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A Study on Prescribing Patterns of Antibiotics based on Culture Sensitivity Tests

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ABSTRACT

Inappropriate and long term usage of antibiotics leads to development of antibiotic resistance, adverse drug reaction and sometimes leads to morbidity and mortality. One of the methods to reduce antibiotic resistance is culture and sensitivity method. The objective of the study is to obtain information on antibiotic prescribing pattern and the sensitivity and resistant pattern of organisms that commonly cause infections in the patients. Among 150 patients with culture sensitivity tests from general surgery and pulmonology, 59% of males are more prone to infection than females with 41%.Patients of age group 55-65 yrs are more prone to infection, in both males and females due to their compromised immune system. Klebseilla pneumonia is the commonly isolated gram negative organism which is sensitive to 8 tested antibiotics and resistant to 11 antibiotics. Cefoperazone+-sulbactum is the commonly prescribed antibiotic for patients during their hospital stay. There is decrease in the duration of hospital stay of patients after they have undergone for culture sensitivity tests. Our study mainly concluded on the importance of culture sensitivity tests, by these rational antibiotics can be prescribed. So, the duration of hospital stay is decreased that indirectly leads to decrease in economic burden on the patients.

INTRODUCTION

Antibiotics are frequently used among patients in many clinical conditions which is an irrational practice and is still common in many countries. In most of the hospitals conventional antibiotic therapy is given for 7–10 days to the patients. As a common practice, surgeons neither act in accordance with the short term courses of antibiotic prophylaxis before surgery nor do they avoid the use of broad spectrum antibiotics unnecessarily [1]. Inappropriate prescriptions, including antibiotic choice, dose, frequency and duration intended at unnecessary prophylaxis can increase the risk of adverse drug reactions, which may lead to the occurrence of resistant organisms, un-necessary therapy cost and waste of health care resources [11]. Several management strategies have been developed to control this problem of inappropriate prophylactic antibiotic usage. In this regard, pharmacist, being a vital member in the antibiotic management team could play a significant role in controlling inappropriate use of antibiotics [10]. Furthermore, studies have also shown that the pharmacist directed drug utilization evaluation (DUE) strategy can promote rational use of antibiotic prophylaxis in hospital settings with significant decrease in antibiotic costs [12]. Antibiotics have been widely used in human medicine for more than 50 years either as prophylaxis or therapeutics, with tremendous benefits to human health. Unfortunately, widespread use, misuse or inappropriate prescribing has resulted in the emergence of drug resistant bacteria [5]. Antibiotic resistance is a worldwide public health concern. Studies have reported a positive relationship between antibiotic utilization and the level of antibiotic resistance [6]. The number of infections due to antibiotic-resistant bacteria is growing at which new classes of antibiotics are discovered and synthesized [3].

Antibiotic resistance is also a obstacle to public health efforts in the control of infectious diseases through specific disease control programmes that depend on the use of antibiotics as a strategy for control and prevention. Appropriate use of antibiotics helps to prevent the persistent increase in resistance. Infections with drug-resistant bacteria have increased not only morbidity and mortality but also duration of hospitalization and cost of treatment. When infections become resistant to first-line antibiotics, more expensive second-line therapies must be used, resulting in a longer duration of illness and treatment in hospitals which often increases health care costs as well as the economic burden [8].As the intensity of care needed by patients with infections caused by drug resistant bacteria is different from that in patients with infections caused by drug sensitive bacteria[4].According to WHO reports, less than 40% and 30% of patients in public and private facilities respectively are treated under WHO guidelines [7]. To safeguard rational drug prescription,

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prescribers must adhere to treatment guidelines and must also follow a standard process of prescribing [2]. Unfortunately, prescribers often use broad spectrum antibiotics to manage suspected cases of both gram positive and gram negative bacterial infections and in some cases, antibiotics are prescribed for conditions not requiring antibiotic treatment [9].

