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Prophylactic use of antibiotics and its consequences

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Abstract:
INTRODUCTION: *Antibiotics are effective and potent drugs in the fight against infectious diseases caused by bacteria, and they have been prevalently used for decades to treat a wide range of bacterial infections around the world. The majority of antibiotics are prescribed in primary care, and general practitioners (GPs) have been encouraged to prescribe antibiotics more rationally and only when necessary. Antibiotic prescribing in both outpatients and inpatients has increased in recent year as a result of the COVID-19 pandemic. As per the study, the prevalence of bacterial/fungal co-infection with COVID-19 is 8%, despite the fact that 72% of COVID-19 patients are treated with antimicrobials.* ***METHODOLOGY:*** *Retro prospective observational study conducted in General Medicine Department for duration of 7 months 500 patients' data were collected for the study.* ***RESULTS:*** *The study result shows that 52.4% of the patients were female and 47.6 % were male. Most of the patients were from 41-50 age groups (29.8%). Diseases in which most antibiotics are prescribed were skin Pneumonia (16.2%) and infections (15%). Cephalosporin (28.29) was the highest prescribed antibiotics class among the others. Most of the patients were prescribed with only one antibiotic i.e. 47.6% patients. Majority of ADRs occurs due to the use of Ceftriaxone (21.05%). Out of total 57 ADRs, Possible 45.61% and Probable 54.39% according WHO causality assessment scale. Vomiting (21.05%) was the highest reaction observed during the study. Based on the level of severity, Mild reactions 22.81%, Moderate reactions 71.93% and 5.26 % severe reactions.* ***DISCUSSION:*** *Among them 47.6% were male and 52.4% were female in harmony with Priyadharsini et al. conducted a study in the year 2022 in a tertiary care hospital in South India 43.4% males and 56.6% females. Only one antibiotic for the therapy 238 (47.6%) were consider then the multiple antibiotic therapy and Cephalosporin 206 (28.29%) was the most choice of antibiotic. This was in accordance to a study conducted by Remesh, A et al. carried out in the year 2013 in Kerala, India and Ahmad et al. performed a study in year 2013 in Bangalore, India.* ***CONCLUSION:*** *The poly pharmacy use of antibiotics was less this is due to a lack of confidence in the choice of antibiotic so, endeavour to counterbalance the broad spectrum of bacteria. A prime duty of a pharmacist to provide proper patient counselling and encourage the patient to rational use of prescriptions.*

Keywords: *Prophylactic, Consumption, detrimental effect, adverse reaction, counterbalance, therapy, assessment scale.*

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I. INTRODUCTION

Antibiotics are effective and potent drugs in the fight against infectious diseases caused by bacteria, and they have ben prevalently used for decades to treat a wide range of bacterial infections around the world [(1)]. Since their emergence about fifty years ago, antibiotics have millions of lives. Antibiotics are medicines used in order to treat bacterial infections [(2)]. Antibiotic have become a significant global concern. Consumption of antibiotics is more likely to develop bacterial resistance [(3)]. The majority of antibiotics are prescribed in primary care, and general practitioners (GPs) have been encouraged to prescribe antibiotics more rationally and only when necessary [(4)].

Antibiotics can be used to treat infections as well as to prevent them, which are known as prophylactic antibiotics. Antibiotic resistance is the most serious concern with prophylactic antibiotics. This is an issue that affects everyone, not just those who take prophylactic antibiotics. Antibiotic resistance occurs when germs like fungal and bacterial infections learn to evade the antibiotics that once killed them [(5)]. When this happens, they become extremely difficult to treat. In immune-competent patients, the three most common

indications for antibiotic prophylaxis are infections and diseases unrelated to surgical procedures for example, recurrent cellulitis, meningococcal disease, or recurrent urinary tract infections (UTIs), before complex dental procedures (infective endocarditis), and to prevent surgical site infections [(6)].

Antibiotic prescribing in both outpatients and inpatients has increased in recent year as a result of the COVID-19 pandemic. As per the study, the prevalence of bacterial/fungal co-infection with COVID-19 is 8%, despite the fact that 72% of COVID-19 patients are treated with antimicrobials. This increase in antibiotic consumption may have a detrimental effect on resistance in the future [(7)].

II. METHODOLOGY

Method: Retro prospective observational study
Study Site: General Medicine Department
Study Duration: 7 months
Sample Size: 500 patients
Data collection: A suitable designed data collection form.
Statistical Analysis: In this study used SPSS (Statistical Package for the Social Sciences) was used to analyse the collected data.
Patient Selection
Inclusion Criteria:

- Patients of above 18 years age
- Both sex who has been prescribed with antibiotics and are willing to participate.

