Prescription Pattern and Adverse Drug Reaction Monitoring Of Antibacterial Agents in a Tertiary Care Hospital

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Abstract: *Currently, Antibacterial agents were most employed in daily practice to treat infections along with other diseases. The most severe misconsequence is the development of acquired resistance due to its irrational use. Hence this study was conducted with an objective to analyze prescription pattern and also to identify, assess and monitoring of ADRs due to antibacterials. Our study was a Prospective Observational study, carried out in a five in-patient clinical departments (Medicine, Surgery, Pediatrics, Gynecology & Obstetrics, Orthopedic) of a 500 bed tertiary care hospital in Ananthapuramu, India for the period of six months. The data were collected in a predesigned profroma from the medical case sheets of 503 in-patients. The enrolled patients were observed till discharge. Descriptive statistics were applied to the collected data. Among the 838 antibacterials, the most commonly prescribed antibiotics were Cephalosporins (55.9%). The antibiotics from NEML were 86%. Antibacterials prescribed from Surgical Department were 310 (36.9%). Majority of antibiotics prescribed as Injections (79.1%). Out of 26 ADRs, 9 (34.6%) ADRs were reported with ceftriaxone and gastro-intestinal system 22 (84.6%) was mostly affected. WHO Causality scale shows that most of them are Possible 15 (57.6%). Our study concludes that, Rational prescribing of antibiotics prevents drug resistances. ADRs due to antibiotics are common and few of them resulted in increased length of hospital stay. Regular prescription auditing and awareness about polypharmacy will further reduce ADRs due to antibiotics.*
Key words: *Antibacterials, Adverse drug reaction, Prescription pattern, Rational antibiotic use.*

I. Introduction

Prescription pattern studies are a tool for assessing the prescribing, dispensing and distribution of medicines. They advance proper utilization of prescribed medications and lessening of maltreatment or abuse of drugs[1].

Antibiotics are presently the most frequently prescribed drugs which are used for treatment and prophylaxis of several infectious conditions in hospitals, globally. But, excessive, incorrect use of antibiotics renders increased drug resistance[2]. The rational use of antibiotics is a main health requirement.

The drugs prescribed from Essential Drug List (EDL) of a country selected using un-biased and evidence based information is a measure of the commitment towards high-quality patient care and appropriate medication use[3]. Prescription of antibiotics by generic names instead of brand names avoids confusion about multiple names for the same product and simplifies procurement, dispensing and improves hospital efficiency[4].

The study of prescribing pattern concludes to monitor, evaluate, and advise variations in the doctor's treatment practices, so as to make patient care reasonable and effective[5]. Prevention of ADRs is probable by correct monitoring, which encouraged the national directive to institutionalize a pharmacovigilance center in each medical college in India. It is paramount to assess the quality of patient care through felicitous surveillance[6].

II. Materials & Methods

Study Site: The study was conducted in Government general hospital, Ananthapuramu.
Study Design: It is a Prospective Observational study**.**
Study Duration: The study was conducted for a period of six months (August to January 2018-19).
Study Sample: The sample size of study is 503 patients.
Study Criteria:
Inclusion Criteria:

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1. In-patients with minimum 3days of hospitalization.
2. Patients who were prescribed with antibacterials.

Exclusion Criteria:
1. Outpatients.
2. Patients with psychiatric diseases.
3. Incomplete case sheets.
4. Patients with malignancy.
5. Patients who are not willing to participate in the study.

Procedure methodology:
1. Patient who meets the inclusion criteria & who are interested to participate in the study are recruited
2. Case sheets were collected & divided according to age groups, gender, social history and other baseline characteristics are taken
3. Prescription errors and ADRs were identified through direct patient interview
4. WHO Casualty assessment scale is used to asses the adverse drug reactions
5. Educated and counselled the patients about adverse drug reactions and events, results were assessed by using suitable statistical tools.

Statistical Analysis:
Descriptive statistics for the demographic parameters. Prescription pattern and adverse drug reactions are measured in percentage and by mean standard deviation (SD) by using graphpad instat (3.1 version).

