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Original Article

ASSESSMENT OF ANTIBIOTICS PRESCRIPTION PATTERN BY USING WHO PRESCRIBING INDICATORS IN GENERAL MEDICINE WARD OF A TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: Antibiotics encompass a great extent of the important cornerstone in clinical medicine. Antibiotics are being used more often for treatment, prophylaxis, and diagnosis as the diversity of infectious illnesses grows. Irrational prescribing of antibiotics leads to antibiotic resistance, ineffective treatment, polypharmacy, and an increase in treatment cost. This study is to assess prescribing pattern of antibiotics in the general medicine ward of a tertiary care hospital, Chitradurga.

Methods: A prospective observational study was carried out for a period of six months. A self-designed data collection form was used to collect the data from the prescriptions. The collected data was entered and analysed using Microsoft Excel.

Results: In 300 prescriptions, a total of 2,468 drugs were prescribed, with an average of 8.2 drugs per prescription. A total of 719 antibiotics were prescribed, with an average of 2.3 per prescription. Percentage of antibiotics prescribed by generic name was 6% and prescribed according to EDL was 74%. About 96% of prescriptions containing antibiotics are in injection form. Ceftriaxone (30.32%) was the most frequently prescribed antibiotic. Cephalosporins (44.51%) were the most frequently prescribed class of antibiotics.

Conclusion: This study indicate that prescription pattern was not optimal compared to the recommended values of the WHO core prescribing indicators. The prescribing practices were not appropriate as they consisted of polypharmacy, lesser prescription by generic name, and parenteral route of administration more than the oral route. Hence, there is a need to implement the standards of antibiotic guidelines prescribed rational therapy.

Keywords: Prescription pattern, WHO prescribing indicators, Antibiotics, Rational use of drugs

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INTRODUCTION

Infections are a leading cause of death in underdeveloped nations. People in the developing world frequently acquire antibiotic resistance, which contributes to poor treatment results and increased healthcare utilization. Antibiotic resistance can be brought on by several things, such as medical facilities, medication non-adherence, multiple prescribers and dispensers, first-generation medication use, inappropriate medication use, incorrect dosage, incorrect medication use, use of counterfeit medicines, over-and under-medication, and so forth. Antibiotic resistance can be avoided by monitoring patient doses and formulations, reviewing patients' pharmacokinetic profiles regularly, and monitoring and treating patients for ADRs [1].

Since the discovery of penicillin in 1920, antibiotics have been extensively prescribed for treating and preventing infections. This discovery changed the way medicine was practiced and reduced the mortality caused by infections, among other things. However, there have lately been concerns regarding the incorrect use of antibiotics, which has contributed to the development of antibiotic resistance in some disease-causing microorganisms [2].

The name antibiotic was derived from the Greek word "antibiosis," which means "against life." Antibiotics were once thought to be chemical compounds generated by one bacteria that are poisonous to other microbes. As a result of this concept, an antibiotic was first described generally as a chemical compound produced by one bacteria or of biological origin that, at low quantities, can inhibit or kill the development of other bacteria [3].

Antibiotics are vital for treating bacterial infections, and antibiotic resistance prevents antibiotics from acting effectively against bacteria, making some illnesses extremely difficult to treat [4]. Antibiotics are a common medication prescribed to people of all ages. Antibiotics are being used more often for treatment, prevention, and diagnosis as the diversity of infectious illnesses and the population grows [5].

The WHO described the rational use of drugs in 1985 as "patients receiving medicines suited to their clinical needs, in dosages that fulfill their specific requirements for a sufficient amount of time, and at the lowest price to them and their community." Rational prescription principles must be followed, and prescribing medications only from the EDL is an essential step in this direction. The use of antibiotics has become more common in the treatment of disease, and irrational antibiotic usage may increase illness and infections.

The main issues with modern medicine include over or underuse of medication, high drug costs, increased use of injectables and antibiotics, polypharmacy, non-compliance with approved clinical guidelines, and the use of brand names rather than generic ones. The factors that affect prescription patterns include the impact of mentors, pharmaceutical sales agents, and patient characteristics [6]. Irrational prescribing includes patient demands or expectations, lack of appropriate role, and sterile injections that may cause transmission of blood-borne diseases [7].

A health professional's prescribing practices are an indication of a health professional's ability to distinguish between many drug options and select the ones that will benefit patients the most. Prescription pattern analysis is a component of medical auditing that attempts to monitor, analyse, and, if required, recommend changes in prescription practises to make medical treatment more reasonable and cost-effective [8].