Exclusion Criteria:

- Patients in which the antibiotics are not prescribed and those who are not willing to participate.
- Patient below 18 years of age.
- Pregnant Woman

III. RESULTS

Gender distribution:
The study result shows that 52.4% of the patients were female and 47.6 % were male are shown in table-1 and figure-1.

Table-1: Gender distribution

Sl. No.	Sex	No. of cases (n=500)	Percentage (%)
1.	Male	238	47.6
2.	Female	262	52.4
Total		500	100

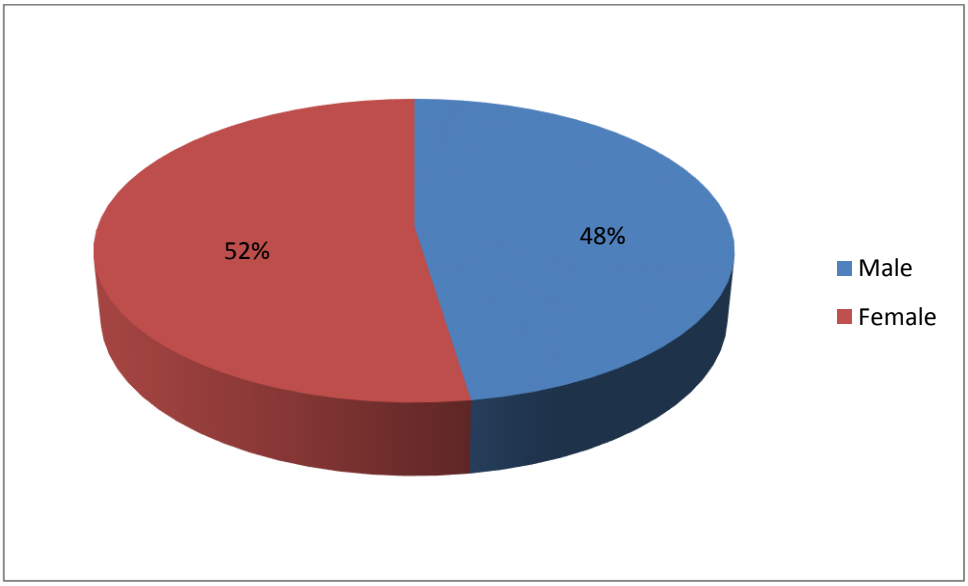

Figure-1: Gender distribution

Age categorisation:

Age wise categorisation of the patients, it was found that 16.2% of the prescriptions were in the age group 18-30 years, followed by 22.6% in the age group of 31-40years, 29.8% in the age group of 41-50 years, 21.6% in the age group of 51-60 years and 9.8% in the age group above 60 years are shown in table-2 and figure-2.

Table-2: Age categorisation

Sl. No.	Age in years	No. of patients prescribed (n=500)	Percentage (%)
1.	18-30	81	16.2
2.	31-40	113	22.6
3.	41-50	149	29.8
4.	51-60	108	21.6
5.	>60	49	9.8
Total		**500**	**100**

