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THE STUDY ON PRESCRIPTION PATTERN OF ANTIBIOTICS IN VARIOUS DEPARTMENTS OF A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Antimicrobial agents are most widely, and often injudiciously, used therapeutic drugs worldwide. In current hospital settings, bacterial resistance is a growing problem and a subject of concern due to irrational consumption of antibiotics by the individual in the community. **Aim**: A prospective cross-sectional study to determine prescription pattern of antibiotics in various departments of a tertiary care hospital in South India. **Method**: A total of 1400 antibiotic samples from 709 hospitalized patients were taken from various general and specialized departments for a period of 6 months. The prescriptions were assessed and details like patient name, sex, age, height, weight, laboratory investigations and antibiotics used for the infections were entered in to the self-designed patient data collection form. Comparison of antibiotic prescribing practices among all the departments was made by using Percentage method. **Results**: Majority of consumer of antibiotics were in the age group of 55-75years with the proportion of male patients (58%) higher than the female patients (42%). Ceftriaxone is the most commonly prescribed antibiotic followed by Piperacillin- Tazobactum and Amoxicillin-Clavulanate. Respiratory infections (44%) are the most common source of infection. Most of the antibiotic therapy were given prophylactically. **Conclusion**: By understanding the prescribing pattern of antibiotics and their accurate dose and frequency based on patient demographics and diagnosis, we will be able to make the rational use of antibiotic agents, as one of the main contributions to control the drug resistance all over the worldwide. Continuous educational programmes can contribute to improve internal medicine specialist's

knowledge on ICMR antibiotic guidelines. Further studies are needed to educate, explore the knowledge and skills to correct the internal medicine specialist's attitudes towards prescription.

KEYWORDS: Antimicrobial agent, Prescribing pattern, Antimicrobial resistance, rational prescriptions.

INTRODUCTION

Antimicrobials are lifesaving drugs and their discovery is among the most important advancement of the 21st century.[1] They are the most consumed drugs in hospitals worldwide. Antibiotics play a key role in combating disease and fight infectious disease especially in developing countries. However, in recent years their continuous use has led to the emergence of antibiotic resistance. Many microbes have become resistant to the commonly available and effective first line agents mainly due to inappropriate prescribing practices. Drug resistant bacteria induced infections result in increased duration of hospitalization and cost of treatment. When infections become resistant to first-line antibiotic choices, more expensive second-line therapies have to be adopted resulting in a longer duration of illness and treatment in hospitals which often increases health care costs as well as the economic burden on families and societies as the intensity of care needed by patients with infections caused by drug resistant bacteria is more than drug sensitive bacterial infections.[2]

The main factors causing resistance in patients include: continuous use of broad-spectrum antibiotics, prolonged use of antimicrobial agents, frequent use of invasive devices and procedures, patients with comorbid conditions within a hospital and prolonged hospitalization.[3] Hospitals are considered an excellent hub of resistant and multi-drug resistant (MDR) bacteria. The number of unqualified medical practitioners is a big contributor to antimicrobial misuse and resistance. In developing countries, around 44–97% of hospitalized patients are prescribed antimicrobials, often unnecessarily or inappropriately.[4]

An auditing of antibiotic prescribing pattern is a key indicator to determine factors like quality and standard of clinical practice. Prescriptions can be described as either rational or irrational based on several factors like obtaining an accurate diagnosis of the infection, identifying opportunities to switch to narrow-spectrum, cost-effective antimicrobials for the

shortest duration, understanding peculiar drug characteristics of antimicrobials (such as pharmacodynamics and efficacy at the site of infection), that accounts for host characteristics which influence antimicrobial activity; and in turn recognizing their adverse effects on patients. In clinical practice, these parameters are often neglected due to various factors which have led to the emergence of antibiotic resistance, increased adverse effects, prolongation of length of stay, and thereby an increase in the expenses of health care services.[5]

This study was conducted in a tertiary care hospital in South India where the prescription pattern of antibiotics are assessed in terms of the prevalence of a variety of antibiotic uses including frequency, doses, intervals, routes of administration and the appropriateness of the choice of antibiotics in various departments of hospital.

