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# A Study of Prescription Pattern of Antibiotics in Paediatric In-Patients at a tertiary care hospital in central India

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## Abstract

**Introduction:** Rational antibiotic prescription is very important to prevent antimicrobial resistance. Widespread use of antimicrobials has facilitated the development of resistance.
**Aim:** The study was to assess the use of antimicrobials in tertiary care hospital in central India
**Material and methods:** A retrospective analysis of 200 case sheets of paediatric inpatients was done using medical records. Data was analysed for average number of drugs prescribed, antimicrobials prescribed by generic name or brand name, percentage of antibiotics among the prescribed drugs etc
**Statistical tests:** Data was expressed as number, percentage and Mean±SD.
**Results:** In our study, we found out that mean age of paediatric patients was 5.6 yrs. Our results showed tendency of polypharmacy with maximum number of prescriptions were having 3 drugs (39%). 2 antibiotics were prescribed to 79% of the patients. Cefexime was most commonly prescribed antibiotic. 48.92% drugs were prescribed in generic name. 96% of antibiotics were prescribed by Parenteral route.
**Conclusion:** Antibiotic resistance is an emerging problem worldwide which can be controlled by rational prescription, restricting the number of antimicrobial prescription and appropriate selection of the drug.
**Keywords:** Antibiotics, Paediatric, prescription pattern, rational

## 1. Introduction

We live in a world which is heavily populated by microorganisms of astonishing diversity. The paediatric group populations are commonly affected by various infectious diseases in this environment. Antibiotics are commonly prescribed to treat various infectious conditions.[1,2] Several studies have reported that 50% to 85% of children receive antibiotics in developed and developing countries.[3] Rational antibiotic prescription is very important to avoid multiple drug resistance, treatment failure, non-compliance and increase in cost of treatment.[4]

In case of prescribing for children, there is a need to consider the etiopathogenesis of the disease conditions as well as the developmental stage of the child at that particular time. Prescriptions can be described as rational and irrational with the latter having possible consequences such as adverse drug reactions (ADRs), increased frequency of drug-drug interactions and increased healthcare costs.[5] Regular audit of prescriptions is essential in identifying the various types of irrational prescribing such as polypharmacy, and over prescription of injectables among others.[6] It is also necessary to describe trends and follow adherence to various treatment guidelines. Irrational use of antimicrobials has been identified as a major problem in many paediatric prescription studies; this could lead to antimicrobial resistance, treatment failures and increased healthcare costs.[7]

Strategies should be made to optimize antibiotic use and this will minimize the antibiotic resistance. Following the strategy developed by WHO in a collaborative work with international network for rational use of drug (INRUD)[8,9] we can detect the problems in drug prescribing such as polypharmacy, inclination for branded products, over use of antibiotics or injections and prescribing out of formulary or essential drug list.

Prescription pattern audit is a continuous ongoing process. To know the rational use of drugs in paediatric inpatients we planned to carry out this study in our hospital.

## 2. Material methods

A cross- sectional retrospective study was carried out using medical records of the paediatric inpatients in our tertiary care hospital from the period of January to march 2015. Patients of both genders between ages from 1 month to 13 years were included in the study. Neonates were excluded.

Using the WHO model of drug utilization study, a total of 200 patient records were selected for the 3 months

period by systematic sampling. The information retrieved from the case notes included bio-demographic data, working diagnoses, list of prescribed drugs and their routes of administration. The following drug use indicators were assessed using the WHO guidelines on investigation of drug use in health care facilities: average number of drugs per prescription, percentage of encounters with antibiotics, percentage of drugs prescribed by generic name, percentage of drugs prescribed from essential drug list and percentage of encounters with injection.[10] Intravenous fluids, blood transfusion and nutritional preparations were not included in the study.

Data regarding drugs on the utilization of antibiotics and patient's data were computed using MS Excel and statistical analysis was done by using SPSS (Statistical package for the social sciences). The results were expressed as percentages or as mean ±standard deviation (SD).

