



**PRESCRIBING PATTERN OF ANTIBIOTICS IN PAEDIATRIC PATIENTS-  
A REVIEW**

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Article Received on 20/03/2018

Article Revised on 10/04/2018

Article Accepted on 01/05/2018

**ABSTRACT**

Antibiotics are one of the most widely used drugs among pediatric patients. The main aim of our review is to determine the prescribing trend of antibiotics in pediatric patients and also to identify the most efficient and highly prescribed antibiotics. Evaluation of the prescribing pattern helps in minimizing adverse events as children are more susceptible to them and shall also aid in providing cost effective medical care. The assessment of the prescription will also help to know the attitude of the physician towards prescribing and to provide rationality in the prescription. The ultimate goal of this review is to discuss the antibiotic use in pediatrics in various hospitals and to determine the most commonly prescribed antibiotic class.

**KEYWORDS:** Antibiotics, Pediatrics, beta lactam, prescription pattern.

**INTRODUCTION**

Antibiotics are the substances that destroy or inhibit the growth of other microorganisms and are used in the treatment of external or internal infections.<sup>[1]</sup> Pediatrics is the branch of medicine dealing with the development, diseases and disorders of children from age ranging from 1-12 yrs.<sup>[3]</sup> Antibiotics are the most commonly prescribed drugs in pediatrics. Study of prescribing pattern is a part of medical audit and seeks to monitor, evaluate and if necessary, suggest modification in prescribing practices to make medical care rational and cost effective.

The indiscriminate use of antibiotics increases the risk of bacterial drug resistance and this have prompted the need to use antibiotics judiciously in pediatric practice. Many of the antibiotics are unnecessarily prescribed for viral infections therefore a proper selection of antibiotics, along with prescribing of appropriate dose, formulation, response and ADR must be considered very seriously.<sup>[3]</sup> The main antibiotics that are used include, beta lactam antibiotics, aminoglycosides, fluoroquinolones, and macrolides etc. Pediatric population is prone to suffer from recurrent infections of respiratory tract and gastrointestinal tract, lower respiratory tract infections are leading cause of death in children below 5 years of age.<sup>[2]</sup>

To overcome the resistance problems and to assure safety, antibiotic guidelines are being set. These guidelines help the physician to prescribe antibiotics rationally to pediatric patients when undeniably indicated.<sup>[5]</sup> Drug Utilization in pediatric pharmacotherapy is all the more essential since one third

of total prescriptions in pre school going children are systemic antibiotics. Therefore the monitoring of antibiotic use through examination of prescribing trends in clinical settings and associated efficacy will serve as a baseline data for formulating standard treatment guidelines to promote rational antibiotic use.<sup>[4]</sup>

In the following we will discuss some studies about prescription pattern of antibiotics in pediatrics Study by Laya et al<sup>[1]</sup> which was a prospective and observational study, over a period of 6 months,. Evaluates the antibiotic prescriptions given to the pediatric patients. Study includes a sample size of about 109 patients. It was observed that respiratory infections were the most reported infection in pediatrics. The prescriptions were analyzed for the percentage of drugs prescribed by generic name, percentage of encounters with an antibiotic prescribed, frequency of treatment, duration etc.

Out of 155 antimicrobial agents prescribed, the major class were beta lactam antibiotics which includes cephalosporins and penicillins about 58%, followed by aminoglycoside antibiotics about 25%. Cephalosporins were mostly used for infection caused by Bacteria in pediatrics, among cephalosporins more than half of prescribed once were Ceftriaxone which is a third generation cephalosporin. The most preferred dosage forms were injectable, because of the urgent control of infection and increase the cost of therapy. This study suggests that there should be strict control over prescribing antibiotics in pediatric population. This study also highlights the need for rational drug use practices

like prescribing by generics and drugs under essential drug list.

Study by Kailash *et al*<sup>[2]</sup>, was a hospital based retrospective study which was done for 6 months analyzes various parameters like age, gender, combination therapies etc. The most prevalent disease among patients was pneumonia followed by gastroenteritis, and LRTI in third position. The average number of antibiotics per prescription in the study was 1.86, WHO recommends that average number of drugs per prescription should be less than 2. In this study cephalosporins are found to be widely prescribed which agrees with Laya *et al*<sup>[1]</sup>, and ceftriaxone was leading antibiotic prescribed. The least prescribed were Ofloxacin, Ampicillin, Chloramphenicol. Laya *et al*<sup>[1]</sup> study was done in Banglore India but Kailash *et al*<sup>[2]</sup> study was done in Nepal, but both the studies proves that beta lactam antibiotics are most efficient due to their broad spectrum of activity and tolerance. In contrast with Laya *et al*<sup>[1]</sup> this study discuss about combination of antibiotics. The most commonly used combination was ceftriaxone and tazobactam. This study proves that combination of antibiotic therapy achieves better outcome compared to monotherapy, it has better coverage for typical microorganism in pneumonia. This study gives an overview of pattern of antibiotic use, since as well as combined drugs prescriptions. Beta lactam antibiotics were the highly prescribed antibiotics as well as the most preferred for combination therapy among pediatric patient.

Study by Ashok Kumar *et al*<sup>[3]</sup> and Ravika kanish *et al*<sup>[4]</sup> are similar studies conducted in the Northern part of India. Both are prospective observational studies, and differs in sample size which is more in Ashok<sup>[3]</sup>'s study. Both study reveals that beta lactam (cephalosporins) are the maximally prescribed followed by aminoglycosides. Among cephalosporins, Ceftriaxone was the most prescribed one. Among Penicillins, ampicillin+clavulanic acid has been commonly prescribed. Culture sensitivity was done in most of the patients.