MATERIALS AND METHODS

A cross sectional study was conducted based on the prescriptions collected from patients in various departments of a tertiary care hospital, Kerala, South India. A total of 709 prescriptions were collected from inpatients of General Medicine wards and other specialties like Gastroenterology, Neurology, Nephrology, Pulmonology, Rheumatology, Oncology, Dermatology, Cardiology, and Urology over a period of 6 months from November 2019 to April 2020. The data of the patients who received antimicrobials were collected on the basis of the inclusion and exclusion criteria. The data collected includes; patient characteristics (sex, age, height, weight, ward, creatinine clearance), antibiotics used for the infections, dosage, dose, route, date of starting and stopping therapy and reason for switching or stopping. The study protocol, data collection form and all the other documents related to the study were approved by the Institutional Ethics Committee. The data collected were entered in Microsoft Excel software and analyzed for drug utilization studies.

The Selection Criteria of the Patients

1. **Inclusion Criteria:** All the patients who were admitted in the general medicine wards and other specialties using antibiotics with at least 24 hours of hospital stay.
2. **Exclusion Criteria:** Pregnant & pediatric population were excluded from the study.

RESULTS

A total of 1400 antibiotics were obtained from 709 antibiotic prescriptions. The mean age of patients are 63.19 years. It was found that 46% of the patients using antibiotics were in the age group between 55-75 years followed by 24 % of patients were in the age group of 35-55 years and 75-95 years. Only 6 % patients were in the age group of 15 – 35 years.

Table 1: Age Distribution of patients.

Si.no:	Age group	Frequency	Percentage
1	15-35	90	6
2	35-55	328	24
3	55-75	646	46
4	75-95	336	24

58% of the population using antibiotics were male. The female population counts for only 42%.

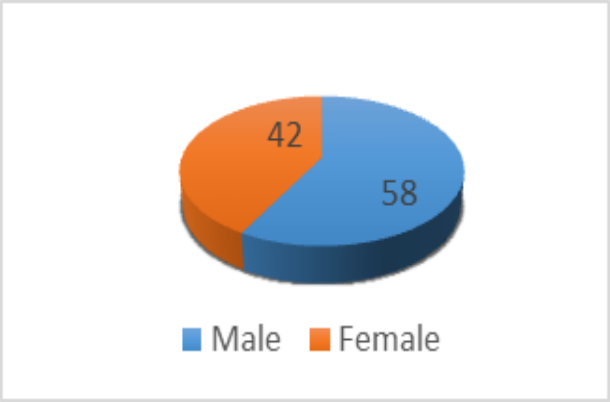

Fig 1: Gender wise distribution of Patients.

Distribution of allergic status showed only 2 % of the total sample population were found to be allergic to drugs while 98 % were free from allergy to drugs. Among drugs that caused allergy in patients, 46% were due to allergy to sulpha drugs alone. 15 % of patients were found to be allergic to Penicillin. Remaining drugs like Salbutamol - Ibuprofen combination, Diclofenac, NSAIDS, Paracetamol and Levofloxacin- Penicillin combination caused 8% allergy.

Table 2: Allergy status in Patients.