International organizations like the WHO and the INRUD have worked hard to develop standardized drug use indicators to reduce overall drug use, especially in developing countries [9]. Prescribing, facility-specific, and patient care indicators are among the WHO drug use indicators. The WHO prescription indicators can be used primarily and effectively in a wide range of circumstances to detect drug-use problem areas, alert physicians to the need to use medications wisely, and concentrate future efforts to deal with these problems [10]. The WHO core prescribing indicators serve to

improve prescribing patterns and hence encourage the rational use of drugs in healthcare organizations. It is necessary to examine physicians' rational prescribing knowledge, which may be done through periodic prescription audits [11].

The WHO prescribing indicators were used in this study. The indicators were pretested, and slight modifications were made.

Table 1: Prescribing pattern indicators

Indicator	Reference value
Average number of drugs per prescription	1.6-1.99
Average number of antibiotics per prescription	2
Percentage of prescriptions with an injection prescribed	13.24-24.1%
Percentage of antibiotics prescribed from EDL	100%
Percentage of antibiotics prescribed by generic name	100%

These indications can be used as standards to allow the implementation of ASPs in various healthcare settings. Antibiotic prescribing patterns can be studied to detect irrational prescribing practises and improve the rationality and cost-effectiveness of therapy. This study will help minimize improper antibiotic selection, irrationality, and antimicrobial resistance [11, 12].

MATERIALS AND METHODS

Study site

The study was conducted at a Tertiary care hospital, Chitradurga.

Ethical approval

This study was approved by the "Institutional Ethical Committee" of SJM College of Pharmacy, Chitradurga.

Vide number: SJMCP/IEC/624/2022-23

Study duration

The study was carried out for a period of 6 mo.

Study design

A prospective observational study.

Study criteria

The study was carried out by considering the following criteria

Inclusion criteria

- Patients who are prescribed at least one antibiotic medication.
- Patients of both genders who are admitted to the general medicine department.

Exclusion criteria

- Patients who are admitted to other departments.
- Those patients who are unwilling to participate.

Source of data

- Medical reports of patients.
- WHO model list of essential medicines.

Study procedure

A six-month prospective observational study was conducted in the general medicine department of a tertiary care hospital, Chitradurga. The study was started once the IEC gave its clearance. Each participant signed an informed consent form before beginning the study. The data was collected from the case sheets of general medicine ward patients using a self-designed data collection form and evaluated for prescribing patterns of antibiotics. Confidentiality of collected data was maintained.

Statistics

The collected data was entered and analysed using Microsoft Excel. Categorical data were presented as frequency, percentages, and numbers were analyzed by descriptive methods.

RESULTS

A total of 300 prescriptions were included in this study. The following are study results in the view of age, gender, prescribing indicators, most commonly prescribed antibiotics, different class of antibiotics prescribed, and different dosage form of antibiotics by the objectives of the study.

Distribution of prescriptions according to age

A total of 300 prescriptions were included in the study. Table 1 shows that among the 300 prescriptions, the majority of them belong to the age group 18-40 (41%), followed by the age group 41-60 (37%), age group 61-80 (20%), and the age group of>80 is (2%). Fig. 1 shows a graphical representation of the age distribution of the prescriptions included in the study.

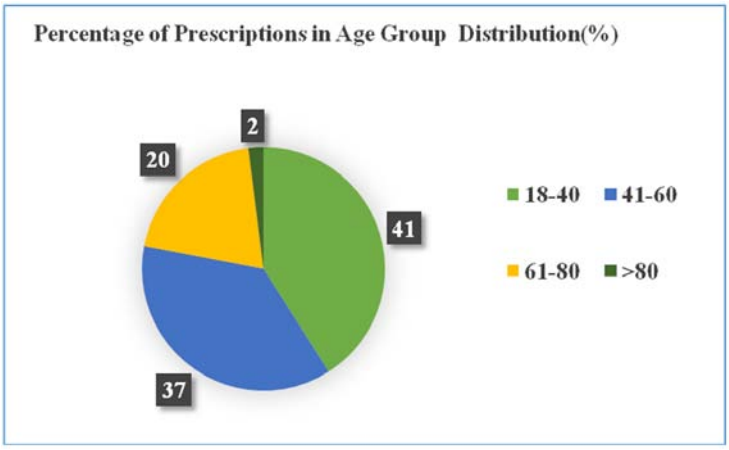

Fig. 1: Distribution of prescriptions according to age

Distribution of prescriptions according to gender

Out of the 300 prescriptions, 52.67% were male prescriptions and 47.33% were female prescriptions. Fig. 2 shows its graphical representation.