III.   Results
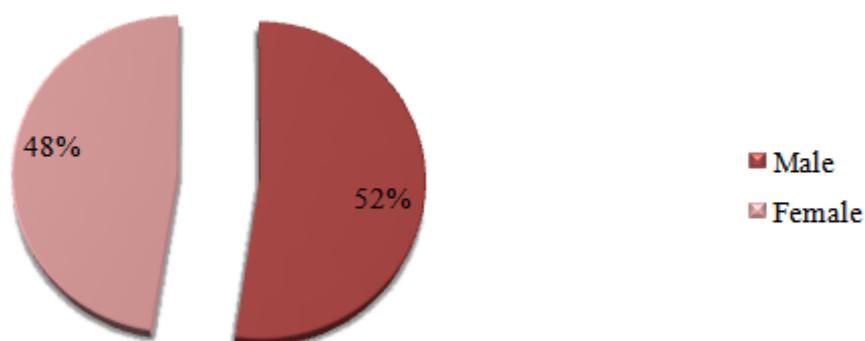
In our study, the proportions of Males 264 (52.4%) were higher than Females 239 (47.5%).

Table no 1: Prescribing Indicators

| Prescribing Indicators	Results
Average number of drugs per prescription	5.5±1.8
Average number of antibiotics per prescription	1.8±0.81
Percentage of antibiotics prescribed by generic name	44.7%
Percentage of antibiotics prescribed by brand name	55.3%
Percentage of antibiotics with fixed dose combinations	12.3%
Percentage of antibiotics from essential medicines list (NEML)	86.3%
Percentage of antibiotics with injections	79.1%
Monotherapy of antibiotics	39.1%

Table no 1 : A total of 838 drugs prescribed, the average number of drugs per prescription was 5.5 (±1.8), the antibiotics per prescription were 1.8 (±0.81). About 44.7% drugs prescribed by generic name. The fixed dose combinations of antibiotics constituted 12.3%. The antibiotics from National Essential Medicine List (India) were 86%.
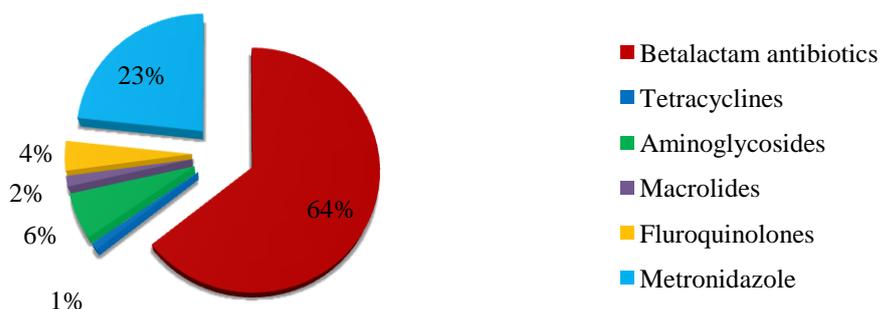
Among the 838 antibacterials prescribed, the most commonly prescribed antibiotics were Cephalosporins (55.9%) followed by Metronidazole (23%), Penicillin's (7.4%), Macrolides (6.1%), Fluroquinolones (3.9%).

