



A DRUG UTILIZATION STUDY OF ANTIMICROBIAL DRUGS AT TERTIARY CARE HOSPITAL SOUTHERN RAJASTHAN

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ABSTRACT

Background: Irrational usage and higher utilization of antimicrobial agents has become a major problem in all health care facilities all over the world, further give rise to “antimicrobial resistance”. Inappropriate use of antibacterial drugs may result in increased adverse drug reaction and also increase cost of treatment. The aim of the study was to evaluate and study drug utilization or drug distribution pattern of antimicrobial drugs. The objective of the study was to determine the average number of antibiotics prescribed per prescription, to evaluate the prescribing pattern and frequency, and to determine the most commonly prescribed antibiotic. **Method:** The present study was a prospective study done in general medicine ward of tertiary care teaching hospital to evaluate the utilization pattern of antibiotics. A total number of 208 patients were included in the study. **Results:** The ratio of male population is more as compared to females and most of the patients were in the age group of (61-70) years. The study report shows that most common class of antibiotics prescribed were cephalosporin (45.01%) followed by penicillin (14.74%), quinolones(13.94%), macrolides (7.56%), tetracycline's (4.38%). Study reports shows that (40.23%) of the prescription were prescribed with ceftriaxone (monocef). **Conclusion:** In this study maximum number of prescription had prescribed only one antibiotic as per W.H.O. A strict protocol for prescriber is now at utmost requirement to promote safe and rational use of antibiotic. **KEYWORDS:** Antimicrobial resistance, drug utilization evaluation, rational use, prescribing pattern, drug utilization review

INTRODUCTION

Drug utilization research has been defined by the WHO in 1977 as the study of marketing, distribution, prescription, and use of drugs in society with special emphasis on the resulting medical, economic and social consequences. Drug utilization research may provide insights into a different aspects of drug use and drug prescribing, such as a pattern of use. Drug utilization study forms an important component of many research studies which aim to examine the clinical as well as economic effects of pharmacotherapy.1 Drug utilization review also referred to be as drug utilization pattern (DUP) and drug utilization evaluation (DUE). It is defined as an ongoing, authorized, and systemic quality improvement process. . DUP involves a comprehensive review of patients' prescription and medication data before, during, and after dispensing to ensure appropriate medication decision-making and positive patient outcomes. Drug utilization patterns play a significant role in helping the health care system to understand, explain and improve the prescribing administration of the use of medications the ultimate goal is to achieve rational and effective pharmaceutical care for the general department patients.2

- **Benefits of the drug utilization review**
 - DUR helps the health care system to understand, explain and improve the prescribing.
 - DUR plays a significant role in achieve rational and effective pharmaceutical care.
 - Ensuring appropriate medication decision making.
- **Need for the drug utilization review**
 - To identify and solve adverse drug reactions.
 - To evaluate poly pharmacy.
 - Large number of medication used within a same therapeutic range.
 - Use of high cost medicines where less expensive alternatives exist.
- **Objectives of a drug utilization review**
 - For promoting optimal medication therapy.



- DUR will help in creating criteria for appropriate medicine use.
- It plays an important role in controlling pharmaceutical costs.
- To provide assurance that the pharmaceutical therapy meets current standards of care.

MATERIALS AND METHODOLOGY

STUDY SETTING: This study was conducted in the general medicine indoor patient department and outdoor patient department of a tertiary care teaching hospital in southern Rajasthan at the Ananta institute of medical sciences and research centre, Rajsamand, Rajasthan.

STUDY DESIGN: The study was planned as a prospective and observational study.

STUDY DURATION: This was a 12-week study from February 2022 to April 2022.

SAMPLE SIZE: A total of 208 patients were included in this study.

Inclusion Criteria

- ✓ Patients of all age groups (new born to 80 years)
- ✓ Patients of both gender (male and female)
- ✓ Patient who attends outpatient department
- ✓ Patients admitted to the inpatient department who will be prescribed antibiotics will be included in the study.
- ✓ Patients with any kind of infectious disease.

Exclusion criteria

- ✓ Patients in which the antibiotic is not prescribed.
- ✓ Patients with critical illness or admitted to the ICU.
- ✓ Pregnant women will be excluded from the study.