Prescribing indicators

In 300 prescriptions, a total of 2,468 drugs were prescribed, with an average of 8.2 drugs per prescription. A total of 719 antibiotics were prescribed, with an average of 2.3 per

prescription. Out of 719 antibiotics prescribed, 74% were prescribed from the WHO model list of essential drugs, 6% were prescribed by generic name, and 96% of prescriptions containing antibiotics were in injection form. The results are shown in table 2.

Distribution of most commonly prescribed antibiotics

In this study population, ceftriaxone (30.32%) was the most frequently prescribed antibiotic, and cefotaxim (0.83%) was the least prescribed antibiotic. The results are shown in table 3.

Distribution of class of antibiotics

In this study population, cephalosporins 320 (44.51%) were the most frequently prescribed antibiotic, followed by tetracyclines 102 (14.19%) and glycopeptides 1 (0.14%) were the least prescribed antibiotic. The results are shown in table 4.

Distribution of dosage form of antibiotics

From the data analyzed, we have found that injections 366 (50.9%) were predominantly prescribed over tablets 353 (49.1%). The results are shown in table 5.

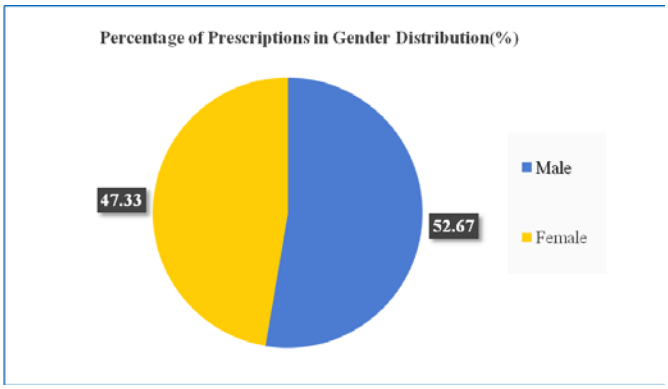

Fig. 2: Distribution of prescriptions according to gender

Table 2: Prescribing indicators

Prescribing indicators	Total drugs/Prescriptions	Average/Percent
Average number of drugs per prescription	2,468	8.2
Average number of antibiotics per prescription	719	2.39
Percentage of antibiotics prescribed from the EDL	532	74%
Percentage of antibiotics prescribed by generic name	44	6%
Percentage of prescriptions with an injection prescribed	288	96%

Table 3: Distribution of most commonly prescribed antibiotics

Antibiotics	Frequency	Percentage (%)
Ceftriaxone	218	30.32
Doxycycline	102	14.19
Cefpodoxime Proxetil	84	11.68
Azithromycin	69	9.6
Piperacillin+Tazobactam	56	7.79
Metronidazole	50	6.95
Amoxicillin+Potassium Clavulanate	29	4.03
Nitrofurantoin	20	2.8
Ofloxacin+ornidazole	13	1.81
Cefixime	12	1.67
Ciprofloxacin	10	1.39
cefpodoxime proxetil+Potassium Clavulanate	10	1.39
Cefotaxime+Sulbactam	7	0.97
Cefotaxim	6	0.83
Others	33	4.58
Total	719	100.0

Table 4: Distribution of class of antibiotics

Classification of antibiotics	Frequency	Percentage
Cephalosporins	320	44.51
Tetracyclines	102	14.19
Penicillins+Beta Lactam Inhibitors	85	11.82
Macrolides	71	9.87
Nitro Imidazoles	50	6.95
Cephalosporins+Beta Lactam Inhibitors	29	4.03
Nitro Furans	20	2.78
Fluoroquinolones	14	1.95
Fluoroquinolones+Nitro Imidazoles	13	1.81
Carbapenems	6	0.83
Lincomycins	6	0.83
Oxazolidinones	2	0.28
Glycopeptide	1	0.14
Total	719	100.0

Table 5: Distribution of dosage form of antibiotics

Dosage form	Frequency	Percentage (%)
Injections	366	50.9
Tablets	353	49.1
Total	719	100.0

DISCUSSION

Antibiotics are one of the most significant discoveries in the field of clinical medicine and are used extensively to treat infections. A study of antibiotic prescribing patterns is a useful tool for evaluating the appropriateness of antibiotic use. In addition, it can also help in the reduction of health care costs, reducing polypharmacy, and improving the rational use of antibiotics.