Dosage forms
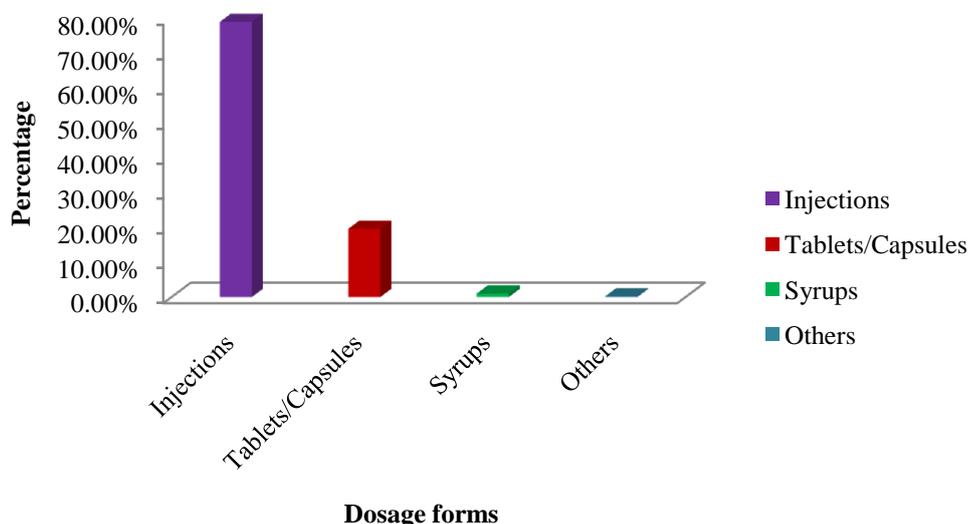
Most of the antibacterials prescribed as Injections (79.1%) followed by tablets and capsules (18.4%) and Syrups (1.1%).
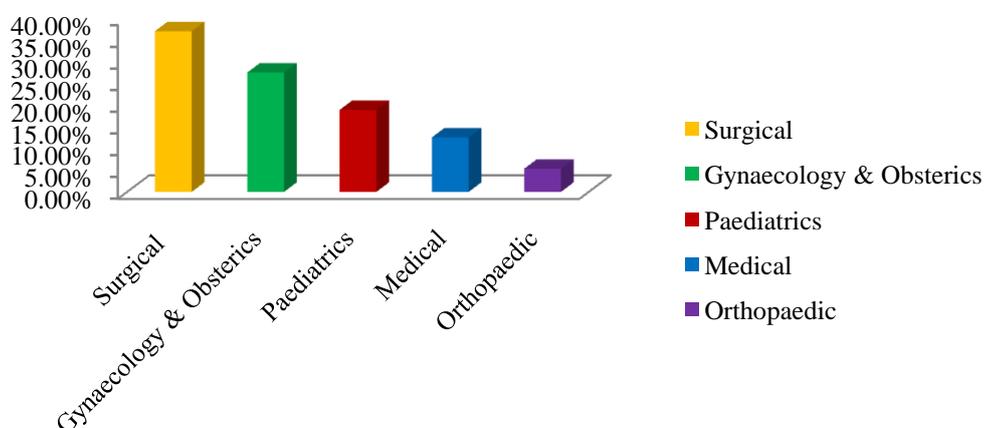
In our study, most antibacterials are prescribed in Surgical department 310 (36.9%) followed by Gynaecology & Obsterics 230 (27.4%), Paediatrics 148 (17.6%), Medical department 105 (12.5%) and Orthopaedic department 45 (5.3%).

ADRs frequency of Patients
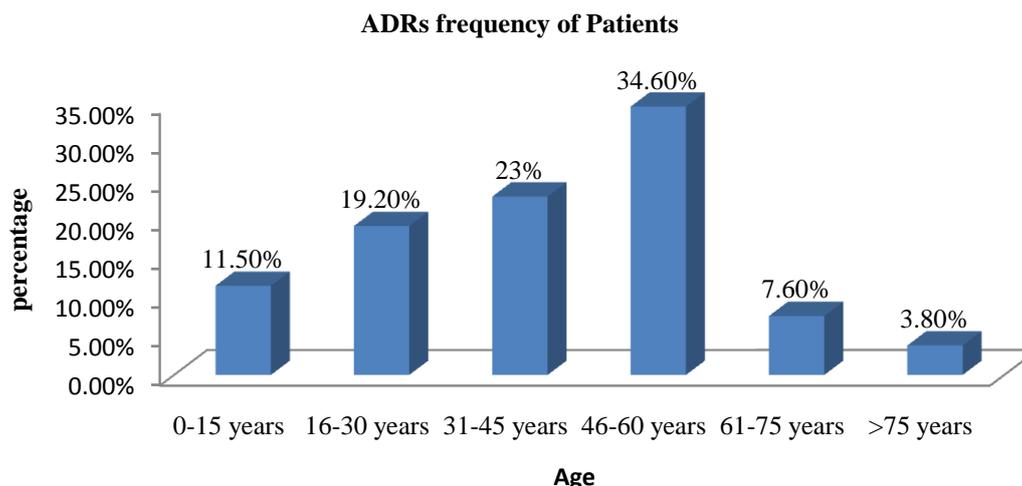
Most of the age group affected due to ADRs was 46-60years 9 (34.6%) followed by 31-45 years age group were 6 (28.2%), 16-30 years age group were 5 (28.2%), 0-15 years age group were 3 (23.8%).

