

## **A Study of Prescription Pattern of Antibiotics in Pediatric In-Patients of Mc-Gann Teaching Hospital Shivamogga Institute of Medical Sciences (SIMS), Shivamogga, Karnataka.**

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### **Abstract**

**Introduction:** Rational antibiotic prescription is very important to prevent antimicrobial resistance. So the present study was conducted to know the rational use of drug in paediatric in-patient of Mc-Gann teaching hospital, SIMS, Shivamogga.

**Material and Methods:** A retrospective study of 2 months duration was undertaken during May-June of 2013. A total number of 100 patients case sheets were utilized for our study from paediatric in-patients department of Mc-Gann teaching hospital. Patients were included with history of various infections. The data were analysed by using SPSS.

**Result and Conclusion:** The mean age of paediatric patient was 5.8. The average number of drugs per encounter was 4.26. The average number of antibiotic per patient was 2.13. In present study antibiotic were 50% of total drugs prescribed and 98.1% of antibiotics were prescribed from the WHO list of essential medicine, 2013. Most common prevalence of disease among study patients sample was acute gastroenteritis. The most commonly prescribed antibiotics were Cefixime and Gentamicin. In present study 47.59% of antibiotics were prescribed in generic name. Most commonly preferred route for antibiotic administration was intravenous route (93%) and next common was oral route.

The present study on antibiotic prescription pattern reveals prescribing pattern was not rational, as there is polypharmacy, less use of generic drugs, over use and inappropriate use of antibiotics, and excessive parenteral use of antibiotics administration. But prescription pattern was rational regarding adhering to WHO list of essential medicine. Strict adherence to the antibiotic prescription policy can significantly overcome the overuse of antibiotics and reduce the development of resistance to antibiotics.

**Key Words:** Paediatric, Antibiotics, Rational, Prescription pattern, Generic

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### **I. Introduction**

Pediatrics is the specialty of medical science concerned with the physical, mental and social health of children from birth to young adulthood<sup>1</sup>. We live in world which is heavily populated by microorganisms of astonishing diversity. In this environment the paediatric group populations are commonly affected by various infectious diseases. Antibiotics are commonly prescribed to treat various infectious condition<sup>2,3</sup>. Several studies reported that 50% to 85% of children receive antibiotics in developed and developing countries<sup>4</sup>. Rational antibiotic prescription is very important to avoid multiple drug resistance, treatment failure, non-compliance and increase in cost of treatment<sup>5</sup>. Rational use of drug method can be done by following six steps such as- 1)defining the patients problems(diagnosis), 2)defining effective and safe treatment(drugs and nondrug options), 3)selecting appropriate drug, dosage, duration, 4) writing a legible prescription, 5)giving patient adequate information and 6)proper planning to evaluate treatment response<sup>6</sup>.

Emergence of antibiotic resistance is a worldwide phenomenon and it is due to over use of antibiotics<sup>6</sup>. Increased self prescribing, poor choice of antibiotics, not following routine susceptibility testing and inadequate surveillance are other factors contributing to development of antibiotic resistance<sup>6,7</sup>. Dr.M.Ipp study showed that antibiotics are unnecessarily prescribed for viral infections such as common cold<sup>8</sup>. 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)<sup>8,9</sup> 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. As prescription pattern analysis is continuous processes, the present study was done, to know the rational use of drug in paediatric in-patients of Mc-Gann teaching hospital, SIMS, Shimoga.

## II. Materials And Methodology

A retrospective study of 2 months duration was undertaken during May-June of 2013. A total number of 100 patients case sheets were utilized for study from pediatric in-patients department of Mc-Gann teaching hospital attached to SIMS, Shimoga. Patients were included in study with age between 1 month to 13 years with diagnosis of respiratory, gastrointestinal, urinary tract and other infections. Neonates were excluded. Randomization was done by selecting alternative case sheets. The data's were collected in proforma, which includes name, age, gender, diagnosis, number of drugs prescribed, number of antibiotics prescribed with dose and routes of drug administration and also condition of patient on discharge were recorded. Intravenous fluids, blood transfusion and nutritional preparations were not included in the study. Source of data was collected from patient's case sheets obtained from record section. Ethical clearance was taken from institutional ethical committee.