DATA COLLECTION: These following element was included in data collection -

- A brief discussion of the current illness.
- Data regarding current diagnosis and Presenting complaints.
- Demographic details about patients.
- Medical history and Investigation did previously.
- Antimicrobial doses.
- Frequency and route of drug given.
- Duration of antimicrobial use

STUDY PROCEDURE

STAGE-1

- ❖ Obtaining consent from hospital authorities.
- ❖ Obtaining clearance from ethical committee.
- ❖ Design of data collection form.
- ❖ The demographic, clinical, and therapeutic data were collected by reviewing the case notes, prescriptions of the patients, and treatment charts of the patients.
- ❖ All patients were monitored from the day of admission till the day of discharge.

STAGE-2

- ❖ During the treatment of antibiotics, the patients were evaluated clinically every day to assess the clinical outcome.
- ❖ To evaluate the rationality of antimicrobials.
- ❖ To check the most commonly used antimicrobials.
- ❖ To check most frequently used route of administration.
- ❖ After data collection all data were entered in Microsoft excel, where they will be further cleaned and imported to SPSS version 25.0 for analysis.

RESULTS AND DISCUSSION

GENDER: The data were collected prospectively for 208 patients, who were having at least one antibiotic on their prescription while visiting the outpatient and inpatient department, and drug utilization evaluation was done. In the current study, demographic data showed that male population (51%) were more affected and prescribed with antibiotics when compared to female population (49%).

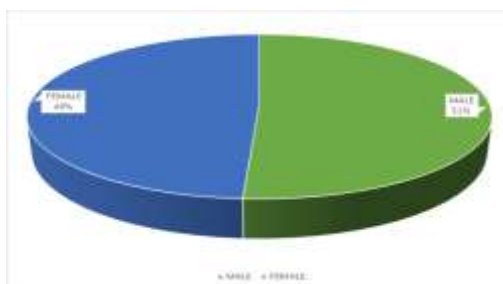
This is similar to a study conducted by **Meher et.al.**, who concluded that the overall study population was predominantly male population. (51%) male population was prescribed antibiotics and (49%) females were prescribed with antibiotics.



TABLE 1: Gender wise distribution of patients

S.NO.	GENDER	NO. OF PATIENT	PERCENTAGE (%)
1.	MALE	106	51%
2.	FEMALE	102	49%

FIGURE 1: Gender Wise Distribution of Patients

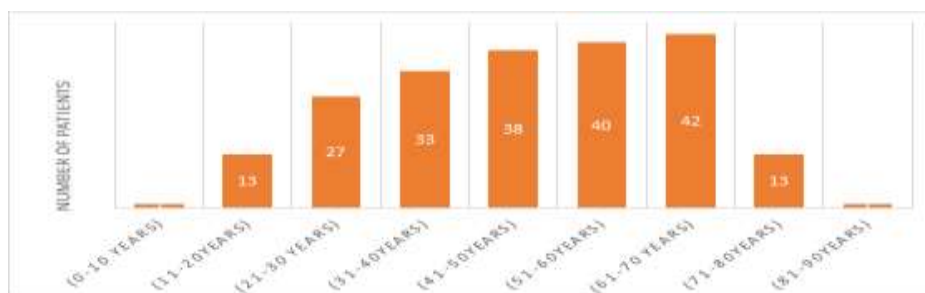


AGE WISE DISTRIBUTION: Maximum number of patients who were prescribed antibiotics were between the age group of 61-70 years (20.19%), followed by the age group 51-60 years (19.23%). A Similar study was conducted by **Maryam et.al, (2020)** in the medicine department and showed nearly about 20% of patients were in the age group of 60 years. This was due to the older population being more easily catching infectious diseases compared to other age groups.⁴

TABLE 2: Age wise distribution of patients

S. NO.	AGE (YEARS)	NUMBER OF PATIENTS	PERCENTAGE (%)
1	0-10	1	0.40%
2	11-20	13	6.25%
3	21-30	27	12.98%
4	31-40	33	15.86%
5	41-50	38	18.26%
6	51-60	40	19.23%
7	61-70	42	20.19%
8	71-80	13	6.25%
9	81-90	1	0.40%

FIGURE 2: Age wise distribution of patients:



DISEASE WISE DISTRIBUTION

In this study, the disease-wise distribution of patients was analysed, and found that out of 208 patients, majority of the patients prescribed antibiotics were affected by acute febrile illness 62 (29.80%) and chronic obstructive pulmonary disease 35 (16.82%), which was similar to a study conducted by **Shankar et.al.**, who reported that majority of the patients have the chronic obstructive pulmonary disorder.⁵