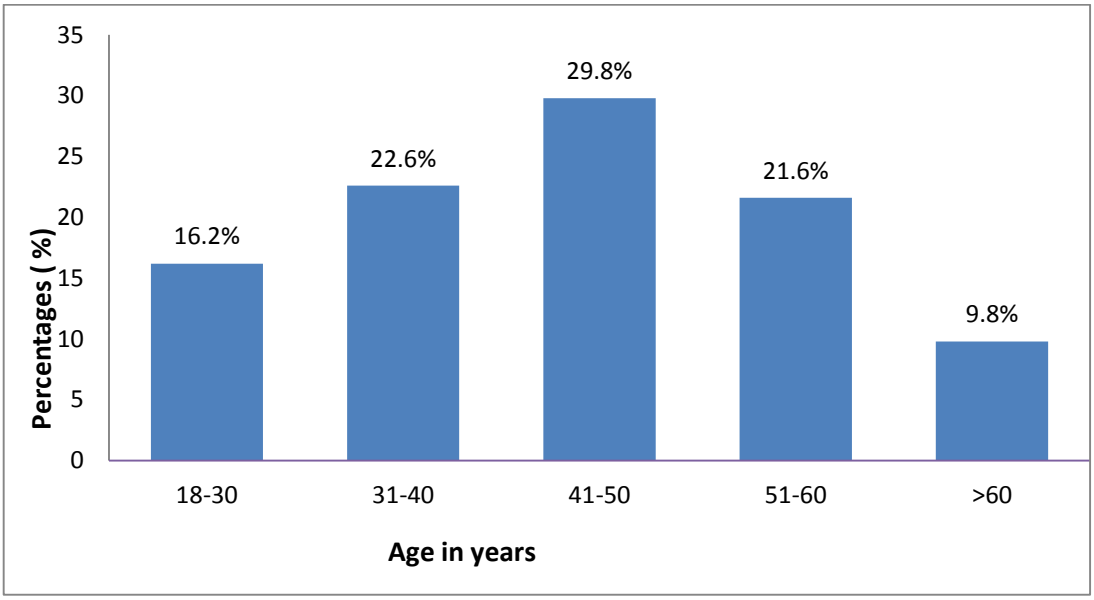

Figure-2: Age categorisation

Diseases in which antibiotics are prescribed:

Diseases in which antibiotics are prescribed were skin infections in 15%, Chest infections in 10.2%, Urinary tract infections in 7.8%, Septicaemia in 3.8%, Meningitis in 2.2%, Acne in 8.6%, Bronchitis in 9.6%, Pneumonia in 16.2%, Sore throats in 7.4% , Flu in 8.3% and Others include hypokalaemia, ear infection etc. in 12.6% patients are shown in table-3 and figure-3.

Table-3: Diseases in which antibiotics are prescribed

Sl. No.	Antibiotic prescribed for	No. of patients Prescribed (n=500)	Percentage (%)
1.	Skin infections	75	15
2.	Chest infections	51	10.2
3.	Urinary tract infections	39	7.8
4.	Septicaemia	19	3.8
5.	Meningitis	11	2.2
6.	Acne	43	8.6
7.	Bronchitis	48	9.6
8.	Pneumonia	81	16.2
9.	Sore throats	37	7.4
10.	Flu	33	6.6
11.	Others	63	12.6

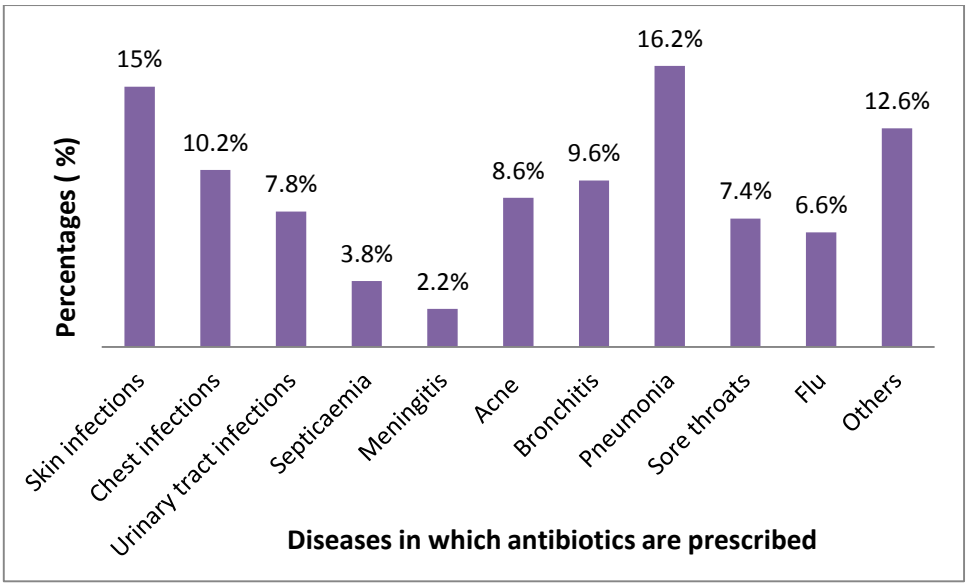

Figure-3: Diseases in which antibiotics are prescribed

Antibiotics Prescribed by Generic and Brand name:

Out of 728 antibiotics prescribed, 77.75% were generic and 22.25% were branded are shown in table-4 and figure-4.

Table-4: Antibiotics Prescribed by Generic and Brand name

SI No.	Drugs Prescribed by	Total No. of Drugs (n = 728)	Percentage (%)
1.	Generic name	566	77.75
2.	Brand name	162	22.25
Total		728	100