Table no 2: Frequency of ADRs due to various antibiotics prescribed

DRUG	Number of patients prescribed with antibiotics		Number of patients reported ADRs due to antibiotics		ADRS	CAUSALITY
	Frequency	%	Frequency	%		
Monocef	337	50.4%	9	34.6%	Headache Vomittings(5) Rash(2) Cough	Probable Possible Possible Unclassifiable
Piptaz	25	3.7%%	5	19.2%	Constipation Nausea Diarrhea Vomittings Dyspepsia	Possible Possible Possible Possible Possible
Metronidazole	192	28.7%	8	30.7%	Taste distrubance	Unclassified
Cefixime	98	14.6%	1	3.8%	Vomittings	Possible
Azithromycin	11	1.6%	2	7.6%	Dyspepsia Vomitings	Possible Possible
Meropenem	5	0.7%	1	3.8%	Anorexia	Unclassifiable
Total			26			

Table no 2 shows: In our study, Maximum ADRs were reported with Ceftriaxone 9 (34.6%) followed by Metronidazole 8 (30.7%), Piperacillin/tazobactam 5 (19.2%), Azithromycin 2 (7.6%), Cefixime 1 (3.8%) & Meropenem 1 (3.8%).
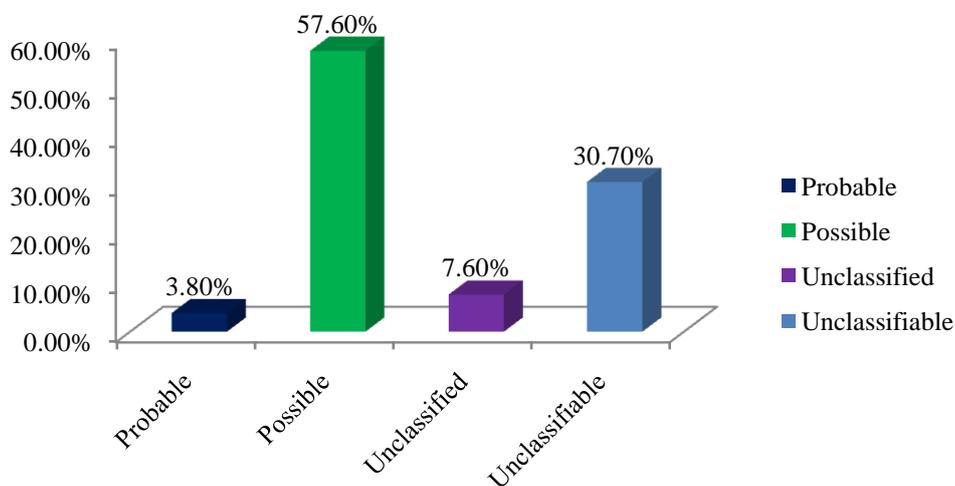
The assessment by WHO Causality scale showed that 26 ADRs, 15 (57.6%) were Possible, 08 (30.7%) were Unclassified/Conditional followed by 02 (7.6%) were Unclassifiable and 01(3.8%) was Probable.

Systems affected by ADRs
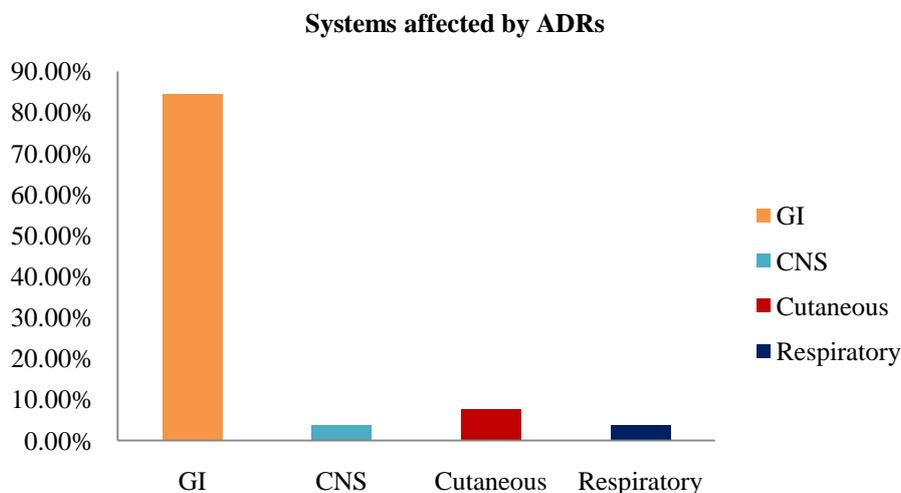
The most common system affected by ADRs was Gastrointestinal system 22 (84.6%) followed by Cutaneous system 2 (7.6%) and Central nervous system 1 (3.8%), Respiratory system 1 (3.8%).