Drugs data 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  $\pm$  standard deviation (SD).

## III. Results

The mean age of pediatric in-patient was 5.8 (years). More number of patients were belong to 1-5 years age group (47%), next in 5-13 years group (43%) and less number in 1 month – 1 year group (10%). The male patients accounted for admitted were 54 percent, whereas the female patients were accounted for admitted 46 percent (Table no 1).

**Table no1: Paediatric in patient characteristics**

Parameters	Percentage (%)
Age	
1 month – 1 year	10
1-5 year	47
5-13 year	43
Age (mean in months )	67.89 $\pm$ 40
Gender	
Male	54
Female	46

The average number of drugs per encounter was 4.26. All patients were exposed to more than one drug. The average number of antibiotic per patient was 2.13. Multiple antibiotics were prescribed in 92% patients, only one antibiotic was prescribed in 8% patients, two antibiotics in 76% patients, three antibiotics in 12% patients, four antibiotics in 3% patients and five antibiotics in one percent.

In present study antibiotics were prescribed 50% of total drugs. In present study 98.1% of drugs were prescribed from the WHO list of essential medicine, 2013.

**Table no2: Paediatric in-patients exposure to drugs and antibiotic**

Drugs /patient	% (No )	Antibiotic/patient	% (No)
1	0	1	8
2	3	2	76
3	24	3	12
4	39	4	3
5	18	5	1
6	12		
7	2		
8	2		
Range	1-8	RANGE	1-5
Mean $\pm$ SD	3.33 $\pm$ 2.11	MEAN $\pm$ SD	2.13 $\pm$ 0.62

More than one antibiotic was prescribed for patients with diagnosis of acute gastroenteritis (GE), lower respiratory tract infection (LRTI), viral fever, upper respiratory tract infection (URTI), pneumonia, enteric fever and dengue fever. Only one antibiotic was prescribed in infective hepatitis.

Most common prevalence of disease among study patients sample was acute gastroenteritis (20%). Enteric fever more was common in above 5 years of children (75%). LRTI (55%) and URTI (100%) were more common in age groups between 1-5 years of children (Table no 3).

**Table no3:** Diagnosis pattern in different age groups

DIAGNOSIS	1month-1yr	1-5yr	5-13yr	Total
Acute GE	3	7	10	20
LRTI	2	5	2	9
Viral fever	0	3	5	8
URTI	0	6	0	6
Pneumonia	0	5	1	6
Enteric fever	0	1	9	10
Dengue fever	0	4	12	16
OTHERS	4	13	8	25

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

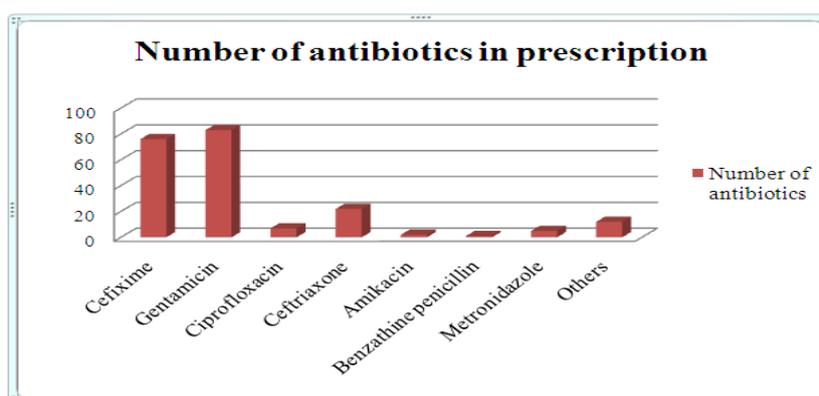
Cefixime was most commonly prescribed in acute GE followed by gentamicin and other antibiotics. Gentamicin (37.98%) commonly prescribed among all antibiotics and next most commonly prescribed was Cefixime (33.17%) (Table no 4).