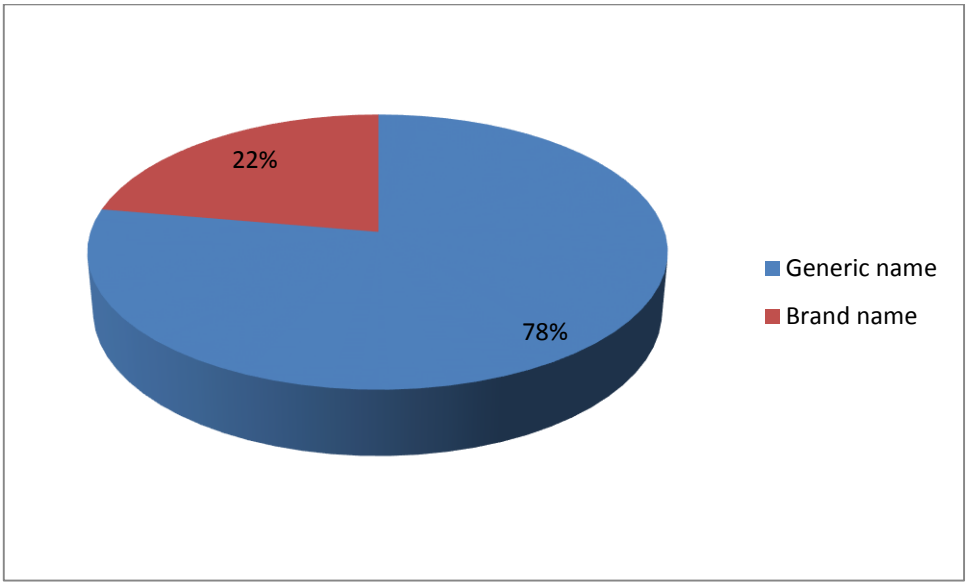

Figure-4: Antibiotics Prescribed by Generic and Brand name

Class of Antibiotics Prescribed:

The study reports that the major class of antibiotics prescribed among patients were Cephalosporins 28.29% followed by Fluoroquinolones 23.77%, Nitroimidazoles 19.79%, Macrolides 12.77%, Aminoglycosides (6.46%), Penicillin (4.39%), Tetracycline 8% and Sulphonamide 1.24 in patients are shown in table-5 and figure-5.

Table-5: Class of Antibiotics Prescribed

SI No.	Antibiotic Class of Drugs	Total No. of Drugs (n = 728)	Percentage
1.	Cephalosporin	206	28.29
2.	Fluoroquinolones	173	23.77
3.	Nitroimidazoles	144	19.79
4.	Macrolides	93	12.77
5.	Aminoglycosides	47	6.46
6.	Penicillin	32	4.39
7.	Tetracycline	24	3.29
8.	Sulphonamide	09	1.24
Total		728	100

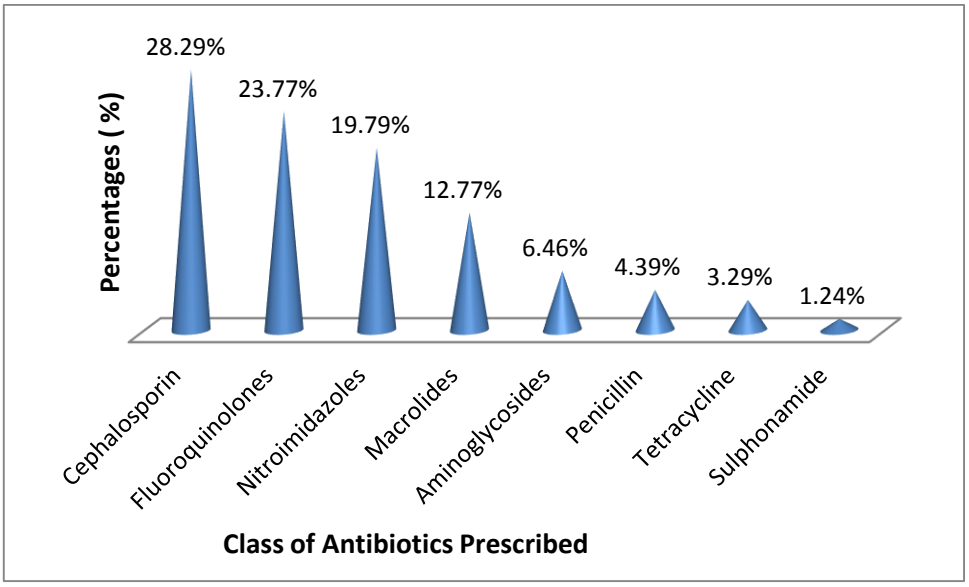

Figure-5: Class of Antibiotics Prescribed

Number of Antibiotics per Prescription:

Most of the patients were prescribed with only one antibiotic i.e. 47.6% patients, 39% patients with 2 antibiotics, 9.8% patients with 3 antibiotics, 3.6% patients were prescribed antibiotics are shown in table-6 and figure-6.

