution of Patients

GENDER	n	n (%)
Male	121	48.4%
Female	129	51.6%
	Total = 250	

*n= Total no. of patients in the study.

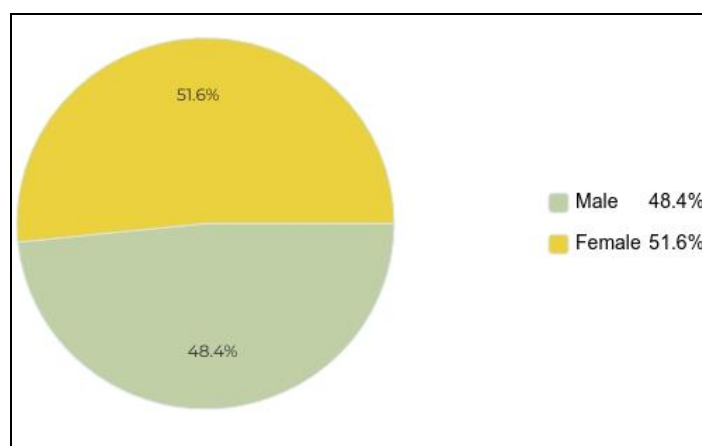


Figure No.2: Gender-wise Distribution of Patients

Out of 250 prescriptions, antibiotics were prescribed in 200 (80%) prescriptions. Proportion of females (50.5%) was more when compared to males (49.5%) in antibiotic prescriptions. Ratio of males to females was found to be 99:101.

Although many comorbidities were found in the patients during the study, the most prevalent comorbidity was found to be Hypertension(m=69) followed by DM-2(m=58) and Hypothyroidism (m=9) and others as depicted in Table-3. 41.2% of patients were associated with a comorbidity whereas 58.8% of patients were not associated with any comorbidity as depicted in Figure-3.

Table No. 3: Comorbidities Associated with the Patients

COMORBIDITIES	m
Hypertension	69
Diabetes Mellitus-Type 2	58
COPD	2
Bronchial asthma	4
Hypothyroidism	9
Renal disorder	4
Hepatic disease	1
Neurological disorder	6

*m=No. of patients associated with a specific co-morbidity.

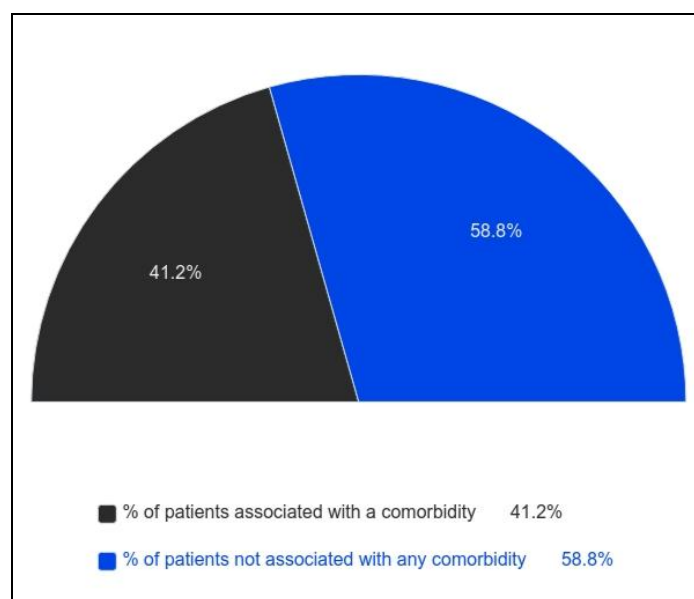


Figure No.3: Comorbidities Associated and Not Associated with the Patients

Antibiotic Prescription Pattern:

During the study phase, a total of 278 antibiotics were prescribed in 200 antibiotic prescriptions. Proportion of no. of antibiotics prescribed in males and females were equal. Most frequently prescribed antibiotic group found during the study was Cephalosporin (p=96, 34.53%) followed by Beta lactam/Beta lactamase Inhibitor combination (p=79, 28.41%), Nitroimidazole (p=26, 9.35%) and others as depicted in Table-4 and Figure-4. Most

frequently prescribed antibiotic found during the study was Ceftriaxone (50, 17.98%) followed by Cefoperazone + Salbactam(33, 11.87%), Metronidazole (22, 7.91%) and others. Among antibiotic combinations, Beta lactam/Beta lactamase Inhibitor combinations were mostly prescribed with Cefoperazone+ Salbactam(33, 11.87%) being frequently prescribed followed by Piperacillin+ Tazobactam (18, 6.47%), Amoxicillin+ Clavulanic acid (15, 5.39%) and others.

