Prescribing Pattern Of Antibiotics In A Medicine ICU Of A Tertiary Care Hospital In North-East India: A Cross-Sectional Study

Sumili Debbarma [1], Debasis Ray [2] , Arindam Roy[3]

[1](Post Graduate Student, Pharmacology Department, Agartala Govt. Medical College, India)
[2](Professor & Head, Pharmacology Department, Agartala Govt. Medical College, India)
[3](Post Graduate Student, Pharmacology Department, Agartala Govt. Medical College, India)

Abstract:

Introduction: *Rationale Use Of Antibiotic Is The Most Imperative Component Of Antibiotic Stewardship Program. In India, The Prevalence Of Use Of Antibiotics Varies From 24% To 67%. Moreover, The Evidence Of Antibiotic Prescribing Pattern In Critical Care Unit Using WHO Core Indicators Is Scarce In This Part Of India. Hence The Study Is Conducted To Evaluate Antibiotic Use Pattern In ICU Of A Tertiary Care Center, AGMC Using Standard Tool.*

Methodology: *A Cross-Sectional Study Was Conducted In Intensive Care Unit Of General Medicine Department Of Agartala Government Medical College, Tripura From March To April, 2023 Among The Patients Admitted In ICU More Than 24 Hours. Descriptive Statistic Like Mean, Standard Deviation, Percentage And Frequency Were Used To Expressed The Study Findings. SPSS Version 21.0 Was Used To Analyzed The Data.*

Results: *Total 50 Patients Were Included In The Study With The Mean Age Of 58 ± 6.7 Years. The Average Use Of Antibiotic Per Prescription Was 1.26. 90% Of The Prescription Are In Generic Name. 100% 0f The Antibiotics Are Given In Injection Form And 98% Of The Prescription Followed NLEM/Essential Drug List Guideline. Meropenem Was Prescribed In 34% Of The Patients Of ICU Followed By Pipzo (32%). 74% Of The Patients Are Prescribed Single Antibiotic.*

Conclusion: *The Study Concluded That Using WHO Core Indicators For Drug Prescription, Averagely 1.26 Antibiotic Was Prescribed Per Prescription. All Antibiotics Prescribed Are In Empirical Form Which Followed NLEM Guideline. Meropenem And Pipzo Were Commoner Antibiotic Prescribed.*

Keywords*: Prescription Pattern, Antibiotics, WHO Core Indicators, NLEM Etc.*

I. Introduction

Since the advent of antibiotics and its advancement over the last century, antibiotics remain the most used as well as misused group of drugs in all over the world. Overuse leads to unnecessary expenditure on drugs, raised risk of adverse reactions, and the development of antimicrobial resistance.[1,2] It is also seen that inappropriate prescribing habits lead to ineffective and unsafe treatment, worsening of disease and increment of health care costs.[3] India tops the list of countries that has high antibiotic resistance and it also leads the world in the antibiotic consumption per person as there is rampant use of broad-spectrum penicillin, which are cheap and easily accessible.[4] In India, the prevalence of use of antibiotics varies from 24% to 67%. According to a study, the 75% of the antimicrobial prescriptions each year and is the most frequent reason for seeking medical attention.[5] A study conducted by Kaur et al in-triage area of emergency unit of a tertiary care hospital, where patients were screened for antibiotic prescription including dosage, duration and frequency of antimicrobial administration. Out of 517 screened patients, 300 were prescribed antimicrobials. Out of 29 antibiotics prescribed, 12 were prescribed in more than 90% of patients. Broad spectrum antibiotics accounted for 67.3% of prescriptions.[6] As per a study in Saudi Arabia over 36,069 patients with complaint of infection were shown that the average number of drugs per encounter was 1.26, while the percentage of encounters with a prescribed antibiotic was 17.6%. Among antibiotic prescriptions, injection antibiotics was 15.2%. Almost 77% of antibiotics were prescribed by their generic names, and the percentage of antibiotics prescribed from the essential list was 100%.[7] An Ethiopian study also found that overall, 60.6% of inpatients were prescribed at least one antibiotic, with an average (mean ± SD) number of antibiotics prescribed per patient of 1.7 ± 1.6. During their hospital stay, patients were given antibiotics for an average (mean ± SD) of 6.4 ± 2.7 days. Furthermore, 83.3% of antibiotics were prescribed for therapeutic purposes, whereas 100% were provided for empiric