Table-6: Number of Antibiotics per Prescription

SI NO.	No. of Antibiotics Per Prescription	Total No. of Cases (n = 500)	Percentage
1.	Single Antibiotic per Prescription	238	47.6
2.	Two Antibiotics per Prescription	195	39
3.	Three Antibiotics per Prescription	49	9.8
4.	Four Antibiotics per Prescription	18	3.6
Total		500	100

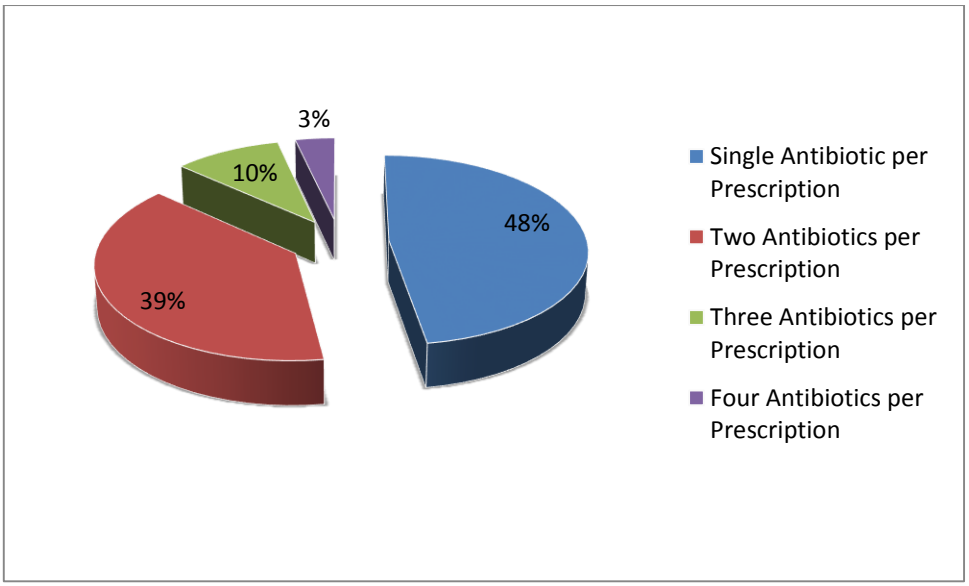

Figure-6: Number of Antibiotics per Prescription

Antibiotics Causing ADR:

The major class of antibiotics causing ADR in patients were found to be Tazobactum (7.01%), followed by Ceftriaxone (21.05%), Clarithromycin (15.78%), Ofloxacin (8.77%), Metronidazole (17.58%), Amoxicillin (14.03%), Clindamycin (10.52%) and Ampicillin (5.26%) were being reported in the study are shown in table-7 and figure-7.

Table-7: Antibiotics Causing ADR

Sl. No.	Name of Drug	No. of ADR (n=57)	ADR Percentage (%)
5.	Tazobactum	4	7.01
6.	Ceftriaxone	12	21.05
7.	Clarithromycin	9	15.78
8.	Ofloxacin	5	8.77
9.	Metronidazole	10	17.58
10.	Amoxicillin	8	14.03
11.	Clindamycin	6	10.52
12.	Ampicillin	3	5.26