Table No. 4: Group of Antibiotics Prescribed

ANTIMICROBIAL CLASS OF DRUGS	NO.OF PATIENTS	p	p (%)
• Beta-Lactam Antibiotics			
Penicillins	1	1	0.38%
Cephalosporins	94	96	34.53%
Beta Lactam /Beta-Lactamase Inhibitor Combinations	78	79	28.41%
Penems	4	4	1.43%
• Non-Beta Lactam Antibiotics			
Quinolone	14	15	5.39%
Aminoglycoside	7	7	2.51%
Nitroimidazole	26	26	9.35%
Quinolone+ Nitroimidazole	3	3	1.07%
Lincosamide	6	6	2.15%
Macrolide	21	21	7.55%
Tetracycline	11	11	3.95%
Oxazolidinone	2	2	0.71%
Steroidol	3	4	1.43%
Nitrofurantoin	1	1	0.38%
Aminoglycoside+Lipopeptide Antibiotic	1	1	0.38%
Ansamycin	1	1	0.38%
		Total = 278	

*p= Total No. of Antibiotics Found In The Study.

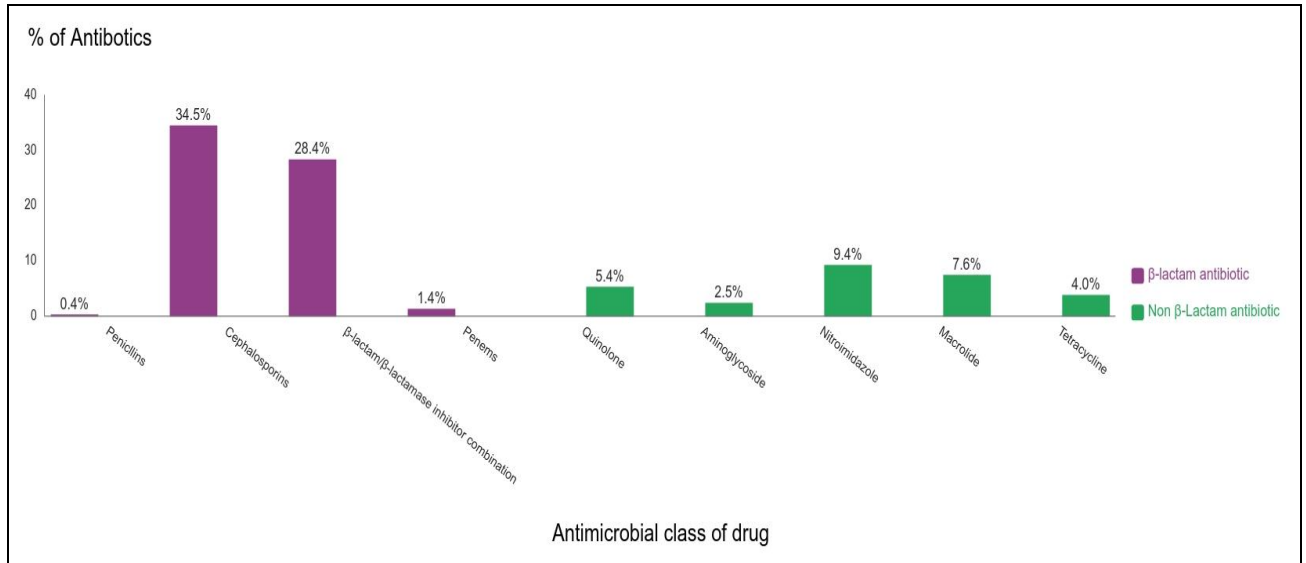


Figure No.4: Group of Antibiotics Prescribed

No. Of antibiotics prescribed per prescription was studied. It was observed that 1,2,3 and >3 antibiotics prescribed per prescription were 68%, 26.5%, 4%, 1.5% respectively as depicted in Table-5 and Figure-5.

Table No. 5: No. of Antibiotics Prescribed Per Prescription

NO. OF ANTIBIOTICS PRESCRIBED PER PRESCRIPTION:	N	N (%)
1 Antibiotic	136	68%
2 Antibiotics	53	26.5%
3 Antibiotics	8	4%
>3 Antibiotics	3	1.5%
	Total = 200	

*N=No. of Prescriptions with Antibiotics.

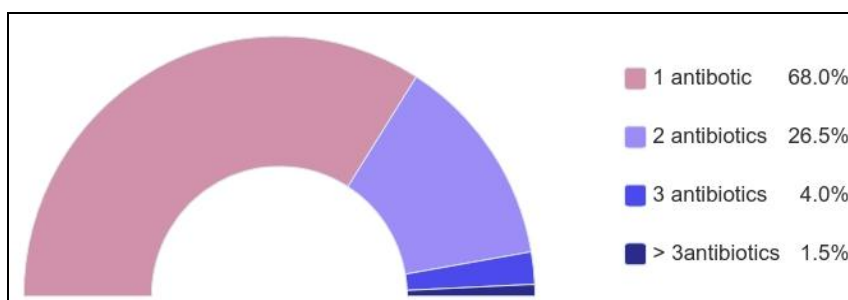


Figure No.5: No. of Antibiotics Prescribed Per Prescription

Type and no. of each drug formulation of antibiotic preferred was also taken into account. Injection (80.2%) was most commonly preferred drug formulation followed by Tablets(15.4%), Capsules (2.5%) and Topicals (1.9%) as depicted in Table-6 and Figure-6.

