Asian Journal of Medical and Pharmaceutical Sciences
ISSN: 2348-0165
Journal Home Page: www.pharmaresearchlibrary.com/ajmps

A Prospective Study on Assessment of Antimicrobials Prescribing Pattern in Various Departments of Tertiary Care Hospital

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A B S T R A C T

Microorganisms include bacteria, viruses, protozoan's, and fungi such as mold and mildew.[1] You may find antimicrobial products in your home, workplace, or school. The U.S. Environmental Protection Agency (EPA) regulates antimicrobial products as pesticides, and the U.S. Food and Drug Administration (FDA) regulates antimicrobial products as drugs/antiseptics. As pesticides, antimicrobial products are used on objects such as countertops, toys, grocery carts, and hospital equipment. As antiseptics, antimicrobial products are used to treat or prevent diseases on people, pets, and other living things. The proper understanding of prescribing pattern of antibiotics and prescribing the frequency of antibiotics on patient demographics would able to make the rational use of antibiotic agents in the hospitals. High efforts must needed to prescribe antibiotics on bacteriological basis should be encouraged. So evidence based prescribing should be practice for improved results of treating critical conditions and infections. Proper antibiotic stewardship guidelines practice should be followed up to identify the problem of antibiotic drug resistance which is raising more due to inappropriate use of these drugs. The current study has provided a outline information regarding appropriateness of prescribing pattern of anti microbial agents in terms of indications and appropriateness.

Keywords: Microorganisms, bacteria, viruses, protozoan's, and fungi, Food and Drug Administration

A R T I C L E I N F O

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A R T I C L E H I S T O R Y: Received 11 Dec 2021, **Accepted** 28 Feb 2022, **Published Online** 24 March 2022

Citation: *Amara Swathi, et al. Synthetic vaccine*. A Study on Identification of clinical diagnosed cases and analysis of prescribing Pattern of drugs in Ophthalmology Department of a Tertiary care Hospital *A. J. Med. Pharm, Sci.*, 2022, 10(1): 20-24.

C O N T E N T S

1. Introduction

Antimicrobial products kill or slow the spread of microorganisms. Microorganisms include bacteria, viruses, protozoan's, and fungi such as mold and mildew.[1] You may find antimicrobial products in your home, workplace, or school. The U.S. Environmental Protection Agency (EPA) regulates antimicrobial products as pesticides, and the U.S.

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Mechanisms of resistance to antibacterial agents

Efflux pump

An antibacterial agent can be effective upon reaching the specific site of action and accumulate at specific concentrations. Efflux pumps (EPs) act as an export or efflux system that can cause resistance to the wide ranges of antibacterial agents. Throughout this mechanism, the antibacterial agent is pumped out faster than the time it requires to be diffused in bacterial cell and consequently, the intrabacterial concentration becomes much less than the effective value.

Structural modification of porins

Intracellular access of an antibiotic can be restricted by the reduction of antibiotics influx. Influx is mainly controlled by porins which are proteins able to form water-filled open channels that allowing the passive transportation of molecules across lipid bilayer membranes. So, porins can be considered as potential targets for bactericidal compounds especially for Gram-negative bacteria.

Destroying the antibacterial agents

The second strategy of bacterial resistance is the chemical degradation of antibiotics or antibacterial agents, in which unlike the previous one, the aim is to change the chemical formula. The classic degradation is mediated by attacking the hydrolytic enzyme, β-lactamase, to the β-lactam ring of penicillins, cephalosporins and carbapenems.

Modification of antibiotics

Other classes of antibiotics, such as aminoglycosides, represent another mechanism of resistance with respect to the previous ones. These antibacterial agents are deactivated through the modification of functional groups at three sites by utilizing three kinds of modifying enzymatic.

Antimicrobial Dosing

Most antimicrobial drugs express their effect either through being static (e.g. bacteriostatic) or cidal (bactericidal). Static drugs stop the organism from growing but do not necessarily kill it; cidal drugs generally kill the microorganism at concentrations that can be achieved clinically. Antimicrobials may also be concentration or time-dependent. Concentration dependent drugs usually have a longer action, and many are taken up by the target organism.