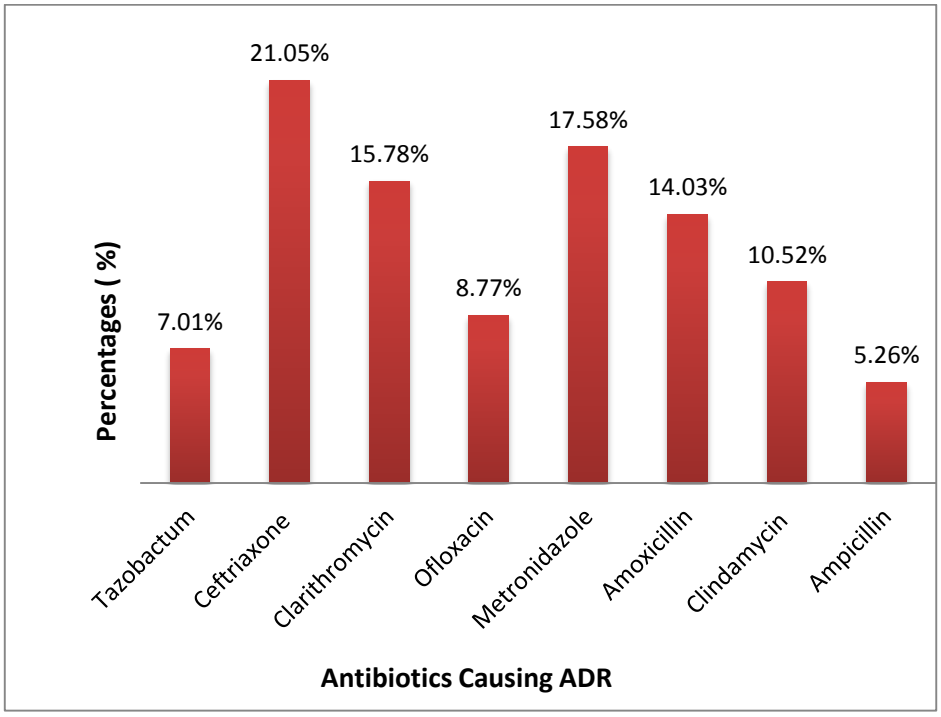

Figure-7: Antibiotics Causing ADR

Causality Assessment:

The adverse drug reactions assessment by WHO causality assessment scale showed that around 54.39% probable ADR's and 45.61% possible ADR's among the patients are shown in table-8 and figure-8.

Table-8: Causality Assessment

Sl. No	Causality assessment	No. of ADR(n=57)	Percentage
1.	Certain	0	0
2.	Possible	26	45.61
3.	Probable	31	54.39
4.	Unlikely	0	0
5.	Unclassifiable	0	0
6.	Conditional	0	0

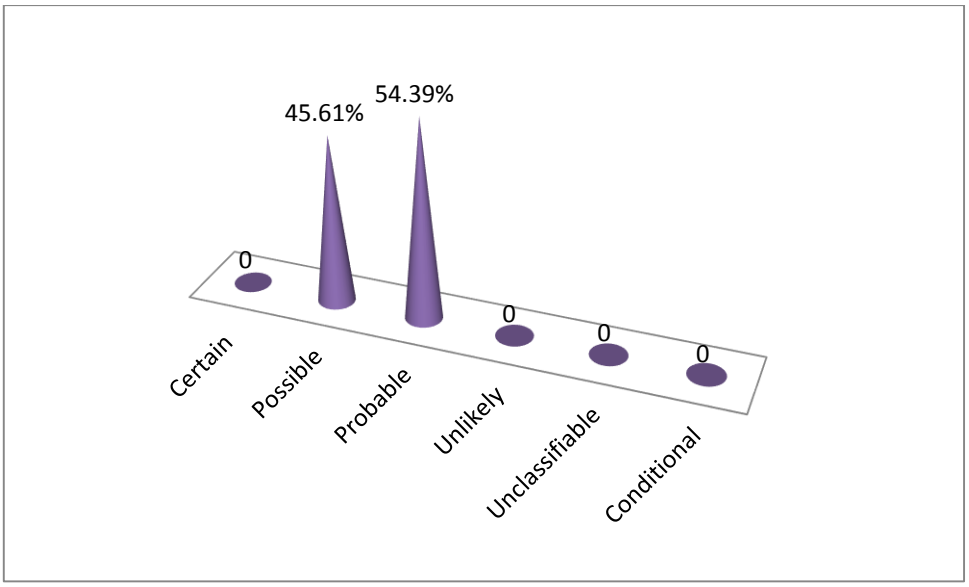

Figure-8: Causality Assessment

Reaction Observed During ADR:

The reactions seen in patients were Abdominal pain in 10.53%, Vomiting in 21.05%, Haemolytic uremic Syndrome in 3.51%, Pruritus in 8.77%, Haemolytic anaemia in 3.51%, Eosinophilia in 3.51%, Giddiness in 7.02%, Thrombophlebitis in 5.26%, Constipation in 15.79%, Hypokalemia in7.02% and Redness and rehashes in 14.04% patients were being reported are shown in table-9 and figure-9.

Table-9: Reaction Observed During ADR

Sl. No.	Type of reaction	No. of ADR (n=57)	Percentage %
1.	Abdominal pain	6	10.53
2.	Vomiting	12	21.05
3.	Haemolytic uremic Syndrome	2	3.51
4.	Pruritus	5	8.77
5.	Haemolytic anaemia	2	3.51
6.	Eosinophilia	2	3.51
7.	Giddiness	4	7.02
8.	Thrombophlebitis	3	5.26
9.	Constipation	9	15.79
10.	Hypokalemia	4	7.02
11.	Redness and rehashes	8	14.04

ADR Based On Level of Severity:

Based on the level of severity, Minor reactions 22.81%, Moderate reactions 71.93% and 5.26 % severe reactions were observed or reported in patients are shown in table-10 and figure-10.