METHODOLOGY

Study design: A Prospective observational study

Study place: This study was carried out in general surgery and pulmonology departments of Santhiram Medical College and General Hospital, Nandyal.

Study period: A period of 6 months

Sample size: The total sample size was approximately 150 patients.

Inclusion criteria: This study includes patients of age group above 25 yrs and patients who are admitted in inpatient ward with culture sensitivity reports.

Exclusion criteria: This study excludes patients who are pregnant and nursing mothers.

Data collection: The data was collected from case sheets from culture sensitivity reports and antibiotic prescription. The necessary information was collected from patients by using patient data profile form.

RESULTS & DISCUSSION

A prospective observational study was conducted for a period of 6 months from December to May 2021 in general surgery and pulmonology departments at a tertiary care teaching hospital, Nandyal. Based on the age wise distribution, patients of age group 56-65 are more prone to infections in both male and females depicted in Fig 1.

Based on the Antibiotics prescribed during hospital stay, 45.3% patients are prescribed with cefoperazone+sulbactum (cephalosporin) and 2% of patients are prescribed with Amphicillin+cloxacillin (Pencillins) depicted in Fig 2.

Organisms	No. of patients	Percentage (%)
Klebseilla pneumonia	46	30.6
Staphylococcus aureus	23	15.3
Pseudomonas aeroginosa	22	14.6
Escherichia coli	15	10
Klebseilla oxitoca	10	6.6
Enterococcus	10	6.6
Moraxella	9	6
Acenetobacter	9	6
Proteus vulgaris	8	5.3
Streptococcus pneumonia	8	5.3

Table 1: Common microorganisms isolated in the patients based on Culture sensitivity tests.

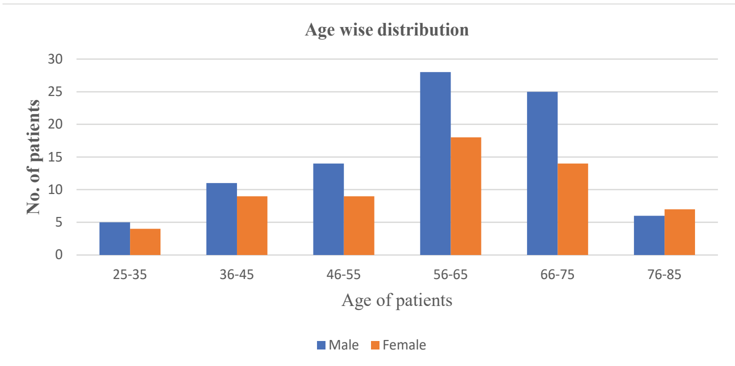

Figure 1: Age wise distribution of patients.

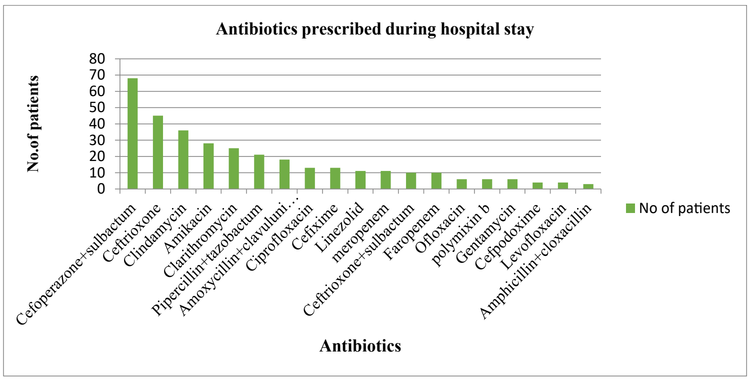

Figure 2: Antibiotics prescribed during the hospital stay.