Antimicrobial Policies

All healthcare organisations should have an antimicrobial policy, which aims to guide clinicians as to the best and most rational use of these drugs. Such policies have a number of aims, specifically to:

- Ensure that a sufficient range of antimicrobials remain available
- Guide prescribing
- Avoid their unnecessary use
- Reduce the emergence and spread of resistance
- Promote good practice
- Contain costs

Risks of Antimicrobials

Inhibition of Biogas Production

Following the wide use of antimicrobial drugs in intensive animal production for growth promotion and prevention or treatment of disease, a large proportion of ingested drugs are excreted in manure and end up with livestock wastewater. Excreted antibiotics in the environment may partially inhibit methanogenesis in anaerobic waste-storage facilities, commonly used at Concentrated Animal Feeding Operation (CAFOs), and thus, decrease the rate at which bacteria metabolize animal waste products (Loftin et al., 2005, Sarmah et al., 2006).

2. Methodology

This is a prospective study was performed for a period of 6 months. The study was conducted in General surgery department in a tertiary care hospital. A written informed consent form was obtained from the study patients. A sample size of 285 patients was enrolled in the study.

Study Design: It was Prospective observational study.

Study Period: The Present study was conducted for a period of six months from January 2021 to June 2021.

Study site: The Present study was conducted in General surgery department.

Sample size: It was 285 Patients.

Type of study Patients: Out patients.

Inclusion criteria

- Patients with age of more than 18 years.
- Patients who are willing to participate in the study.
- Patients diagnosed with various infections in general surgery department.
- Patients who are prescribed with medications

Exclusion criteria

- Patients who are not willing to give consent
- Pregnancy
- Cognitive impairment
- Patients with improper diagnosis details
- Lactation

Institutional ethics committee (IEC) consideration:

The research protocol was approved by ethical committee. The institutional ethical committee clearance was obtained from institutional human ethics committee permitted to perform the research in the general surgery department.

Patient data collection:

The patient data collection form was created with assistance of physician, teaching faculty of pharmacy practice to collect the data from medication charts. The data collection tool includes information concerning about age, sex, past medical history, and treatment. The information about drugs details, dose and frequency of administration and duration of therapy was collected from treatment chart.

Statistical analysis: SPSS software was used for analysis and measurement data are expressed as the mean ± standard

deviation. Measurement data are expressed as a percentage, the comparison of sample rates was performed by the χ2 test. P<0.05 was considered to indicate a statistically significant difference.

3. Results and Discussion

Table 1: Age

In our study 25-35 years age patients were 39(28.88%), 36-45 age patients were 57 (42.22%), 46-55 age patients were 9(6.66%), 56-65 age patients were 30 (22.22%).

S.No	Age	Total N=135	Percentage (%)
1.	25-35	39	28.88
2.	36-45	57	42.22
3.	46-55	9	6.66
4.	56-65	30	22.22

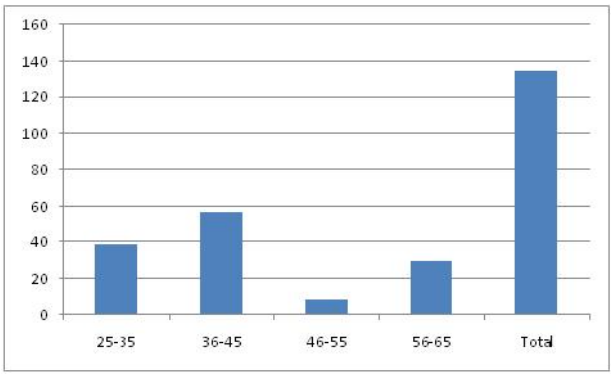

Figure 1: Age

Table 2: Gender:

In our study male patients were 98 (72.59%) and female patients were 37(27.40%).