Table-10: Reaction Observed During ADR

Sl. No.	Severity	No. of Patients	Percentage (%)
1.	Major	3	5.26
2.	Moderate	41	71.93
3.	Minor	13	22.81

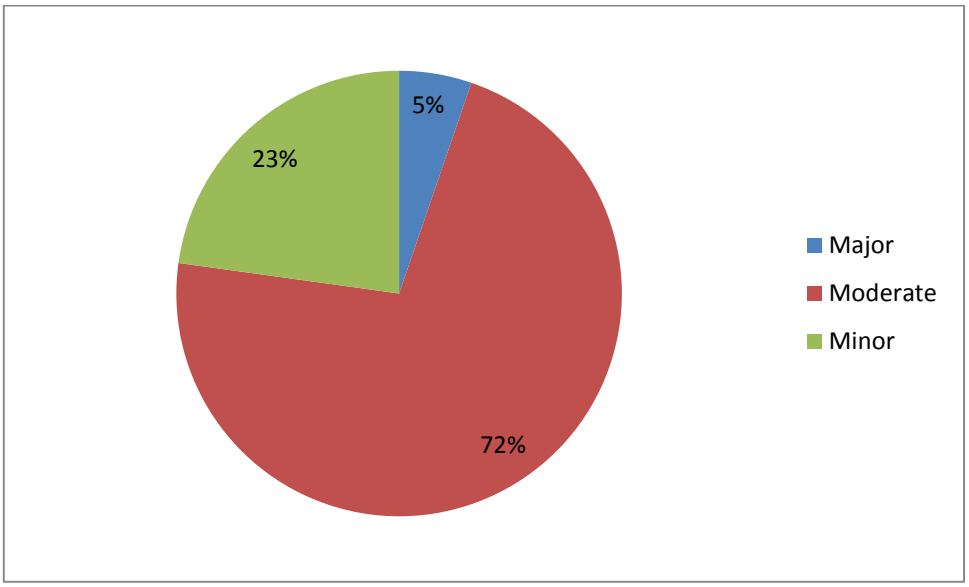

Figure-10: Reaction Observed During ADR

Outcomes:
In the study all ADR occurs in the patients were fully recovered are shown in table-11.

Table-11: Outcomes (N=57)

Sl. No.	Outcome	No. of ADR	Percentage (%)
1.	Fatal	0	0
2.	Recovering	0	0
3.	Fully recovered	57	100
4.	Unknown	0	0
5.	Others	0	0

IV. DISCUSSIONS

A retrospective study was conducted in General Medicine Department, with 500 patients prescribed with a total number of 728 antibiotics. Among them 47.6% were male and 52.4% were female in harmony with Priyadharsini *et al.* [8] conducted a study in the year 2022 in a tertiary care hospital in South India 43.4% males and 56.6% females. Antibiotics were prescribed for skin infections in 15% of patients, chest infections in 10.2%, urinary tract infections in 7.8%, septicaemia in 3.8%, meningitis in 2.2%, acne in 8.6%, bronchitis in 9.6%, pneumonia in 16.2%, sore throats in 7.4%, flu in 8.3%, and other conditions such as hypokalemia, ear infection, and other 12.6% in accordance to study Elvis Dzelamonyuy Chem. *et al.*[9] conducted at Kumbo East and Kumbo West Health Districts, North West Cameroon found respiratory tract infection 21.48%, uncomplicated malaria 11.75%, gastroenteritis 10.32%, wound 7.56%, STD 6.94%, severe malaria 6.69%, typhoid 4.30%, gastritis 4.10%, UTI 3.43%, conjunctivitis 3.23%, rashes 3.10%, diarrhoea 2.33%, abbess 2.04%, tonsillitis 2.03%, arthritis 1.36%, Pneumonia 1.28%, otitis 1.21%, accident1.06%, chicken pox0.48%, dysentery 0.30% and no diagnosed 5.01%. According to the study, antibiotics were prescribed more frequently in generic name (77.75%) than in brand name (22.25%). In compare to Priyadharsini *et al.* [8] conduct a study in which they found 87.5% antibiotics were prescribed by generic and 12.5% were branded.

