

A Study on Antibiotic Prescription Pattern in the In-Patient Departments of a Tertiary Care Hospital

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ABSTRACT

Antibiotics are most commonly and widely used medicines in reducing infections. Inappropriate use of antibiotics, in the form of improper dose or dosage form, using for longer periods of time than required or for shorter period may leads to risk of drug resistance. Evaluation and Monitoring of prescriptions is necessary for a better rational therapeutic benefit. The main objective is to study prescribing patterns of antibiotics in in-patient in a tertiary care hospital. This is a Prospective observational study of 3 months duration was undertaken. A total number of 500 patients were taken for the study. A detailed information on list of all classes of antibiotics used in different diseased conditions at various departments was provided. There is a need of awareness on antibiotic misuse, evaluate and monitor prescribing patterns in physicians for an effective therapeutic outcome and avoid burden of resistance and economy.

Keywords: Antibiotics, Microbial Infections, Antibiotic Resistance, Prescribing frequency.

INTRODUCTION

Antibiotics are currently the most commonly prescribed drugs in hospitals, worldwide. [1] The Centers for Disease Control and Prevention (CDC) estimates that more than 100 million antibiotic prescriptions are written each year in the ambulatory care setting. [2] Antibiotics have been used effectively for the treatment of many diseases, which is why they were called miracle drugs. Unfortunately,

widespread use and misuse worldwide have led to the emergence of 'super bugs' and other drug-resistant bacteria. [3-8] Microbial infections are most common types of infection which usually requires the use of antibiotics for treatment. [9,10] Natural substances with selective antibacterial activity produced from microorganisms are the traditional definition given for antibiotics. They either inhibit (bacteriostatic effect) or kill (bactericidal effect) bacteria. The discovery of antibiotics had eradicated the infections that once ravaged humankind. But their indiscriminate use has led to the development of multidrug-resistant pathogens. Around 90-95% of *Staphylococcus aureus* strains worldwide are resistant to penicillin [11] and in most of the Asian countries 70-80% of the same strains are methicillin resistant. [12] Conventional antibiotics fall into five major categories with respect to their targets. These targets include: (i) bacterial peptidoglycan/cell wall disruption; (ii) protein biosynthesis; (iii) folate biosynthesis; (iv) DNA replication and transcription; and (v) disruption of the bacterial membrane. [13-19] The present study demonstrates the prescription pattern of antibiotics in different clinical conditions in a tertiary care hospital.

METHODS

Study design: This was a hospital based prospective and observational study carried

out over a period of five months (October 2019 to February 2020).

Study population: The study was done in various in-patient departments of a tertiary care hospital in Telangana, India. The data was collected from patients admitted to Medicine, Pediatrics, Nephrology, Urology, Orthopedics, Pulmonology, Dermatology, Neurology, Gynecology, ENT, Cardiology, Oncology over these five months.

Sampling method: All the patients on antibiotic prescription and were willing to give consent were included in the study. We have visited 500 patients in different inpatient wards and analyzed medical case sheets for data collection which includes age, gender, social history, past medical history, diagnosis and prescribed antibiotics with dose, frequency, route of administration.

Statistical analysis: Descriptive statistics were applied to the collected data using Microsoft Excel software. Results are expressed in percentages and Mean-Standard Deviation (SD) wherever necessary.

RESULTS

The study population of 500 patients included 64% males and 36% females (Figure.1). Mean age of total patients was 39.28 ± 20.75 years. Mean age of males and females was 39.34 ± 20.82 , 39.23 ± 20.77 years respectively. The age distribution is shown in Figure 2. Most of the antibiotics in this study were given by intravenous route (73%) and oral route (27%) (Figure.3). Total antibiotics prescribed are listed in Table 1.