Si.no:	Allergy Status	Frequency	Percentage
1	Nil	696	98
2	Yes	13	2

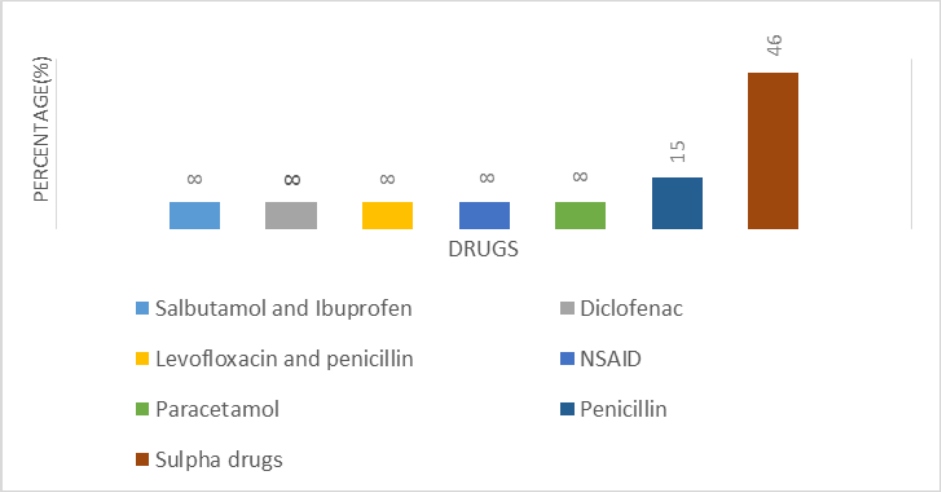

Fig 3: Distribution of drugs causing allergy in patients.

It was found that around 61% of antibiotics were used in general medicine wards.12% of antibiotics were used in pulmonology department, followed by 8% each in gastroenterology and nephrology, 3% in neurology, 2% each in oncology, dermatology and cardiology, followed by 1% each in rheumatology and urology departments.

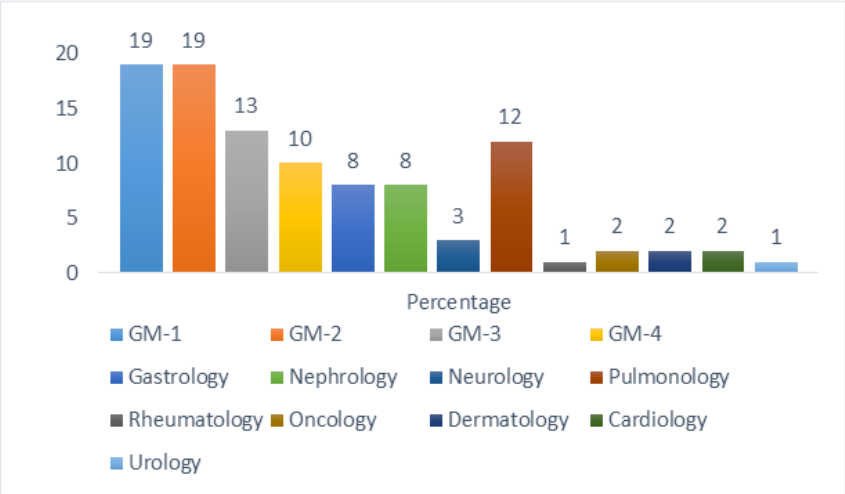

Fig 4: Distribution of antibiotics in various departments.

Respiratory tract infections were the main source of infection (44%). Respiratory infections included conditions such as COPD, pneumonia, LRTI, asthma, pulmonary edema, URTI, bronchitis, CAD, TB, respiratory failure. UTI accounts for infection in around 21% of patients. It consists of 6 main comorbid conditions such as UTI, CKD, Epididymitis, and Ureteric calculi, Glomerulonephritis, Pyelonephritis cystitis, prostatitis and pyelonephritis. Intra-abdominal infections were found in 17% of patients among which Chronic liver disease was the leading cause of infection.