S.No	Gender	Total N=135	Percentage (%)
1	Male	98	72.59
2	Female	37	27.40

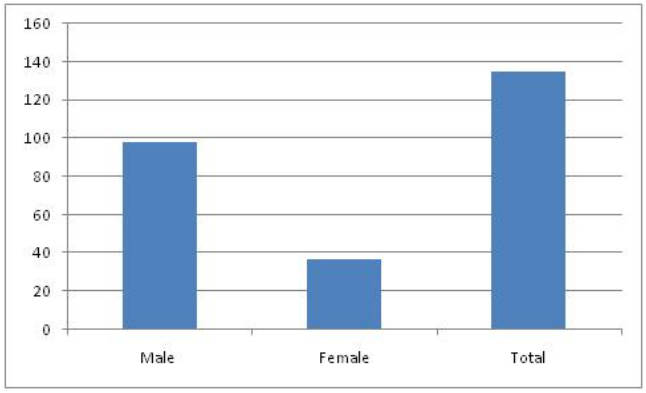

Figure 2: Gender

Table 3: BMI

BMI of study patients includes <18.5kg/cm2 BMI patients were 78(57.77%), 18.5 -24.9 kg/cm2 patients were 33(24.44%), 25-29 kg/cm2 patients were 19(14.07%), >30kg/cm2 patients were 5 (3.70%).

S.No	BMI	Total N=135	Percentage (%)
1.	<18.5kg/cm2	78	57.77
2.	18.5 -24.9 kg/cm2	33	24.44
3.	25-29 kg/cm2	19	14.07
4.	>30kg/cm2	5	3.70

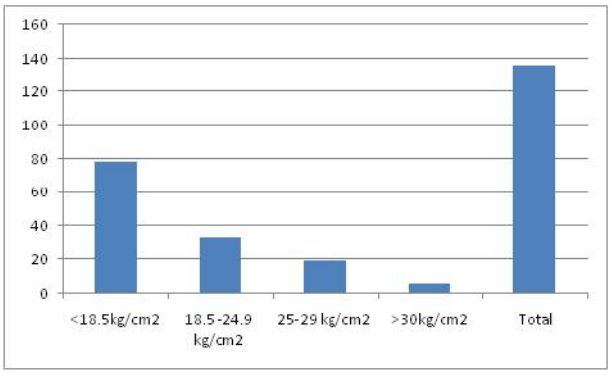

Figure 3: BMI

Table 4: Diet

Vegetarian patients were 109(80.74%) and non vegetarian patients were 26(19.25%).

S.No	Diet	Total N=135	Percentage (%)
1.	Vegetarian	109	80.74
2.	Non Vegetarian	26	19.25

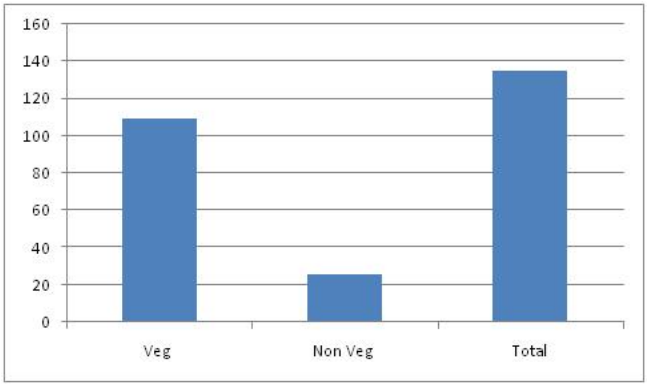

Figure 4: Diet

Table 5: Education

The education levels of study subjects include primary education patients were 57 (42.22%), secondary education patients were 69(51.11%), graduation education qualification patients were 9 (6.66%).

S.No	Education	Total N=135	Percentage (%)
1.	Primary	57	42.22
2.	Secondary	69	51.11
3.	Graduation	9	6.66

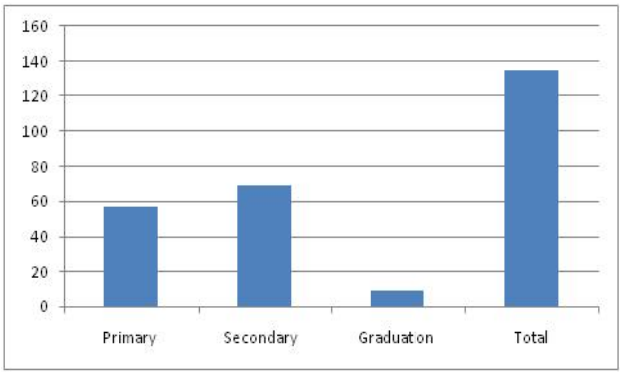

Figure 5: Education level

Table 6: Work experience

1-4 years of work experience patients were 67(49.62%), 5-8 years of work experience patients were 47(34.81%), 9-12 years of work experience patients were 21 (15.55%).