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Antibiotics	Klebseilla pneumonia (n =46)	Staphylococcus aureus (n =23)	Pseudomonas aeroginosa (n =22)	E coli (n =15)	Klebseilla oxitoca (n =10)	Enterococcus (n =10)	Moraxella (n =9)	Acenetobacter (n =9)	Proteus vulgaris (n =8)	Streptococcus pneumonia (n =8)
Pencilling g	0	0	0	0	0	0	0	0	0	0
Amphicillin	0	0	0	0	0	4(2.6%)	0	2(1.3%)	0	0
Amoxicillin+clavulanic acid	0	10(6.6%)	0	0	0	4(2.6%)	0	4(2.6%)	0	4(2.6%)
Pipercillin+tazobactum	4 (2.6%)	0	15(10%)	0	8(5.3%)	0	0	6(4%)	6(4%)	4(2.6%)
Ceftotaxime	0	0	2(1.3%)	0	12(8%)	0	6(4%)	4(2.6%)	0	4(2.6%)
Ceftazidime	0	0	12(8%)	0	0	0	0	0	0	0
Cefixime	0	0	0	0	0	0	0	0	0	4(2.6%)
Cefoperazone+sulbactum	30(20%)	0	10(6.6%)	0	10(6.6%)	0	0	0	6(4%)	4(2.6%)
Ceftrioxone	0	0	6(4%)	0	0	0	4(2.6%)	0	0	0
Gentamycin	19(12.6%)	15(10%)	20(13.3%)	6(4%)	10	0	2(1.3%)	6(4%)	0	4(2.6%)
Clarithromycin	0	0	0	0	0	0	0	0	0	0
Amikacin	15(10%)	0	26(17.3%)	8(5.3%)	8(5.3%)	0	0	4(2.6%)	0	0
Ciprofloxacin	20(13.3%)	14(9.3%)	24(16%)	0	10	6(4%)	6(4%)	0	0	4(2.6%)
Sparfloxacin	14(9.3%)	2(1.3%)	2(1.3%)	0	6(4%)	0	0	0	0	0
Levofloxacin	0	0	0	0	0	0	0	2(1.3%)	0	0
Azithromycin	0	0	0	0	0	0	6(4%)	0	0	0
Impinem	9(6%)	0	20(13.3%)	10(6.6%)	10(6.6%)	0	2(1.3%)	8(5.3%)	6(4%)	0
Linezolid	0	15(10%)	0	0	0	4(2.6%)	0	0	0	4(2.6%)
Clindamycin	0	12(8%)	0	0	0	0	0	0	0	4(2.6%)
Tetracycline	17(11.3%)	0	2(1.3%)	8(5.3%)	2(1.3%)	0	0	2(1.3%)	4(2.6%)	0

Table 2: Sensitivity pattern of isolated organism to tested antibiotic.

Antibiotics	Klebseilla pneumonia (n =46)	Staphylococcus aureus (n =23)	Pseudomonas aeroginosa (n =22)	E coli (n =15)	Klebseilla oxitoca (n =10)	Enterococcus (n =10)	Moraxella (n =9)	Acenetobacter	Proteus vulgaris (n =9)	Streptococcus pneumonia (n =8)
Pencillin g	0	14(9.3%)	2(1.3%)	0	0	10	2(1.3%)	0	0	8(5.3%)
Amphicillin	8(5.3%)	0	0	12(8%)	4(2.6%)	6(4%)	4(2.6%)	6(4%)	6(4%)	8(5.3%)
Amoxicillin+clavulanic acid	17(11.3%)	0	0	0	0	0	4(2.6%)	2(1.3%)	6(4%)	4(2.6%)
Pipercillin+tazobactum	29(19.3%)	0	15(10%)	10(6.6%)	1([6.6%)	0	2(1.3%)	2(1.3%)	4(2.6%)	0
Ceftotaxime	30(20%)	0	2(1.3%)	2(1.3%)	0	0	2(1.3%)	0	6(4%)	0
Ceftazidime	35(23.3%)	0	15(10%)	6(4%)	0	0	2(1.3%)	4(2.6%)	6(4%)	0
Cefixime	0	0	0	0	0	0	0	0	0	0
Cefoperazone+sulbactum	0	0	4(2.6%)	10(6.6%)	0	0	0	0	0	0
Ceftrioxone	6(4%)	0	2(1.3%)	0	0	0	0	0	0	0
Gentamycin	8(5.3%)	8(5.3%)	6(4%)	2(1.3%)	0	0	0	2(1.3%)	6(4%)	0
Clarithromycin	0	0	0	0	0	0	0	0	0	0
Amikacin	2(1.3%)	0	0	0	0	0	0	0	6(4%)	0
Ciprofloxacin	17(11.3%)	10(6.6%)	6(4%)	6(4%)	0	0	0	4(2.6%)	0	4(2.6%)
Sparfloxacin	15(10%)	6(4%)	6(4%)	4(2.6%)	0	0	0	4(2.6%)	0	0
Levofloxacin	2(1.3%)	0	4(2.6%)	0	0	0	0	0	0	0
Azithromycin	0	0	0	0	0	10(6.6%)	2(1.3%)	0	0	4(2.6%)
Impinem	0	0	2(1.3%)	0	0	0	0	0	0	0
Linezolid	0	0	0	0	0	0	0	0	0	0
Clindamycin	0	2(1.3%)	0	0	0	4(2.6%)	2(1.3%)	0	0	0
Tetracycline	0	0	0	0	0	0	0	0	0	0