As per class of antibiotics prescribed among patients Gowthami *et al.* [10] were conducted a study Pencillins, Cephalosporins, and other beta-lactams (57.62%), Aminoglycosides (1.63), Other anti bacterials (3.55%), Tetracycline (3.55%), Quinolones (12.11%), Macrolides (5.22%), Anti malarials (6.68%), Anti mycobacterials (10.65%). Cephalosporins (28.29%) followed by Fluroquinolones (23.77%), Nitroimidazole (19.79%), Macrolides (12.77%), Aminoglycosides (6.46%), Penicillin (4.39%), Tetracycline (8%) and Sulphonamide (1.24%) in patients. The major class of antibiotics causing ADR in patients were found to be Tazobactum (7.01%), followed by Ceftriaxone (21.05%), Clarithromycin (15.78%), Ofloxacin (8.77%),

Metronidazole (17.58%), Amoxicillin (14.03%, Clindamycin (10.52%) and Ampicillin (5.26%) were being reported in this study. Only one antibiotic for the therapy 238 (47.6%) were consider then the multiple antibiotic therapy and Cephalosporin 206 (28.29%) was the most choice of antibiotic. This was in accordance to a study conducted by Remesh, A *et al.*[11] carried out in the year 2013 in Kerala, India and Ahmad *et al.*[12] performed a study in year 2013 in Bangalore, India.

V. CONCLUSION:

The study disclosed that most of the therapy done by using cephalosporin and ceftriaxone was commonly used. In this study period the generic antibiotics was most preferable one which reflects cost effective prescribing practices. The poly pharmacy use of antibiotics was less this is due to a lack of confidence in the choice of antibiotic so, endeavor to counterbalance the broad spectrum of bacteria.

Collaboration of clinical pharmacist in prescription analysis of antibiotics can help the physicians on the current prescribing practices, reduce the cost of treatment and reduce development of resistance. Most of the ADRs occurs due to the use of poly pharmacy or irrational use of prescriptions so, it a prime duty of a pharmacist to provide proper patient counselling and encourage the patient to rational use of prescriptions.

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REFERENCES:

[1]. Shrivastava, S.R.; Shrivastava, P.S.; Ramasamy, J. World health organization releases global priority list of antibiotic-resistant bacteria to guide research, discovery, and development of new antibiotics. *J. Med. Soc*. 2018, 32, 76.

[2]. Thangaraju, P.; Venkatesan, S. WHO Ten threats to global health in 2019: Antimicrobial resistance. *Cukurova Med. J*. 2019, 44, 1150–1151.

[3]. A.J. F. Siqueira Jr., I. N. Rôças, and M. G. Silva, "Prevalence and clonal analysis of Porphyromonas gingivalis in primary endodontic infections," *Journal of Endodontics*, vol. 34, no. 11, pp. 1332–1336, 2008.

[4]. B. J. Crumpton and S. B. McClanahan, "Antibiotic resistance and antibiotics in endodontics," Clinical Update, vol. 25, pp. 23–25, 2003.

[5]. Thornhill MH, Gibson TB, Cutler E, Dayer MJ, Chu VH, Lockhart PB, et al. Antibiotic Prophylaxis and Incidence of Endocarditis Before and After the 2007 AHA Recommendations. *J Am Coll Car diol*. 2018;72(20):2443–54. doi: 10.1

[6]. Ahmed, N. J. (2020c). The outpatient prescribing pattern of cefuroxime in Al-kharj. *J. Pharm. Res. Int*. 32, 74–78, doi:10.9734/jpri/2020/v32i830473.

[7]. World Health Organization. Antimicrobial Resistance Surveillance in Europe 2022–2020 Data; World Health Organization: Geneva, Switzerland, 2022.

[8]. R. P. Priyadharsini, Kesavan Ramasamy, Sura Amarendar. Antibiotic‐prescribing pattern in the outpatient departments using the WHO prescribing indicators and aware assessment tool in a tertiary‐care hospital in South India. *Journal of Family Medicine and-Primary Care*. (2022) Volume 11: Issue 1: pp 74-78.

[9]. Elvis Dzelamonyuy Chem, Damian Nota Anong, Jane-Francis K. T. Akoachere.. Prescribing patterns and associated factors of antibiotic prescription in primary health care facilities of Kumbo East and Kumbo West Health Districts, North West Cameroon. *PloS one*, (2018). *13(4): e0196861*.

[10]. Gowthami, B., & Spurthi, T. Drug utilization evaluation of antibiotics in general medicine department of a tertiary care hospital. *Value in Health*, (2016) *19*(7), A824.

[11]. Remesh, A., Salim, S., Gayathri, A. M., Nair, U., & Retnavally, K. G. Antibiotics prescribing pattern in the in-patient departments of a tertiary care hospital. *Arch Pharm Pract*, (2013). *4*(2), 71.

[12]. Akram Ahamad, Megha Revankar, Isha B Patel. "Study the prescription pattern of antibiotics in the medicine department in a teaching hospital: A descriptive study". *International Journal of toxicology and pharmacological research*; (2014) 6(3):43-46.