**Table no4:** Frequency (%) of individual antibiotic for specific diagnosis

Diagnosis	Cefixime	Gentamicin	Ciprofloxacin	Ceftriaxone	Amikacin	BP	Metronidazole	Others
AGE %	17 (45)	16 (42)	1 (3)	0	0	0	4 (10)	0
LRTI %	9 (47)	8 (42)	0	0	0	0	0	4 (11)
Pneumonia %	3 (25)	5 (42)	1 (8)	2 (17)	0	0	0	4 (8)
Viral fever %	7 (44)	8 (50)	0	1 (6)	0	0	0	2
URTI %	6 (50)	6 (50)	0	0	0	0	0	4
Enteric fever %	4 (15)	9 (33)	5 (18)	8 (30)	0	0	0	1 (4)
Dengue fever %	11 (38)	13 (45)	0	3 (11)	0	0	1 (3)	3 (3)
Others %	12 (31)	14 (36)	2	8 (21)	1 (2)	2 (2)	1	7 (8)

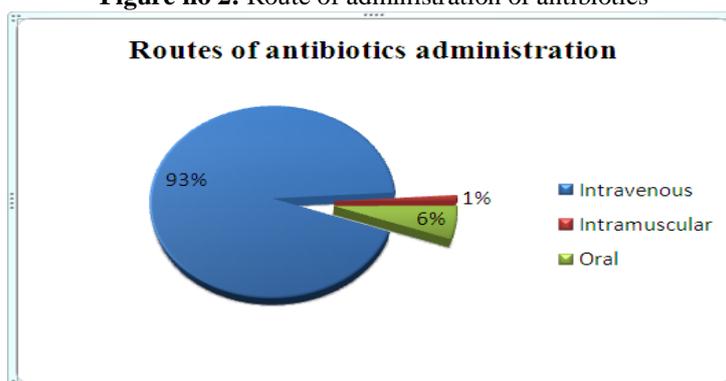
AGE= Acute gastroenteritis, LRTI= Lower respiratory tract infection, URTI= Upper respiratory tract infection, others=infective hepatitis, appendicitis. BP=Benzathine penicillin, others= erythromycin, chloroquine, ofloxacin, meropenam etc.

**Figure no 1:** Number of antibiotics used in prescription



In present study 47.59% of antibiotics were prescribed in generic name. In this study 201(94.36%) antibiotics of the total antibiotics were administered by parenteral route (intravenous and intramuscular routes) followed by 12(5.6%) antibiotics by oral route.

Figure no 2: Route of administration of antibiotics



In oral route dosage forms: 51.5% of patients were given syrup type dosage form and 48.4% of patients were given tablet type dosage form.

For 100 patients infectious diseases were clinically diagnosed and treated with antibiotics, but specimens were taken for culture in only 25 cases to identify the organisms. Culture results were not mentioned in case sheets. Adverse drug reaction were not recorded in any of the case sheets.

#### IV. Discussion

The present study was carried out in 100 prescriptions randomly selected pediatric in-patients case sheets from record section of Mc-Gann teaching hospital, SIMS, Shivamogga.

The more number of paediatric patients belongs to age group 1-5 years (47%) and next in 5-13 years (43%). This indicates more chances of infections in 1-5 years age group. Choudhury DK study shows more patients belong to 5-12 years<sup>11</sup>.

The male patients (54%) were more compared to female (46%). The same findings were seen in other studies like Choudhury DK, Kanish et al study<sup>11, 12</sup>.

The average number of drugs prescribed per encounter was 4.26. 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  $4.54 \pm 1.71$  and 4.56 respectively and more than present study<sup>13, 14</sup>. The WHO recommends that the average number of drugs per prescription should be less than two<sup>15</sup>. In present study this number is more than two, so it indicates polypharmacy<sup>15</sup>. The average number of drugs per prescription value should be low as possible to prevent the unfavorable outcomes of polypharmacy such as increased risk of drug interactions, increased cost of therapy, non-compliance and emergence of resistance in case of use of antimicrobials.