Table 3: Disease Wise Distribution of Patients

S.NO.	DISEASE	NO. OF PATIENT	PERCENTAGE (%)
1	ACUTE FEBRILE ILLNESS	62	29.80%
2	COPD	35	16.82%
3	ACID PEPTIC DISEASE	26	12.50%
4	URINARY TRACT INFECTION	21	10.09%
5	CHRONIC KIDNEY DISEASE	6	2.88%
6	TUBERCULOSIS	4	1.92%
7	SEVERE ANEMIA WITH FEVER	4	1.92%
8	PYREXIA	14	6.73%
9	PELVICINFLAMATORYDISEASE	5	2.40%
10	ALCOHOLIC LIVER DISEASE	4	1.92%
11	INFECTIVE DIARRHEA	4	1.92%
12	OTHERS	23	11.05%

Figure 3: Disease Wise Distribution of Patients



CLASS WISE DRUG UTILIZATION OF ANTI-MICROBIAL

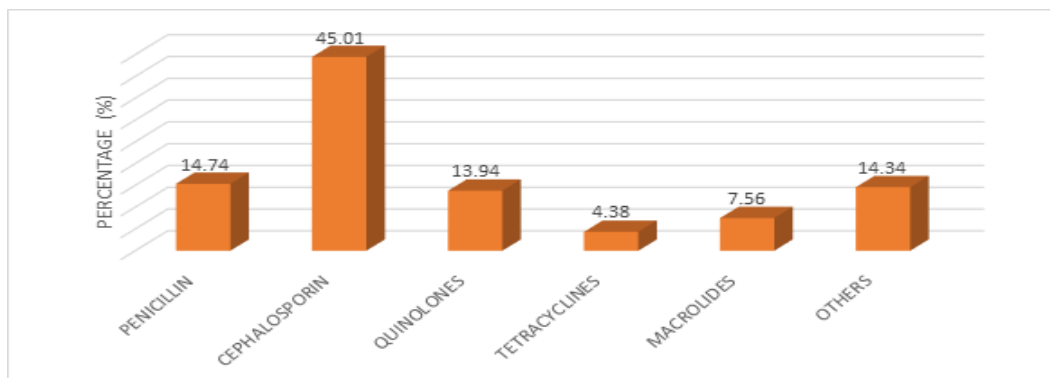
The reports on the class-wise distribution of antibiotics prescribed were analyzed and found the most commonly prescribed antibiotic class was cephalosporin (45.01%), followed by penicillin (14.74%) and quinolones (13.94%). This is because of their broad spectrum activity and convenient dosage regimen. A similar result was found in the study of **Ahmad et.al., (2014)** in the medicine department and state cephalosporin’s was the most prescribed class of antibiotic (62.5%) followed by fluoroquinolones and penicillin.6

Table 4: Class-Wise Distribution of Antibiotics Prescribed

S.NO.	ANTIBIOTIC CLASS	NO. OF PATIENTS	PERCENTAGE(%)
1	CEPHALOSPORINS	113	45.01%
2	PENICILLIN	37	14.74%
3	QUINOLONES	35	13.94%
4	MACROLID	19	7.56%
5	TETRACYCLINE	11	4.38%
6	OTHERS	36	14.34%



Figure 4: Class Wise Distribution of Antibiotics Prescribed



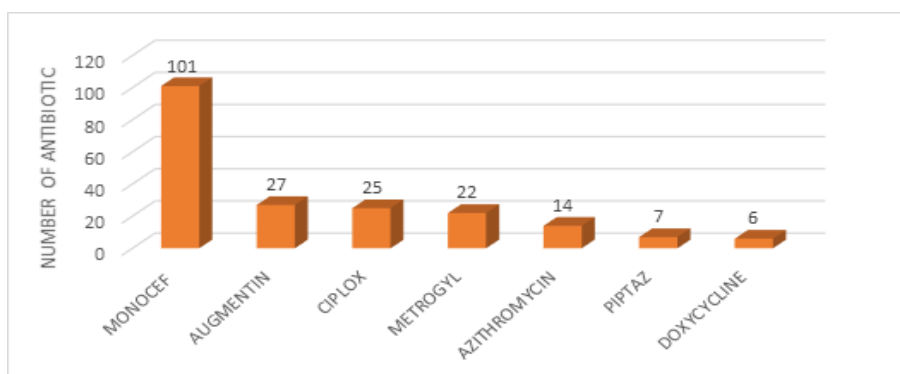
ANTIBIOTICS WISE DISTRIBUTION

In a total of 208 patients, 251 antibiotics were prescribed. The profile of antibiotics prescribed is shown in table 5. Among which 40.23% of the prescriptions were prescribed with Monocef, 10.75% were prescribed with Augmentin, 9.96% with Ciplox, 8.76% with metrogyl, 5.57% with Azithromycin, 2.78% with piptaz and 2.39% with doxycycline. Similar study results were found in the study conducted by **Marupaka et.al., (2020)** that monocef was the most frequently used antibiotic in the medicine department.7