purposes. Ceftriaxone was the most commonly administered antibiotic in the study settings (49.2%). During the study period, Debre Tabor comprehensive specialized hospital had access to 67.5% of key antibiotics.[8] A study conducted a tertiary care government hospital in Delhi over a period of 4 months found that staphylococcus aureus and Klebsiella species were the most common organism (23%). Among patients where causative organism was isolated, two or more organisms were isolated from 50% of the samples. Most of the Klebsiella species and Acinetobacter species were resistant to beta lactam group of antibiotics such as cephalosporins and piperacillin-tazobactam. 60% of isolates of S. aureus were found to be MRSA while none of the S. aureus were resistant to linezolid and vancomycin. All patients were prescribed two or more antimicrobials while 66% patients were prescribed 3-5 antimicrobials. The commonest combination was beta lactam with metronidazole followed by levofloxacin with metronidazole with addition of aminoglycosides or linezolid as third drug. Total 20 antimicrobial agents were used in the treatment of the patients. Among this consumption (in DDD/100bed days) of metronidazole was highest (100%) followed by fluconazole (76.6%) and levofloxacin (62.7%).[9] Similarly Mahendra et al[10] Piperacillin-tazobactam was most common empirical antibiotic used. 60% was found to be resistant to piperacillin-tazobactam. Acinetobacter baumanii was the most common organism isolated (29.2%) and was highly resistant to Carbapenem (60%). Klebsiella pneumoniae was resistant to Amikacin (45%), piperacillin (55%) and Ceftazidime (50%). Invariably drug prescribing pattern were varied in around the globe. Moreover, data on prescribing pattern of antibiotics in North-East region is scanty especially where ICU setup are running. To optimize the antibiotic utilization and reduce its resistance rate it is necessary to evaluate the antibiotic use pattern and identify its flaws if any. Therefore, this study was conducted to analyze the prescribing pattern and contribute to the existing knowledge of antibiotic use using WHO core prescribing indicators.[11]

II. Material And Methods

A descriptive, cross-sectional study was conducted at Pharmacology Department in collaboration of Intensive care unit of General Medicine Department of Agartala Government Medical College from March to April, 2023 among the patients admitted in ICU more than 24 hours. All Patients 18 years and above admitted during the study periods were included irrespective of the diagnosis and participants were selected conveniently. Data were collected using a case record form including WHO core indicators[11] and analyzed using SPSS version 21.0. Descriptive statistic like mean, standard deviation, percentage and frequency were used to expressed the study findings. Ethical approval taken Institutional Ethics Committee, Agartala Govt Medical College. Informed consent and gate keeper consent were taken.

III. Result

Total 50 patients admitted in ICU of Medicine department of AGMC were consented to participated in the study. The mean age of the participants was 58 ± 6.7 years ranges from 42 years to 76 years. Sociodemographic profile was shown in table 1 where male (68%) participants were more than female (32%). The age group of elderly (70%) were more than other age group (30%). Only 18% of the patients were non-salaried and majority were studied upto matric and above (90%) and 10% of them studied upto primary level (table 1).

Table 1: Sociodemographic characteristics of the study participants (N=50)

Sociodemographic characteristics	Frequency	Percent
Mean age (years ± standard deviation)	58 ± 6.7	-
Gender		
Male	34	68
Female	16	32
Occupation		
Salaried	41	82
Non-salaried	9	18
Education		
Primary	5	10
Matriculation	23	46
Graduate & above	22	44

The reason for being admitted in the intensive care unit was cardiovascular disease and respiratory illnesses (50%) followed by CNS disease (16%), metabolic or endocrine imbalance (14%) gastro-urinary-hepatic biliary system diseases (8%) and others 12% (table 2).

Table 2: The reason of ICU care (diagnosis) (N=50)

Diagnosis	Frequency	Percent
Cardiovascular diseases	13	26
Respiratory system illness	12	24
CNS disorder	8	16
Endocrine or metabolic disease	7	14
Genito-urinary system	2	4
Hepato-biliary disease	2	4
Others	6	12

In total 63 times antibiotic were prescribed during the course of the treatment to the patients admitted in the ICU. Others drugs prescribed were 165 times. The most common antibiotic prescribed was meropenem (34%) followed by piperacillin & tazobactam combination (32%), ceftriaxone (28%), Doxycycline (24%), levofloxacin (8%) and cefoperazone (4%) (table 3).

Table 3: Pattern and number of antibiotics prescribed

Antibiotics	Frequency	Percent
Meropenem	17	34
Piperacillin + tazobactam	16	32
Ceftriaxone	14	28
Doxycycline	12	24
Levofloxacin	4	8
Cefoperazone	2	4

As per World Health Organization (WHO) guideline, the antibiotic prescription pattern in the study were given in table 4 where the study findings shown that the average number of prescribed per patient is 1.26. Percentage of antibiotic prescribed in generic name is 90% (61 out of 65 antibiotics prescribed). Out of 65 antibiotics prescribed 64 (98%) means one drug was not prescribed from National List of Essential medicine (NLEM). All antibiotic prescriptions were in the form injection. Among the participants, single antibiotic use to 74% and 26% of them were prescribed two or more antibiotics (figure 1).