IV. Discussion

Maximum infections, comprises of nosocomial origin, are serious in nature and require longer and complex treatment procedures. Their therapy always includes antibiotics. As the antibacterial drug resistance incidence is on the raise, there is a huge need for taking steps to promote rational use of antibiotics. Antibiotics are the most commonly prescribed and misused drugs by patients and physicians[7].

Antibiotics are considered as the second most prescribed drugs in the world, only next to the drugs indicated for cardiovascular diseases[8]. But, as with other drugs, they too show adverse Drug Reactions. In this study, 28.2% of the patients were in the age group of 16-30years. Sex distribution showed male preponderance of 52.4%. Among 503 prescriptions were analyzed, contained 2465 drugs. The average number of antibiotics prescribed was low (mean value 1.8). Average number of drugs per prescription was high (mean value 5.5). This value is similar to study conducted by Dhar K et al., (2015)[9]. This is much higher than the recommended limit of 2.0. Increase in number of drugs per prescription increase the risk of drug interaction various side effects, increase cost and increased the chances of emergence of resistance. Monotherapy of antibiotics observed in 39.1% of cases.

In this study, 44.7% of antibacterial agents were prescribed by generic name. As per WHO recommendation it should be 100%. But 44.7% was quite low as compared with other studies. Generic prescribing reduces the chances of dispensing errors which may be due to misinterpretation of like sounding names of drugs and also decreases the economic burden on the patients. Hence we should encourage generic prescribing[10]. Drugs from national essential medicine list (NEML) were 86.3%. Our Study value is quite high when compared to other studies. Injectables were used in 79.1% of prescriptions[11]. Most of the patients received 3rd generation cephalosporin (Inj. Ceftriaxone) which is given by IV route, followed by tablets (18.4%). Among the 838 (33.9%) of antibiotics prescribed, Cephalosporins topped the list (55.9%), followed by Metronidazole (23%) and penicillins (7.4%). Cephalosporin was widely prescribed because of its high potent action, availability in various formulations and its broad spectrum activity. Higher percentage use of cephalosporin was observed in developing countries like India (82.0%)[12].

In the present study, Majority of patients affected due to ADR's were adult age group of 46-60 years (34.6%). Geriatric patients were more prone to antibiotic ADRs due to age related pharmacokinetic and pharmacodynamic changes and the presence of co-morbid illnesses and Polypharmacy along with infectious diseases[13]. High antibiotic usage were found in Surgical department 310 (36.9%) and 230 (27.4%) antibacterials were found in Obstreics & Gynaecology departments, may be due to frequent prescription of antibiotics in these units[14]. Most common class of antibacterials causing ADRs was Cephalosporins which is analogous to previous studies[15,16]. Most common system affected by ADRs was Gastro-intestinal tract (84.6%) followed by cutaneous manifestations (7.6%). Other studies also found similar to Gastro-intestinal tract predominance Kavita Dhar et al., (2015)[17]. It increased the length of stay in hospital and required some medical intervention[18].

According to WHO causality assessment scale, most of the reactions belonged to possible category (57.6%) followed by Unclassified/Conditional category (30.7%). Re-challenge was not done considering the patient safety so no ADR was categorized as certain.

V. Conclusion

In our study, it was observed that physicians prescribed antibiotics are rational, with no banned drugs and less new drugs. The adherence to National Essential Medicine List (NEML) was found to be 86%. The present study has Polypharmacy, and use of non-Generic (Branded) and injectable drugs. Adverse Drug Reactions are one of the significant drug related issue in the hospital setting and is a challenge for ensuring drug safety. In this study, Cephalosporin's (Ceftriaxone) were the most common class of drug that causes the gastrointestinal ADR's.

Our study concludes that, Rational prescribing of antibiotics prevents drug resistances. ADRs due to antibiotics are common and few of them resulted in increased length of hospital stay. Clinical Pharmacists can take part in regular prescription auditing and awareness about Polypharmacy to the physicians will further reduce ADRs due to antibiotics.

Acknowledgment

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