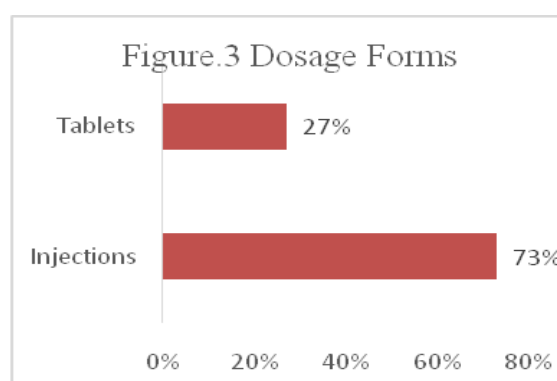
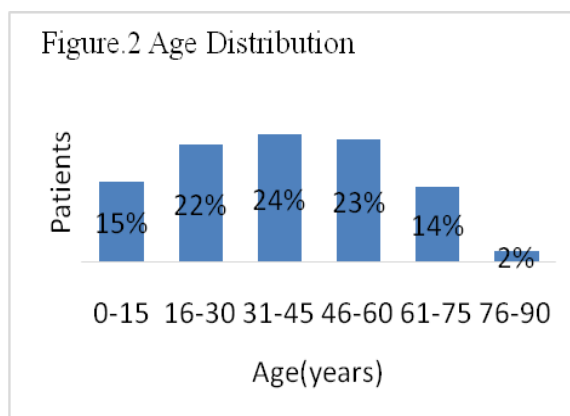
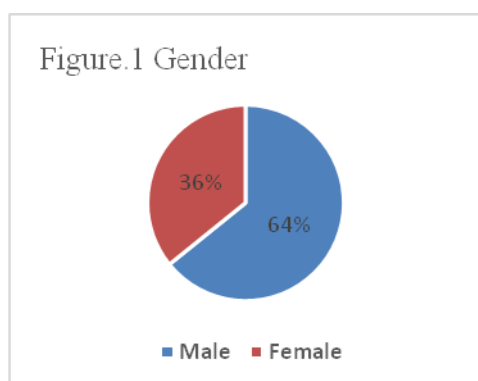
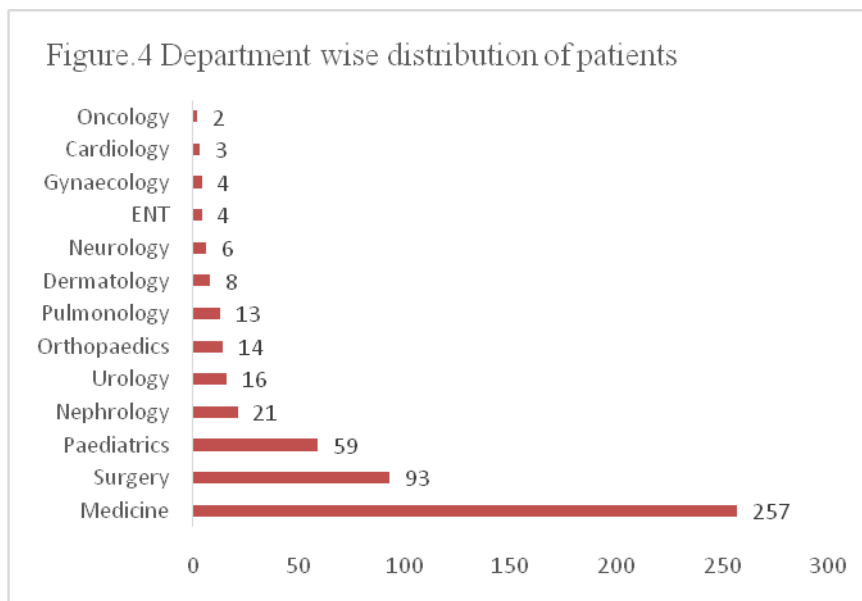
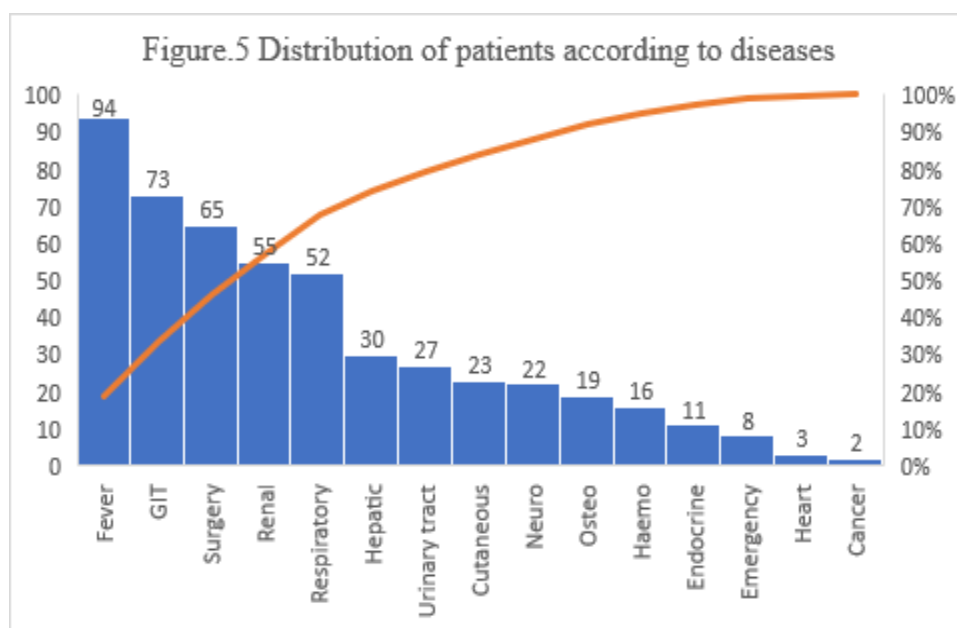


Table.1 List of total Antibiotics prescribed.