S.No	Work experience	Total N=135	Percentage (%)
1.	1-4	67	49.62
2.	5-8	47	34.81
3.	9-12	21	15.55

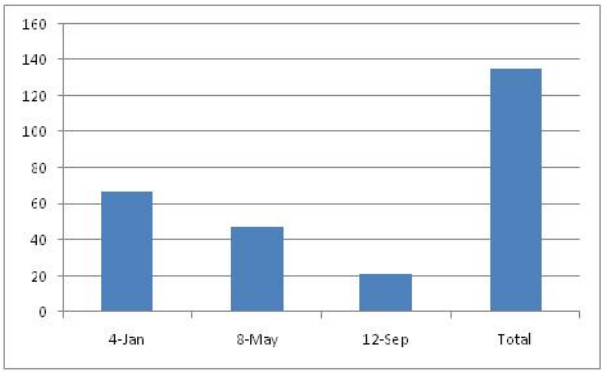

Figure 6: Work experience

Table 7: Marital status

Marital status of study patients includes single patients were 114 (84.44%), and married patients were 21 (15.55%).

S.No	Marital status	Total N=135	Percentage (%)
1.	Single	114	84.44
2.	Married	21	15.55

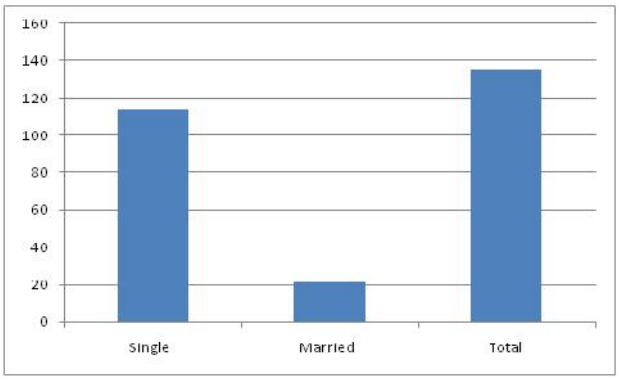

Figure 7: Marital status

Discussion

- In our study 36-45 age patients were 57 (42.22%) more as compared to other age groups.
- The male patients were more 98(72.59%) as compared to female patients.
- In our study <18.5kg/cm2 BMI patients were more 78(57.77%) as compared to other BMI categories.
- Vegetarian patients were more 109(80.74%) as compared to non vegetarian patients.
- Secondary education patients were more 69(51.11%) as compared to other education levels.
- 1-4 years of work experience patients were more 67(49.62%) as compared to other work experiences.
- Single patients were more 114 (84.44%) as compared to other marital status of study patients.
- Antimicrobial agent's utilized appropriate prescriptions were more 119 (88.14%) as compared to inappropriateness in the prescriptions.
- In our study 3-4 antimicrobial agents prescriptions was more 69 (51.11%) as compared to other category of antimicrobial agents.
- In our study tablet dosage forms were more 58(42.96%) as compared to other dosage forms.
- In our study urine culture done samples were more 59 (43.70%) as compared to other laboratory tests.
- Diabetes mellitus comorbid condition patients were more 44 (32.59%) as compared to other co morbidities.
- Beta lactams was 29(21.48%) prescribed more as compared to other category of antimicrobial agents.

4. Conclusion

The current study has provided a outline information regarding appropriateness of prescribing pattern of anti microbial agents in terms of indications and appropriateness. Anti microbial policy could be a helpful tool for the health-care institutions to reduce inappropriate antimicrobial use, improve patient outcomes in terms of morbidity and mortality, and reduce adverse consequences of antimicrobial use. Health-care professionals, especially clinicians, need to adhere to antimicrobial guidelines for preserving the effectiveness of the current antimicrobials. High efforts must needed to prescribe antibiotics on bacteriological basis should be encouraged. So evidence based prescribing should be practice for improved results of treating critical conditions and infections. Proper antibiotic stewardship guidelines practice should be followed up to identify the problem of antibiotic drug resistance which is raising more due to inappropriate use of these drugs.

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