## 3. Results

In our study, we found out that mean age of paediatric patients was 5.6 yrs. More number of male patients were admitted (53%) as compared to females (47%). Most of the patients were of age group 1-5 years and least number of patients belonged to age group 1 month to 1 year.[Table 1]

**Table 1: Demographic characteristics of patients**

| Age | Number (percentage) |
|---|---|
| 1 month to 1 year | 17(8.5) |
| 1 year to 5 years | 99(49.5) |
| 5 years to 13 years | 84(42) |
| **Gender** | |
| Males | 106(53) |
| Females | 94(47) |

Our results showed tendency of polypharmacy with maximum number of prescriptions were having 3 drugs (39%). Most of the paediatric patients were prescribed 2 antibiotics (79%)[Table 2,3]. Acute gastroenteritis (AGE), Lower respiratory tract infections (LRTI) and meningitis were most prevalent diseases in paediatric inpatients.[Table 4] Our study showed that AGE is most prevalent in age groups 5-13 years of children, while LRTI was found to be more prevalent amongst 1-5years of children.

**Table 2: Total number of drugs prescribed per patient**

| Drugs/patient | Number(Percentage) |
|---|---|
| 1 | 1(0.5) |
| 2 | 7(3.5) |
| 3 | 78(39) |
| 4 | 54(27) |
| 5 | 34(17) |
| 6 | 23(11.5) |
| 7 | 2(1) |
| 8 | 1(0.5) |

**Table 3: Total number of Antibiotics prescribed per patient**

| Antibiotics/patient | Number(percentage) |
|---|---|
| 1 | 17(8.5) |
| 2 | 158(79) |
| 3 | 21(10.5) |
| 4 | 2(1) |
| 5 | 2(1) |

**Table 4: Diagnosis pattern in different age group**

| Diagnosis | 1 month to 1 year | 1 year to 5 years | 5 years to 13 years | Total |
|---|---|---|---|---|
| Acute GE | 9 | 19 | 35 | 63 |
| URTI | 2 | 7 | 3 | 12 |
| LRTI | 9 | 22 | 10 | 41 |
| Meningitis | 8 | 10 | 8 | 26 |
| Malarial fever | 2 | 7 | 11 | 19 |
| Dengue fever | 0 | 9 | 7 | 16 |
| Enteric fever | 0 | 3 | 6 | 9 |
| Others | 1 | 8 | 3 | 12 |

Acute GE- Acute gastroenteritis, LRTI-Lower respiratory tract infection, URTI- Upper respiratory tract infection, others- infective hepatitis, viral infections etc.

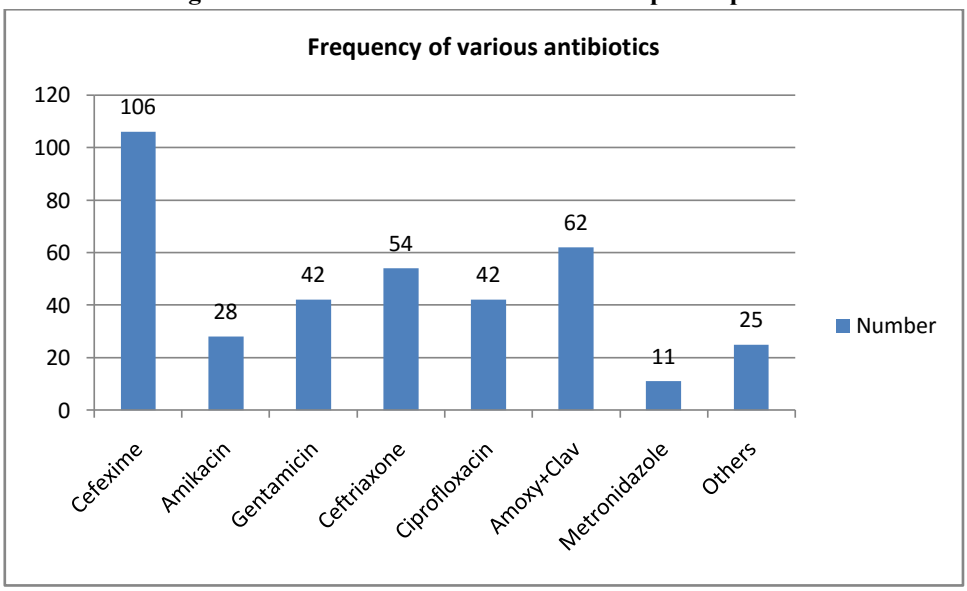
Cefexime is the most commonly prescribed antibiotic followed by Amoxicillin- Clavulanic acid combination[Table 5, Figure 1].