Table No. 6: Drug Formulation of Antibiotics

DRUG FORMULATION	No. of Patients	M	M (%)
Tablet	41	43	15.4%
Capsule	7	7	2.5%
Syrup	0	0	0%
Topical	3	5	1.9%
Injection	183	223	80.2%
		Total = 278	

*M= No. of Drug Formulations.

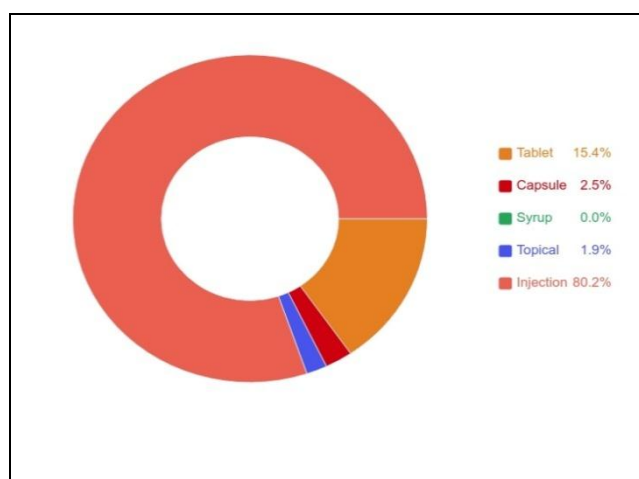


Figure No.6: Drug Formulation of Antibiotics

World Health Organization (WHO)-core Drug Prescribing Indicators are depicted in Table-7. Average number of drugs per encounter was 6.116. % of encounters with an antibiotic prescribed was 80%. % of encounters with an injection prescribed was 96%.

Table No. 7: World Health Organization (WHO) Core Prescribing Indicators

World Health Organization Prescribing Indicator	Avg (or) %	World Health Organization Standard [Avg (or) %]
Average number of drugs per encounter	6.116	<2
% of encounters with an antibiotic prescribed	80%	<30%
% of encounters with an injection prescribed	96%	<20%

DISCUSSION:

Pattern of prescription gives an impression of physician’s perception towards the disease and role of drug in its treatment [20]. Rational prescribing of drugs is the pivotal goal of drug utilisation studies. Rationalization of prescription, reduction of errors and recommendation of effective management of antibiotics to the health care workers are possible with regular auditing. Rational use of antimicrobial agents can be improved by evaluation of antibiotic prescription pattern.

In hospitals and other healthcare settings, antibiotics are one among the most commonly prescribed drugs and around 30% of hospitalized patients are treated with these drugs in developed countries.[21]The present study documents that 80% of patients were prescribed antibiotics. Ratio of number of antibiotics prescribed in males and females is 1:1.

Cephalosporin (34.53%) was the most frequently prescribed antibiotic group. Cephalosporins due to their high potent action, availability in various formulations in the market, extended indications and broad spectrum of activity from 1st to 3rd generations are generally widely prescribed antibiotics.[22]During the study, majority of prescriptions had broad spectrum antibiotics which indicates that these patients may have been given empirical antibiotic therapy.

World Health Organization core prescribing indicators were found to be irrational during the study, average number of drugs per encounter was 6.116. One of the important parameter of prescription audit is average number of drugs per prescription. To reduce the risk of drug interactions, development of bacterial resistance and hospital costs, the drugs prescribed per

prescription must be less.^[21]80% of encounters had an antibiotic prescribed. Chances of emergence of antibiotic resistance increases with continuous, random, immoderate use of antibiotics. 96% of encounters had injections prescribed. Prescribing injections at high rate raises concern. ^[20]High cost of parenteral antibiotic is an economic burden for poor people. Blood-borne infections can be transmitted due to possible use of unsafe syringes. ^[20]

This study has certain restrictions. As our study phase was short and it was performed only in General Medicine Department, our findings may not be applicable to other type of healthcare sites.

CONCLUSION:

This study evaluated prescribing pattern of antibiotics and was found to be irrational as it did not meet the specified standards of World Health Organization(WHO) core Prescribing Indices. Safe prescribing practices may be imbibed by regular auditing and feedback to improve patient care. Promotion of Rational Use of Medicines(RUM) and counteracting Antimicrobial Resistance by utilizing Antibiotic Smart Use(ASU) model. Use of guidelines, protocols, educational initiatives and surveillance can improve the prescribing practices and reduce the misuse of antibiotics. Adequate use of parenteral antibiotics will minimize the wastage of resources (natural, financial, human).

CONFLICT OF INTEREST: The authors declare they have no conflict of interest.

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