Antibiotics	Percentage prescribed
Ceftriaxone	130 (26%)
Amoxicillin + clavulanic acid	97 (19.4%)
Doxycycline	64(12.8%)
Piperacillin + tazobactam	44 (8.8%)
Cefixime	41 (8.2%)
Amikacin	26(5.2%)
Azithromycin	16 (3.2%)
Nitrofurantoin	12 (2.4%)
Ofloxacin	12 (2.4%)
Cefperazone + sulbactam	10 (2%)
Ciprofloxacin	6 (1.2%)
Cefpodoxime + Clavulanic acid	6 (1.2%)
Vancomycin	5 (1%)
Doxycycline + Lactic acid bacillus	4 (0.8%)
Cefuroxime	3 (0.6%)
Meropenem	3 (0.6%)
Cefotaxime	2 (0.4%)
Ceftizoxime	2 (0.4%)
Clindamycin	2 (0.4%)
Imipenem	2 (0.4%)
Ampicillin	2 (0.4%)
Cefuroxime + Clavulanic acid	2 (0.4%)
Cefpodoxime proxetil	1 (0.2%)
Cefepime	1 (0.2%)
Levofloxacin	1 (0.2%)
Clavulanic acid +Ticarcillin	1 (0.2%)
Ampicillin + Sulbactam	1 (0.2%)
Cefotaxime + Sulbactam	1 (0.2%)
Ceftriaxone + Sulbactam	1 (0.2%)
Ceftriaxone + Tazobactam	1 (0.2%)
Ticarcillin	1 (0.2%)



Department-wise distribution of patients on antibiotic therapy is shown in Figure 4. Most of the cases were recorded in medicine department (51.4%) followed by Surgery (18.6%), Pediatrics (11.8%), Nephrology (4.2%), Urology (3.2%), Orthopedics (2.8%), Pulmonology (2.6%), Dermatology (1.6%), Neurology (1.2%), Gynecology (0.8%), ENT (0.8%), Cardiology (0.6%), Oncology (0.4%).



The indications/Diagnosis that led to antibiotics prescription is depicted in Figure 5. Majority of the complaints were fever(18.8%), followed by GIT(14.6%), Surgery(13%), Renal(11%), Respiratory(10.4%), Hepatic(6%), Urinary Tract(5.4%), Cutaneous(4.6%), Neuro(4.4%), Osteo(3.8%), Hematology(3.2%) , Endocrine(2.2%) , Cardiology(0.6%) , Cancer(0.4%).

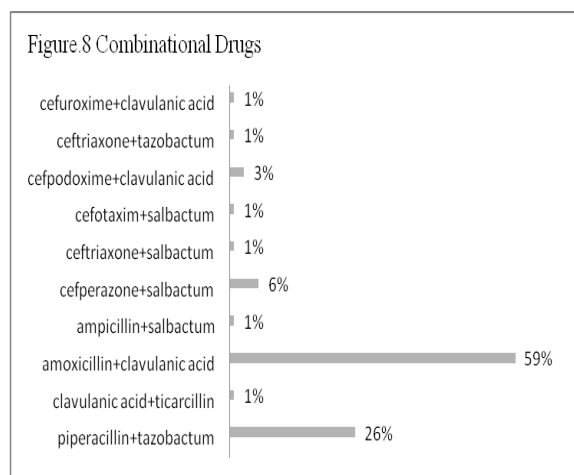
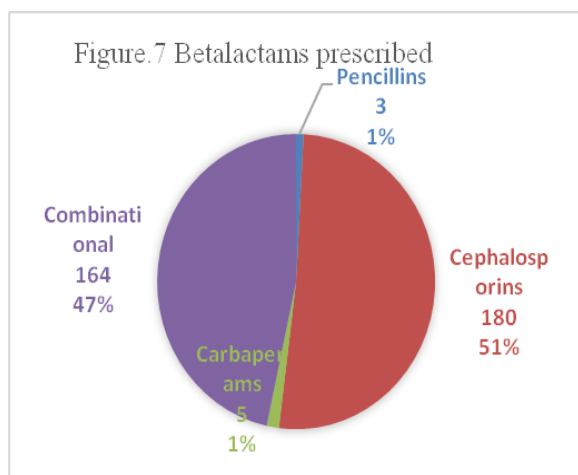
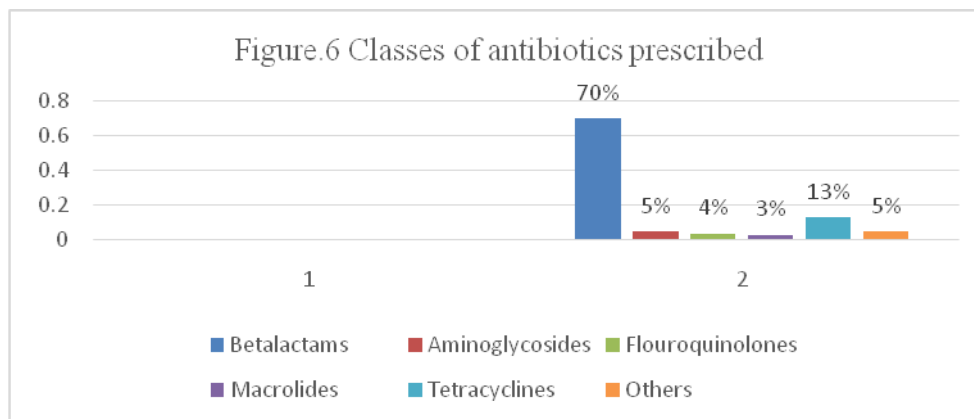