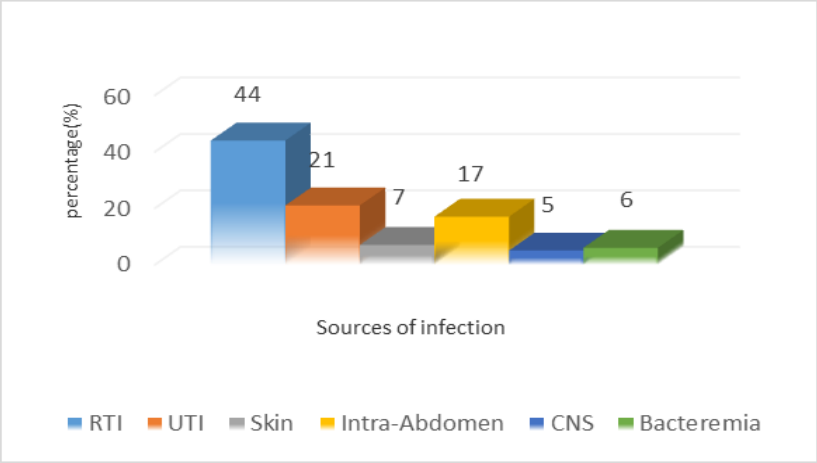

Fig 5: Pattern of sources of infection.

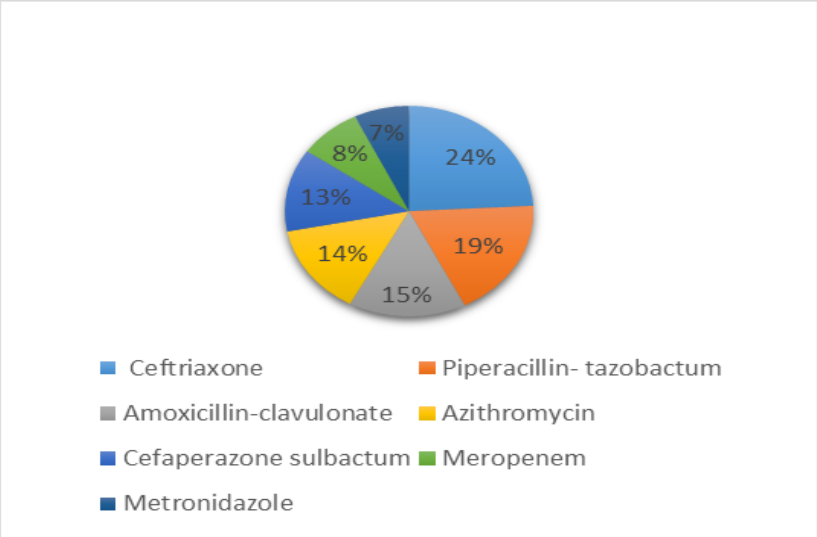

Fig 6: Pattern of antibiotics prescribed in Patients.

Here on analysing the antibiotics used in various departments, ceftriaxone was most prescribed antibiotic followed by piperacillin-tazobactum, amoxicillin-clavulonate, azithromycin, cefaperazone sulbactum.

DICUSSION

A cross sectional survey of inpatient prescriptions of departments Viz General Medicine, Gastroenterology, Neurology, Nephrology, Pulmonology, Rheumatology, Oncology, Dermatology, Cardiology, and Urology was carried out to assess the prescription pattern of antimicrobials.

We found that around 46% of the patients using antibiotics were in the age group between 55-75 years, which agrees with the common concept of age related issues, chronic illness,

weakened body system functioning, physical changes in specific immune response patterns, which may be same in many countries.[6]

Among all departments, around 61% of antibiotics are prescribed in General medicine departments possibly due to large population of patients that prefer to take consultation from internal medicine specialist and presence of various common infectious diseases. While comparing other specialized departments, 12% of antibiotics were used in pulmonology department. Drugs like amoxicillin -clavulanate, azithromycin are highly prescribed for both upper and lower respiratory infections. Azithromycin is given prophylactically at a dose of 250mg to many COPD patients. Amoxicillin clavulanate and ceftriaxone are commonly prescribed for pneumonia. Use of antibiotics in gastroenterology department constitute around 8% where drugs like Cefoperazone-Sulbactum and metronidazole are commonly prescribed for CLD patients. Combined therapy with Metronidazole combination may be superior to beta-lactam-based therapeutic regimens in the treatment of intra-abdominal infections with regard to cure of infections.[7,8]