**Table 5: Frequency (%) of individual antibiotic for specific diagnosis**

| Diagnosis | Cefexime | Amikacin | Gentamicin | Ceftriaxone | Cipro-floxacin | Amoxycillin + Clavulinate | Metro-nidazole | Other dugs |
|---|---|---|---|---|---|---|---|---|
| Acute GE (%) | 43 (40.6) | 0 | 19 (18) | 7 (6.6) | 12 (11.3) | 11 (10.3) | 8 (7.5) | 6 (5.7) |
| URTI (%) | 7 (30.5) | 5 (21.7) | 0 | 0 | 4 (17.4) | 6 (26) | 0 | 1 (4.4) |
| LRTI (%) | 31 (39.2) | 13 (16.5) | 11 (14) | 4 (5) | 1 (1.2) | 17 (21.5) | 0 | 2 (2.6) |
| Meningitis (%) | 3 (5.3) | 6 (10.5) | 3 (5.3) | 23 (40.3) | 9 (15.8) | 8 (14) | 0 | 5 (8.8) |
| Malarial fever (%) | 14 (38) | 0 | 2 (5.4) | 7 (18.9) | 5 (13.5) | 6 (16.2) | 0 | 3 (8.1) |
| Dengue fever (%) | 3 (12.5) | 2 (8.33) | 3 (12.5) | 5 (20.83) | 1 (4.17) | 6 (25) | 1 (4.17) | 3 (12.5) |
| Enteric fever (%) | 2 (7.69) | 1 (3.85) | 2 (7.69) | 5 (19.24) | 8 (30.77) | 4 (15.38) | 2 (7.69) | 2 (7.69) |
| Others (%) | 3 (16.68) | 1 (5.6) | 2 (11.11) | 3 (16.68) | 2 (11.11) | 4 (22.23) | 0 | 3 (16.68) |

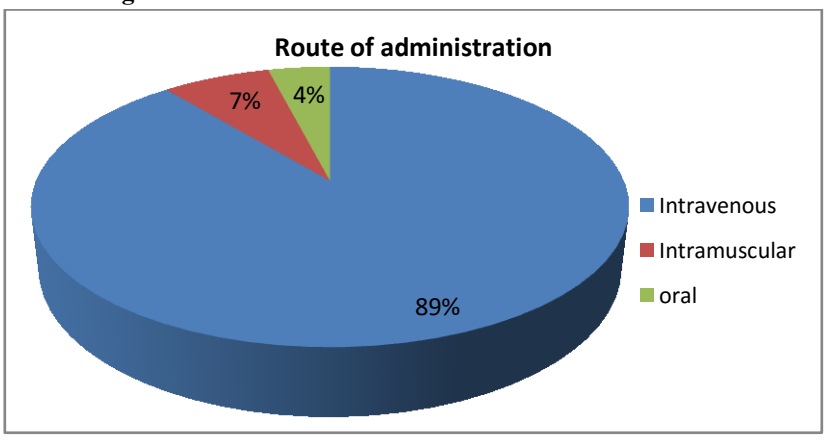
Acute GE- Acute gastroenteritis, LRTI-Lower respiratory tract infection, URTI- Upper respiratory tract infection, others- infective hepatitis, viral infections etc. other drugs= erythromycin, chloroquine, ofloxacin, meropenam etc.