Table 3: Resistant pattern of isolated organism to tested antibiotics.

Based on the common organisms isolated in the patients based on culture sensitivity tests, Klebseilla pneumonia is the most common isolated organism that causes infections in population.

Based on Sensitivity and resistance pattern of antibiotics prescribed in the hospital, Gentamycin is the most sensitive antibiotic in most of the organisms and Amoxicillin+clavulanic acid is the most resistant antibiotic in morenumber of organisms depicted in Fig 3.

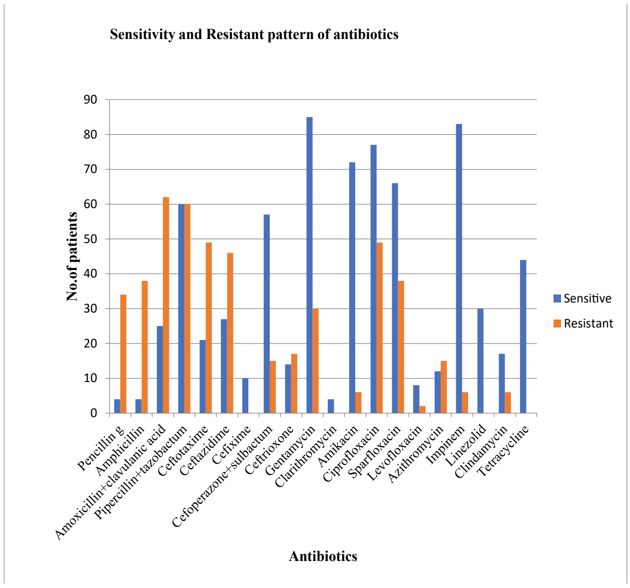

Figure 3: Sensitivity and resistance pattern of antibiotics prescribed in the hospital.

Based on the sensitivity pattern isolated organisms to tested antibiotics of Pseudomonas aeroginosa is sensitive to more number of antibiotics represented in Table 2.

Based on the resistant patterns, isolated organisms tested to antibiotics, klebseilla pneumonia and Pseudomonas aeroginosa are resistant to more number of antibiotics represented in Table 3.

CONCLUSION

Our study focused on the importance of culture sensitivity tests. By this test there is identification of organism that is responsible for causing the infection in patients and their sensitivity and resistant pattern. Our study concludes that rational antibiotics are prescribed. So that the duration of hospital stay is decreased which gives early recovery from the disease which leads to decrease in economic burden on the patients.

Conflict of Interest

None

Funding

None

Ethical Committee Approval

The present study was conducted in Santhiram Medical College and General Hospital, Nandyal after the approval of Institutional Human Ethics Committee at Santhiram Medical College and General Hospital, Nandyal, this study was initiated.

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