The average number of antibiotics prescribed per patient was  $2.14 \pm 0.62$  and this number is more compared to Choudhury DK, Kanish et al and Arute JE studies<sup>11, 12, 13</sup>.

In present study 50% of antibiotic were prescribed and this percentage is less compared to Kanish et al study and more compared to Shankar et al study<sup>12, 16</sup>.

The multiple antibiotics were prescribed in 92% patients and this is more compared to Choudhury DK study (29%)<sup>11</sup>. This indicates severity of disease or failure of treatment with one antibiotic. In present study only one antibiotic was prescribed in 8% of patients and five antibiotics were prescribed in one percent of patient. In Palikhe N study 79% of patients received multiple of antibiotics and 21% of patients received only one antibiotic<sup>6</sup>. In present study percentage of multiple antibiotics prescribed is more and this indicates delay of diagnosis or selection of inappropriate antibiotic.

Cefixime and Gentamicin both drugs were prescribed in most of the infectious diseases like acute GE, pneumonia, URTI, bronchiolitis, dengue fever. Enteric fever was generally treated with Ceftriaxone and only one antibiotic was prescribed in infective hepatitis.

Most common prevalence of disease among the study was acute GE and it is treated commonly by Cefixime and Gentamicin. In present study most commonly prescribed antibiotic was third generation cephalosporin and this result was comparable with other studies like Choudhury DK and Kanish et al and Van Houten MA study<sup>11, 12, 17</sup>.

Most of the antibiotic prescriptions were based on clinical diagnosis, not on culture report. In 25% of cases antibiotics were prescribed based on culture report and in most of case sheets culture results were not mentioned. It is important to obtain proper specimen, examination and culture for selection of antibiotics. This can prevent development of antibiotic resistance, reduces the side effects of drugs and also decrease the cost of treatment. This will help for selection of appropriate antibiotics<sup>18</sup>.

In present study 98.1% of drugs were prescribed from the WHO list of essential medicine, 2013, and this is more compared to Kanish et al study<sup>12, 19</sup>. Drug prescription from essential list of medicine is beneficial in terms of cost effectiveness and safety of the drugs<sup>11</sup>.

In present study 47.59% of generic name antibiotics were prescribed, this percentage is less compared to Kanish et al study (58%)<sup>12</sup>.

In present study 94.36% of antibiotics were administered by parenteral route and 5.6% by oral route. Parenteral route is expensive and associated with other problems<sup>20</sup>. WHO recommends lesser use of injection as it helpful in reducing the cost of treatment and its disadvantages<sup>11</sup>. 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.

Recording adverse drug reaction is very important to evaluate the safety of drugs. In no case sheets adverse drug reactions were reported and it may be there is no proper documentation done.

In present study most common antibiotics prescribed was Cefixime belongs to third generation cephalosporin. Next most commonly prescribed was Gentamicin belongs to aminoglycoside. Ceftriaxone was also prescribed as third most common drug.

## V. Conclusion

In present study antibiotic prescription pattern was not rational as there is polypharmacy, less use of generic drugs, overuse and inappropriate use of antibiotics, excessive parenteral use of antibiotics administration. Prescription pattern was rational regarding adhering to national formulary list of drugs, 2013. As the resistance of antibiotics is increasing, so they should be selected based on culture report and limited use of antibiotics should be done in patients especially in paediatrics.

Limitation of present study was sample size was less and done in single hospital, so if sample size is more and taken from different hospitals then study will be more effective.

Rational use of drugs is largely influenced by knowledge, attitude and its importance has to be emphasized at the earliest. This should be included in medical education to have long term beneficial effects.

Strict antibiotic prescribing policy significantly overcome the overuse of antibiotics and reduces the development of resistance to antibiotics. Prescription pattern analysis or auditing types of studies are to be conducted on large scale in different health sectors then study will be more effective and help in making local policy for antibiotics prescription in paediatric and also in other specialties.

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