In Ravika *et al*<sup>[4]</sup> study the average number of antimicrobials prescribed was 1.9 and in Ashok *et al*<sup>[3]</sup> the average was 1. The main difference between these 2 studies are Ashok *et al*<sup>[3]</sup> study was conducted both in teaching and in non teaching hospitals, it was found that total number of drugs and number of antibiotics prescribed were rational.

Study by Akhil *et al*<sup>[5]</sup> discussed about the adverse reaction of antibiotics. It was a prospective observational study. It helps to identify the effective antibiotic by studying its adverse effects also. Among the total antibiotics prescribed cephalosporins were 80%, followed by aminoglycosides, Quinolones. Among cephalosporins, 99% of ceftriaxone and 1 % cefixime. In

most cases the widely occurring were Gastroenteritis, pneumonia, Urinary tract infection etc. One antibiotic was prescribed for about 83 % of patients and two antibiotics for 16 % and three for 1% patients. Among total 14 ADRs observed, 86 % ADR occurred in cephalosporins which include rashes, diarrhea, vomiting etc and 7 % with Quinolones. Adverse drug reactions in children can have a relatively more severe effect when compared to adults. 79% of ADR caused gastrointestinal disturbances, while 14.1 caused dermatological disorders. The main conclusion made was Antibiotic prescriptions showed some risks such as presence of ADR and prescription other than monotherapy of antibiotics.

Study by Khaja *et al*<sup>[6]</sup> and Stinson *et al*<sup>[7]</sup> discuss about the antibiotic usage in respiratory tract infection like pneumonia, bronchitis etc. Khaja *et al*<sup>[6]</sup> studies about pediatric patients with pneumonia which is a prospective study, whereas Stinson *et al*<sup>[7]</sup> discuss about the antibiotic use on lower respiratory tract infections. In both studies, combination therapy was mainly recommended. Amoxicillin+clavulanic acid combination was the most common antibiotic combination, followed by monotherapy such as ceftriaxone, cefotaxime. Penicillin and its derivatives were most commonly used antibiotic monotherapy, followed by cephalosporins. Blood culture was studies only in 35 cases. Cephalosporin derivatives were commonly prescribed antibiotics in less than 1 yr of age and more than 5 yrs of age. For children with severe pneumonia, IV beta lactam or a combination of beta lactam and beta lactamase inhibitor may be prescribed. Young infants should receive a beta lactam and aminoglycosides because of their tendency to get Gram negative infection.

From the above studies it has been clearly found out that beta lactam antibiotics are the most commonly prescribed antibiotics in pediatric.

The following two studies, which was done by Sattanathan *et al*<sup>[8]</sup> and Deepak Bhatt *et al*<sup>[9]</sup>, discuss about the prescription pattern for beta lactam antibiotics in pediatrics.

Study by Sattanathan *et al*<sup>[8]</sup> it was a prospective observational study, which discussed about the prescription pattern of beta lactam antibiotics and their ADR in pediatrics. Beta lactam antibiotics are named from the beta lactam ring in their chemical structure; include penicillins, cephalosporins and others. Here a total of 90 prescriptions containing beta lactam antibiotics were assessed from patients' medical record. The numbers of male patients were higher than female subjects. This was due to the fact that more males are admitted than females for treatment of various disease conditions. Ceftriaxone was most frequently prescribed followed by Ampicillin and Cefotaxim. Prescribing frequency of newer beta lactam antibiotics was low.

Highest number of ADRs were found as hypersensitivity and GI diarrhea, and least seizures were reported.

Study by Deepak *et al*<sup>[9]</sup> was a prospective observational study, which includes 150 patients, this study result agrees with Sattanathan *et al*<sup>[8]</sup>, the highest number of beta lactam antibiotics prescribed were ceftriaxone followed by amoxicillin+clavulanic acid and cefotaxim. Combination therapy was the most effective one, 33 out of 150 were given combination drugs.

Study done by Ashraf *et al*<sup>[10]</sup> and Lita Susan<sup>[11]</sup>, discuss about the prescribing pattern of drugs in pediatrics department. Majority of the pediatric patients were suffering from pneumonia followed by diarrhea, meningitis, UTI, and enteric fever. From all the drugs prescribed, about 43% were antibiotics, where as NSAIDs constitute only 14 %. Majority of the patients were given multiple antibiotics. Cefotaxim was the leading antibiotics followed by Cefpodoxime. Combination of antibiotics were prescribed to about 33% of which cefotaxim in combination with sulbactam was at the top. In this study it was observed that antibiotics were prescribed even in viral infections, which shows the inappropriateness of prescribing antibiotics.

## CONCLUSION

From all these 11 study journals we have reviewed, all the studies agrees with the result that beta lactam antibiotics are the maximum prescribed ones among pediatric patients and proves to be the most efficient also. Correct diagnosis of disease and its management constitute important aspect of patient care which is even more important in the case of pediatric patients. Continuing education about rational drug use and development of easy to use treatment guidelines for common diseases in children is recommended. In addition, collaborative researches, (pharmacist, physician and microbiologist) can be performed with a clear understanding of need for microbiological diagnosis, pharmacist intervention and physicians good judgments in clinical situation.

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