Table 4: Antibiotic prescription pattern as per WHO core indicators for antibiotic.

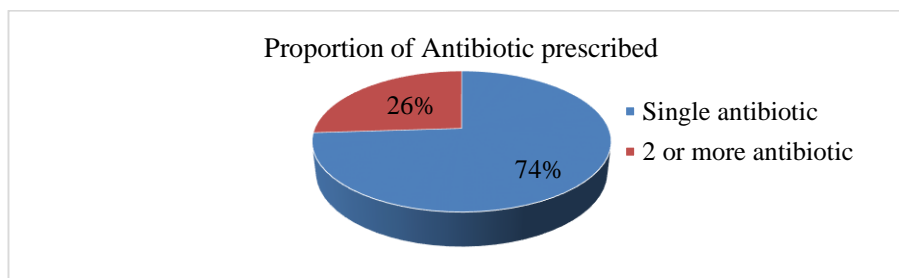| WHO core indicator	Percentage of prescription
Average number of drugs per prescription	4.81
Average number of antibiotics prescribed per patient	1.26
Percentage of antibiotic prescribed in generic name	90
Percent of antibiotic per prescription	100
Percent of antibiotic prescribed as EDL/NLEM	98
Percent of prescription with atleast on injection	100

Figure 1: Proportion of number of antibiotics prescribed (N=50)

IV. Discussion

In this study, the prescribing pattern of antibiotics in Medical intensive care unit of General medicine, Agartala Government College was analyzed using WHO prescribing indicators. In present study all patients (100%) were prescribed antibiotics irrespective of diagnosis and indications. The percentage was higher than the WHO's15 recommended range of 20–25.4%. 16 On the other hand, our antibiotic prescribing rate was low when compared with the findings of Kaur A et al[6], Saxena S et al[9], Mahendra M et a[10]. The percentage of patients using at least one antibiotic in this study was comparable with previous literature where percentage

were ranges from 9% to 67%.[4,5,6,7,12,13,14] However, in the present study 26% of the prescription were prescribed with two or more antibiotic but majority previous articles shown higher uses of multiple antibiotics. [,7,12,13] The polypharmacy was the common phenomenon as stated in previous articles which is incorporated with the present study.[15,16,17] In this study findings shows that meropenem was the commonest antibiotic preferred in ICU setup which is strong antimicrobial beta lactum antibiotic uses in treating wide ranges of infections which are available as intravenous only. Hardly this molecule is used as first choice. But few previous studies have shown different management entity where piperacillin -tazobactum was the most preferred as per Mahendra M et al.[10] As per WHO core prescription pattern for drug use in in patients, the average numbers of drug per prescription ranges from 3.65 to 8.12 [4,5,7,8] but in the present study, the average number of drug use is 4.81. Mahendra M etl al[10], Suryawanshi S et al[13] and Soleymani F et al[15] also demonstrated similar findings. Average number of antibiotics prescribed per patient was 1.26 in present study, it is similar with a study conducted by Kaur A et al[6] - 1.7, Shah N et al[12] – 2.21, Soleymani F et al[15] – 3.38 which much higher in compare to the present study. Majority prescription used generic name while prescribing but previous literature varies 40% to 100%.[6,7,13,14,15] Higher rate of use of generic name while prescribing the drug indicates good governance or drug policy. The present study shows cent percent empirical use of antibiotic in Intensive care unit which is incorporated with a few studies conducted in the past.[6,7,9,10,12] where injection form use of antibiotics was seen ranges from 80% to 100%. Many literatures witnessed that antibiotic prescription was in line with essential drug list or NLEM which is similar to the present study where almost all prescription followed similar guideline.[8,10,12,14,16,17] The present study has few limitations as the study sample was small and study duration also short could gather few data which limit the generalizability of the study. Being single center-based study, the pattern of antibiotic use may not be true fact. However, using standard tool WHO core indicators for antibiotic prescription was the first study being conducted in this part of India which will encourage and enrich the scientific knowledge among the readers.

V. CONCLUSION

The study uses the WHO core indicators for drug prescription pattern to analyze the pattern of antibiotic use in ICU setup in this vary part of India. The findings shows that the average number of drugs per prescription is 4.81 and antibiotic use is 1.26. All antibiotic prescribed in the form empirical and almost all prescription is in generic form and it followed essential drug list. The commonest antibiotic prescribed was meropenem followed by piperacillin-tazobactam preparation. The poly-antibiotic prescription was only 1/3th of the patients. It is recommended further higher studies involving multi-center and higher sample size.

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