Table 5: List of Commonly Antibiotics Prescribed

S.NO.	ANTIBIOTICS	PERCENTAGE (%)
1	MONOCEF	101 (40.23%)
2	AUGMENTIN	27 (10.75%)
3	CIPLOX	25 (9.96%)
4	METROGYL	22 (8.76%)
5	AZITHROMYCIN	14 (5.57%)
6	PIPTAZ	7 (2.78%)
7	DOXYCYCLINE	6 (2.39%)
8	DOXY	5 (1.99%)
9	CEFIXIME	5 (1.99%)
10	RIFAGUT	5 (1.99%)
11	METRONIDAZOLE	4 (1.59%)
12	CLARITHROMYCIN	3 (1.19%)
13	AMOXICLAV	3 (1.19%)
14	OFLOXACIN	2 (0.79%)
15	ZANFLOX	2 (0.79%)
16	LEVOFLOX	2 (0.79%)
17	AZIWOK	2 (0.79%)
18	OFLORA	1 (0.39%)
19	LOXOF	1 (0.39%)
20	NOFLOX	1 (0.39%)
21	CEPROFLOXA	1 (0.39%)
22	ORNIDAZOLE-OF	1 (0.39%)
23	NIFTY-SR	1 (0.39%)
24	TAZAR	1 (0.39%)
25	AZOM	1 (0.39%)
26	SULFONAMIDE	1 (0.39%)
27	CEPODEM	1(0.39%)
28	MEGNA-SB	1(0.39%)
29	CEFTRIAZONE	1(0.39%)
30	CEFI-O	1(0.39%)
31	MEGNACEF	1(0.39%)
32	CEFALOB	1(0.39%)

Figure 5: List of Seven Commonly Prescribed Antibiotics



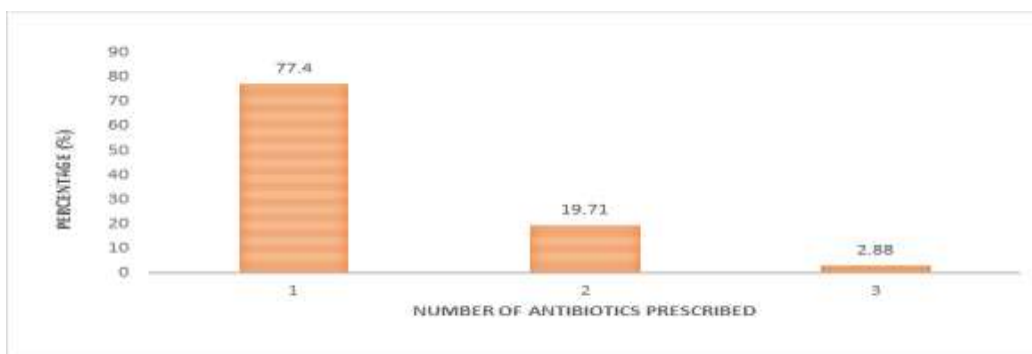
FREQUENCY OF ANTIBIOTIC PRESCRIBED

The study report shows during the hospital stay, most of the patients were prescribed only 1 antibiotic (Mono-therapy), 161 (77.40%), followed by 41(19.71%) patients prescribed with 2 antibiotics, only 6 (2.88%) patients were prescribed with 3 antibiotics. This was similar to a study conducted by **Chem et.al., (2018)** who concluded that prescription with mono-therapy (87.42%) was found to be higher than prescription with combination therapy.⁸