In our study, we found that out of 300 prescriptions, 158 (52.67%) prescriptions were from the male medical ward and 142 (47.33%) prescriptions were from the female medical ward. In a similar study conducted by Kumar S *et al.,* a total of 114 prescriptions were included in the study, out of which 63 (55.3%) were males and 51 (44.7%) were females [13].

In our study, prescriptions were divided into 4 groups based on different ages. Out of 300 prescriptions, the majority of them belong to the age group 18-40 (41%), followed by the age group 41-60 (37%), age group 61-80 (20%), and the age group of >80 is (2%).

The average number of drugs per prescription is 8.2, which is higher than the standard value of 1.6-1.8 drugs per prescription. The value is higher than the value arrived in the study conducted by G Chandika *et al.,* (6.54 drugs per prescription) [6]. This could be a result of the greater occurrence of co-morbid disorders, particularly respiratory and cardiovascular illnesses. A value greater than the standard level is a sign of polypharmacy, which can raise the risk of adverse drug interactions, an increase of resistance in the case of antibiotics, and a rise in healthcare expenses.

The average number of antibiotics prescribed per prescription is 2.39. The value is higher than the value arrived in the study done by Patel J *et al.,* (2 per prescription) [11]. An increase in the average number of antibiotics per prescription may increase the risk of drug interactions and may lead to adverse effects. It also increases the treatment cost and increases the chances of antibiotic resistance.

The percentage of antibiotics prescribed from the EDL is 74%, and the recommended optimal value by the WHO is 100%. The value is lower than the value arrived in the study conducted by Mathew R *et al.,* (99.41%) [12].

The percentage of antibiotics prescribed by generic name is found to be 6% which is below the WHO standard value of 100% and also very less compared to the studies conducted by Kumar S *et al.,* (12.45%) [13]. Most of the drugs are prescribed in brand names and this may be due to concerns about the quality and safety of generic drugs and due to the greater influence of drug marketing by the companies.

The percentage of prescriptions with an injection prescribed is 96%which is higher than the standard value of 13.4%-24.1% and is also higher when compared to the study conducted by Kumar S *et al.,* (50.76%) [13]. The usage of injectables has to be decreased since it comes with several disadvantages, such as infection at the injection site, an increased risk of tissue injury from local irritation, and higher therapeutic costs.

In this study, ceftriaxone is the most frequently prescribed antibiotic (30.32%) followed by doxycycline (14.19%). A similar study conducted by Shrestha B *et al.,* reported that ceftriaxone (16.8%) was the most frequently prescribed antibiotic, followed by amoxicillin (10.97%) [14].

In this study, cephalosporins are the most frequently prescribed class of antibiotics (44.51%) followed by tetracyclines (14.19%). A study conducted by Patel A *et al.,* reported that cephalosporins (54.87%) were the most frequently prescribed class of antibiotics, followed by penicillins (10.97%) [7]. A similar study was conducted by Ahmad A *et al.,* in Karnataka, in which cephalosporins (62.5%) followed by fluoroquinolones (16.5%) were the most frequently prescribed class of antibiotics [1].

In this study, injections are the most frequently prescribed dosage form of antibiotics (50.9%) followed by tablets (49.1%). A similar study conducted by G Chandika *et al.,* reported that injections (73.08%) were the most frequently prescribed dosage form, followed by tablets (0.7%) [6].

Our study result is concordant and the common conclusions arrived with the above-mentioned studies.

CONCLUSION

The conclusions of this study indicate that the prescription pattern was not optimal compared to the recommended values of the WHO core prescribing indicators. The prescribing practices were not appropriate as they consisted of polypharmacy, lesser prescription by generic name, and parenteral route of administration as the predominant route over the oral route. Prescribing drugs in the EDL was not a problem in this study, though there was a slight deviation in comparison to the standard values suggested by WHO. The prescription pattern can be improved by prescribing the least number of drugs in their generic name and from the EDL. Prescribing indicators suggested by the WHO can help physicians give better patient care and also improve quality of life. We recommend utilization of clinical pharmacy services to increase patient-related health outcomes and it also decreases the economic burden of the patient. Hence, there is a need to implement the standards of antibiotic guidelines prescribed rational therapy for better patient health.

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AUTHORS CONTRIBUTIONS

Literature search, design, data acquisition, statistical analysis, manuscript preparation, and editing: Vineel B J. Literature search, design, data acquisition, and editing: Sathish P M. Supervisor, and manuscript review: Dr. Yogananda R.

CONFLICTS OF INTERESTS

Declared none

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