In CKD patients, ceftriaxone and Piperacillin –tazobactum are commonly prescribed drugs. Physicians used to prescribe Piperacillin –Tazobactum at a dose of 2.25g q6h for all patients irrespective of creatinine clearance. Ceftriaxone, Piperacillin – Tazobactum and Vancomycin are the commonly prescribed for CNS infections which accounts for only 3% of total antibiotic use. Skin infections mostly involved the use of Clindamycin, Amoxicillin-Clavulanate etc. Doxycycline 100mg bid is given prophylactically for preventing MRSA infections. Oral antibiotics belonging to the tetracycline family, including Minocycline and Doxycycline, are effective means of treating CA-MRSA infections.[9] Reserve antibiotics like Teicoplanin, Colistin, Meropenem, Linezolid are commonly prescribed for sepsis and urosepsis conditions. Treatment duration of 7 to 10 days are adequate for most cases.

Ceftriaxone was most commonly prescribed antibiotic followed by Piperacillin- Tazobactum & amoxicillin-clavulanate. In our study the most common combination drug prescribed was Piperacillin-Tazobactum followed by Amoxicillin and Clavulanic acid. The reason for prescribing combination therapy is for broadening antibacterial spectrum, to treat polymicrobial infections, achieving synergism and to avoid emergence of resistance. Three or more antibiotics were prescribed to patients either after reviewing the culture and sensitivity results or due to lack of improvement in the clinical condition.[10] Use of reserve antibiotics constitute around 8% of total antibiotic samples which includes Meropenem, Vancomycin,

Colistin, Teicoplanin, Linezolid. The mean duration of hospitalization was 5 days in most patients.

Type of therapy was divided into 3- definitive, empiric and prophylactic. Prescriptions were considered empiric if the medical records contained information that the antibiotic was presented for therapy and clinical signs of infection such as fever were present on the day that antibiotic therapy was initiated. Antibiotics were classified as prophylactic if: the medical record stated that the antibiotic was prescribed for prophylaxis and antibiotic started before culture test. Antibiotic were considered definite if: antibiotic was given after culture test.[11,12] The prophylactic use of antibiotics was around 41.7% in all departments. The empirical therapy constituted around 45.8% while only in 12.5% patients definite therapy was provided.

Antibiotic stewardship programs are necessary in hospital to optimize antibiotic use. Prevention and control of the antibiotic-resistant organisms require adherence to basic infection control policies and procedures. The incorporation of these strategies into institutional goals and development of a plan will help to deal with patients colonized with resistant organisms.[13,14] In a recent study, a vast majority of physicians (97%) believed that widespread and inappropriate use of antimicrobials was an important cause of resistance. However, only 60% favored restricting the use of broad-spectrum antibiotics.

CONCLUSION

Antibiotic stewardship include various educational efforts like passive activities, such as conference presentations, handbook and leaflet distribution. Implementation of an antimicrobial stewardship program initially with educational efforts, followed by prospective audit demonstrated progressive decrease in antimicrobial consumption. The study investigated the prescribing pattern of antibiotics by various prescribers in all departments to observe, evaluate, and suggest modifications in improving the prescribing habits of the health care providers. The choice of antibiotics for different infectious disease can differ from hospital to hospital depending on physician’s choice and preferences. The hospital should develop a system to monitor and regulate the use of antibiotics in hospitalized patients to promote the rational use of antibiotics. By understanding the prescribing pattern of antibiotics and their accurate dose and frequency based on patient demographics and diagnosis, we will be able to make the rational use of antibiotic agents, as one of the main contributions to control the drugs resistance all over the worldwide. Continuous educational programmes can

contribute to improve internal medicine specialist's knowledge on antibiotic guidelines. Further studies are needed to educate, explore the knowledge and skills to correct the internal medicine specialist's attitudes towards prescription.

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