Table.2 Percentage use of Cephalosporins.

Cephalosporins	Patients
Ceftriaxone	130(72%)
Cefixime	41(23%)
Cefuroxime	3(2%)
Cefotaxime	2(1%)
Ceftizoxime	2(1%)
Cefpodoxime proxetil	1(0.5%)
Cefepime	1(0.5%)

The prescribing frequency of antibiotics is depicted in Figure 6 and various Beta-lactams in Figure 7. Of the prescribed antibiotics Beta lactams (70.4%) are maximally prescribed class of antibiotics followed by Tetracyclines (12.8%), Aminoglycosides (5.2%), Fluoroquinolones (3.8%), Macrolides (3.2%), Nitrofurans (2.4%), Others (2.2%). In Beta lactams, Cephalosporins were maximally prescribed (51%). Ceftriaxone (72%) is maximally prescribed drug in Cephalosporins. Percentage use of Cephalosporins is given in Table 2.

Prescribed Fixed dose combination antibiotics are shown in Figure.8. Mostly prescribed combinational drug is Amoxicillin + Clavulanic acid (59%) given mostly in surgical cases, followed by Piperacillin + Tazobactam (26%) mostly given in renal cases, Cefoperazone + Sulbactam (6%) mostly given in surgical cases, Cefpodoxime +Clavulanic Acid (3%),Cefuroxime + Clavulanic acid (1%), Ampicillin + Sulbactam (1%), Cefotaxime + Sulbactam (1%),Ceftriaxone + Sulbactam (1%), Ceftriaxone + Tazobactam (1%), Clavulanic Acid + Ticarcillin(1%). Most of the combinational drugs were prescribed in Surgical cases (28.5%), followed by GIT((14.8%), Pulmonary Diseases (13%), Renal Disorders (10.7%), Dermatological (7.1%), Urinary Tract(6.5%), Hematological cases (4.1%), Hepatic(3.5%), Fever(3.5%), Neuro (2.3%),Ortho (2.3%), Cancer(1.7%), Endocrine (0.5%).

DISCUSSION

Monitoring of antibiotic prescribing, awareness and strict restriction of over-the-counter antibiotic usage decreases the magnitude of burden of infections due to antibiotic resistance and economic burden as well.

Our study in a tertiary care hospital found that antibiotics were used similarly from age 16 to 60 years. Ceftriaxone and amoxicillin with clavulanic acid were prescribed more compared to other antibiotics. Diseases conditions related to fever, gastrointestinal tract and surgical conditions required high number of antibiotics followed by renal and respiratory diseases. A research in Bangladesh observed usage of antibiotics was high among ages of 5 to 11 years and Ceftriaxone, Cefixime, and Cefuroxime were frequently used. It also concluded that Respiratory and gastrointestinal diseases required high number of antibiotics. [20]

The present study revealed that majority of the patients were males, Cephalosporins belonging to beta lactams were prescribed maximally reflecting identical outcomes from another study conducted in Northern India. [21] Another research study from Nepal depicted high use of Gentamicin/Cefotaxime and Benzyl Penicillin, Ceftriaxone with Chloramphenicol whereas Amoxicillin Clavulanic Acid, Piperacillin with Tazobactam are commonly used combinational drugs in the present study. [22]

The present study included adequate amount of sample size but limitations include unequal number of prescriptions employed from various departments, longer duration of study, evaluation of prescribed antibiotics against Standard Therapeutic Guidelines, Dose, Resistance and Outcome evaluation would recognize the potential problems.

CONCLUSION

In many cases antibiotics are widely prescribed and even ingested without prescription. There is a need of awareness

on antibiotic misuse, evaluate and monitor prescribing patterns in physicians for an effective therapeutic outcome and avoid burden of resistance and economy. Microbiological diagnosis, Implementation and regulation of antibiotic prescribing policy in hospitals could ensure effective and safe usage.

Declaration:

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Conflicts of interest – none

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