**Figure 1: Number of various antibiotics in prescriptions**




In present study, 48.92% drugs were prescribed in generic name. In most of the prescriptions, antibiotics were prescribed by Parenteral route (96%). In oral dosage form, 53.2% were prescribed syrup while 46.8% were given tablet type dosage form. Culture sensitivity results were not mentioned in any of the case sheets.

**Figure 2: Route of administration of various antibiotics**



## 4. Discussion

The present study was carried out by analysing 200 inpatients case sheets of paediatric patients randomly selected from medical records over 3 months period.

There was preponderance of male patients in our study which could be the reflection of general pattern of sex distribution in the population of the vicinity of study site. This could also be due to the common tendency of overcautious apprehension of parents towards the health of male child. This findings are also seen in other similar previous studies.[11,12] More number of paediatric patients admitted in the wards belonged to 1-5 years of age (49.5%) suggesting that children of these age group are more susceptible for infections.

Average number of drugs per person is an important index of prescription audit. Mean number of drugs per prescription should be kept as low as possible. The WHO recommends that the average number of drugs per prescription should be less than two.[13] Averege number of drugs prescribed per case was 4.23. It could be due to in-patients nature of the study. In Arute JE study and Triruthopu NS study shows average number of drugs per prescription was 4.54±1.71 and 4.56 respectively and more than present study.[14,15] Higher figures (polypharmacy) always lead to increased risk of drug interaction, adverse effects, development of bacterial resistance, increased hospital cost.

Multiple antibiotics were prescribed in most of the prescriptions(91.5%) and the average number of antibiotics per prescriptions were 2.16±0.72 ,both of which are more as compared to previous similar studies like Choudhury DK, Kanish *et al* and Arute JE studies.[11,12,14] In Palikhe N study 79% of patients received multiple of antibiotics(more than 1).[16] In present study percentage of multiple antibiotics prescribed is more and this indicates delay of diagnosis or selection of inappropriate antibiotic without prior culture sensitivity testing. This could also be due to more severe form of diseases which failed to respond to single antibiotic treatment. All the antibiotic prescriptions were based on clinical diagnosis, not on culture sensitivity test report. It is important to obtain proper specimen, examination and culture for selection of proper antibiotics. This can prevent development of antibiotic resistance, reduces the side effects of drugs and also decrease the cost of treatment.[17]

Cefexime and Amoxicillin-Clavulanic acid combination were most commonly prescribed antibiotics against diseases like AGE, LRTI and URTI. This could be due to their effectiveness in these conditions as well as the routine availability of these drugs in our setup. Ceftriaxone was commonly used in cases of meningitis and enteric fever. These results were comparable with other studies like Choudhury DK and Kanish *et al* and Van Houten MA study.[11,12,18]

In present study 96% of antibiotics were administered by parenteral route and 4% by oral route. WHO recommends lesser use of injection as it helpful in reducing the cost of treatment and its disadvantages.[11] But some factors facilitate the use this route. In oral dosage forms the most commonly used dosage form was syrup. Children are comfortable with the dosage form like syrup and drops compared to tablets and capsules. It increases compliance and helps in completing the treatment regimen.

## 5. Conclusion

In this study antibiotic prescription pattern was not rational as there is polypharmacy, overuse and inappropriate use of antibiotics without prior culture sensitivity testing, excessive Parenteral use of antibiotics administration. Though a conclusive inference could only be made after analysing larger number of cases. Less number of samples and single study site were limitations of our study. Strict antibiotic prescribing policy significantly overcome the overuse of antibiotics and reduces the development of resistance to antibiotics.

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