Table 6: Number of Antibiotics Prescribed

S.NO.	NO. OF ANTIBIOTICS	NO. OF PATIENTS	PERCENTAGE (%)
1	1	161	77.40%
2	2	41	19.71%
3	3	6	2.88%

Figure 6: Number of Antibiotics Prescribed

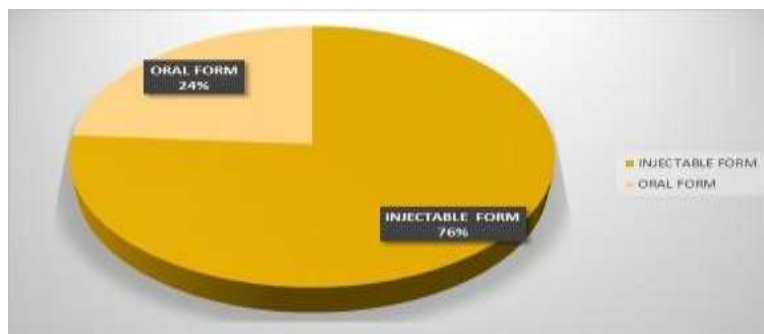


ROUTE OF ADMINISTRATION

Out of 251 antimicrobials, 191 (76%) were in injectable form and 60 (24%) were oral antimicrobials. This is due to intravenous route is more convenient and it has maximum bio-availability. This is in similar with the work done by **Maryam et.al.**, that injection (80.2%) was most commonly preferred drug formulation.⁴

Table 7: Categorization of Patients Depending On Dosage Form

S. NO.	DOSAGE FORM	NUMBER OF PATIENTS	PERCENTAGE (%)
1	INJECTABLE FORM	191	76%
2	ORAL FORM	60	24%

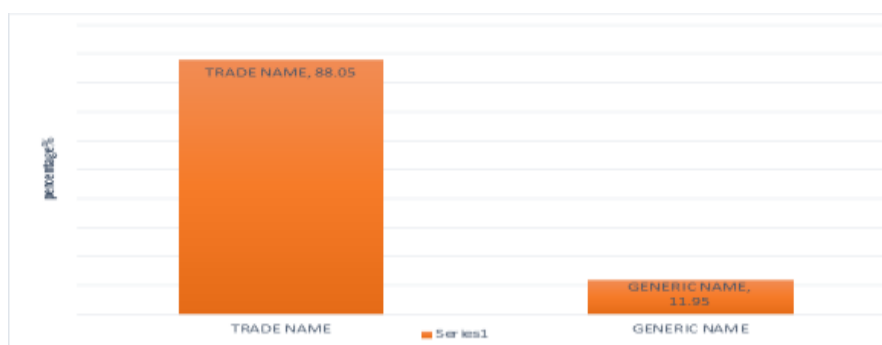
Figure 7: Categorization Of Patients Depending On Dosage Form

GENERIC AND TRADE NAME

In the present study, patients' prescriptions with the antibiotic agents were collected and analyzed on the basis of generic and trade names and found that the maximum percentage of drugs prescribed with trade names was (88.05%), a similar study conducted by Solanki et.al., (2019) reports that 78% of the drug prescribed by their brand name and 22% by their generic name.⁹

Table 8: Antibiotics Prescribed By Generic And Trade Name

S.NO.	ANTIBIOTIC PRESCRIBED	NO. OF PRESCRIPTION	PERCENTAGE (%)
1	TRADE NAME	221	88.05%
2	GENERIC NAME	30	11.95%

Figure 8: Antibiotics Prescribed By Generic Name And Trade Name

Limitation of our study

- This study was not performed in a specific period when viral illnesses such as dengue, and swine flu are common; due to this results of this study may not represent the drug prescribing pattern in such periods.
- Our study was not able to include all patients who reported in the outpatient department of general medicine after 2 p.m.

CONCLUSION

The current study could assess the prescribing pattern/drug utilization of antibiotics, the most commonly prescribed antibiotic in the study population was Monocef followed by Augmentin. the most preferable class of antibiotics was cephalosporins and penicillin. In our study, 11.95 % of drugs were prescribed by generic names. In the present study maximum number of prescriptions had prescribed only 1 antibiotic as per W.H.O. the average number of antibiotics must be kept within the limit.no serious drug interactions were found during the study period. Clinical pharmacists, physicians, and nursing staff need to play an important role in reducing antibiotic misuse and overuse by conducting continual awareness programs concerning prescribing guidelines in the hospital, minimizing resistance development in the antibiotics, and also preserving the antibiotics we use currently.

A strict protocol for prescribers is now an utmost requirement to promote the safe and rational use of antibiotics which will help prevent antibiotic resistance but also reduce the treatment cost.



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