

Prescribing pattern of antimicrobials used for treatment of acute respiratory tract infections in children

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Abstract

Acute respiratory infections (ARI) are among the most common causes of physician consultation in the pediatric age group 4. The underlying etiology is typically viral, however, at the outpatient level; antibiotics are often used for the treatment of many ARI episodes even where therapeutic benefit may be unlikely. The present study was undertaken to analyze the current prescribing trends of antimicrobial use in acute respiratory tract infection in children in a tertiary care hospital. A total of 200 OPD cases which included both URTI and LRTI patients were analysed out of the 2587 cases of ARI screened for the study. Penicillins were the most commonly prescribed class of drugs and we noted a favorable trend towards monotherapy. All drugs in our study were prescribed by generic name.

Keywords: Acute Respiratory Infections, Antimicrobials, children.

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INTRODUCTION

Acute respiratory infections (ARI) remain the leading cause of death in young children, resulting in 1.9 million childhood deaths per year in developing countries, 20% of these deaths are from India¹. Acute respiratory infections (ARI) can be classified as: -a) Upper respiratory tract infections (URTI) include the common cold, laryngitis, pharyngitis/tonsillitis, acute rhinitis, acute rhino sinusitis and acute otitis media. b) Lower respiratory tract infections (LRTI) include acute bronchitis, bronchiolitis, and pneumonia². Recent estimates suggest that the global incidence of hospital admissions in young children related to severe or very

severe lower respiratory tract infections may be as high as 11.9 million (95% CI 10.3–13.9 million) and 3.0 million (2.1–4.2 million) annual episodes respectively, representing a huge burden for the health systems, typically fragile in such settings³. ARI are among the most common causes of physician consultation in the pediatric age group⁴. Typically, the underlying etiology is viral, hence, not requiring, in principle, antibiotic prescription. At the outpatient level, however, antibiotics are often used for the treatment of many ARI episodes including non-specific symptoms such as sore throat, common cold and rhinitis or bronchospasm^{5–7}, for which there is an unlikely therapeutic benefit^{8,9}. In other instances, the existing symptomatology, highly suggestive of a bacterial origin or with signs of severity, or a pre-existing co-morbidity predisposing to bacterial infections, clearly justifies the use of antibacterial agents. Antibiotic treatment is beneficial to children only if symptoms persist for 10-14 days without improvement¹⁰. Most instances of URTI resolve spontaneously without antimicrobial therapy according to Centre for Disease Control (CDC) guidelines.¹¹ The quality of medical care requires prescribing to be judicious, appropriate, safe, effective and economic. “Good” prescribing is a complex balance between various conflicting factors. The aim is to

achieve clinical benefit with minimum risk at cost effective price while respecting the patient's choice¹². The study of prescribing pattern is a component of medical audit that monitors and evaluates prescribing practices of the prescribers as well as recommends necessary modifications to achieve rational and cost effective medical care¹³. Keeping these facts in consideration the present study was undertaken to analyze the current prescribing trends of antimicrobial use in acute respiratory tract infection in children in a tertiary care hospital and to do a quantitative analysis of overall antimicrobials used and their source. Findings of this study are expected to provide relevant and useful feedback to pediatricians, general practitioners and hospital administration.

METHODOLOGY

Study Design

A prospective, non- interventional, observational study conducted in the Pediatrics Outpatient Department of Tertiary Care Hospital.

Study Duration

The total duration of study was 6 months starting from September 2013 to February 2014.

Sample Size

Periodic sample size was taken for the period of 6 months, consisting of 200 OPD patients.

Inclusion Criteria

Individuals satisfying all the following criteria were included in the study:

- Age ≤12 years
- Diagnosed cases of acute respiratory tract infection that were prescribed antimicrobial agents.
- Patients willing to participate in study

Exclusion Criteria

- Critically ill patients
- Patients on antitubercular therapy
- Any other systemic infection

After taking permission from the Institutional Ethics Committee (IEC) and permission of the head of the department of the pediatrics data collection was done.

Methodology

Diagnosed cases of Acute Respiratory Tract Infection were identified and enrolled depending upon pharmacotherapy prescribed. These cases were later screened according to inclusion and exclusion criteria. Written informed consent/assent was taken. Patients who were given antimicrobial agents at their first visit and repeat patients i.e. patients treated symptomatically initially but who were prescribed antimicrobial agents on a subsequent visit due to no improvement in symptoms were included in this study. Demographic details of these

patients were noted in a case record form (CRF). Prescription details were collected (drug name, route of administration, brand name, dose, duration) and prescription pattern was analyzed in the age groups 0-1, 1-5, above 5 years.

Statistical Analysis and Outcome Measures

- Percentage calculation of prescription according to illness i.e. upper respiratory tract infection or lower respiratory tract infection.
- Percentage and number of prescriptions with an oral and/or injectable antibiotic prescribed.
- Percentage calculation of prescription according to each class of antibiotics and individual drug in that class.
- Percentage of FDCs (Fixed dose combination) prescribed.

RESULTS

452 patients were given an antimicrobial agent out of 2587 ARI patients screened. A subset of 200 prescriptions was analyzed in this study as per the inclusion criteria.

Demographic Data

The age group 1-5 years accounted for the highest number i.e. 101 out of 200 patients (50.5 %). Out of 200, 146 were boys (73%) and 54 were girls (27 %).

Clinical Data

The total number of antimicrobial agents prescribed was 200 in 200 prescriptions (Table 2) and the most common diagnosis (Table 1) was URTI. The mean number of antimicrobial agents per prescription was 1.0.

Table 1: Diagnosis wise distribution of OPD cases

Illness	Number	Percentage
URTI	178	89
LRTI	22	11

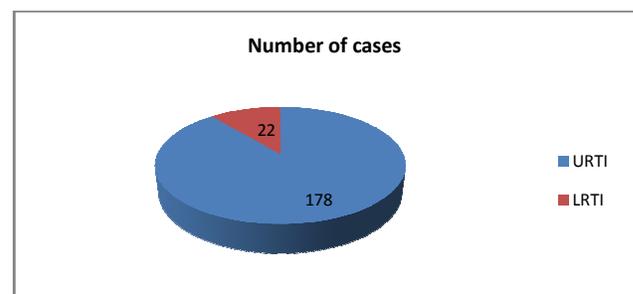


Figure 1: Diagnosis wise distribution of OPD cases

Analysis of drug prescribing patterns

Table 2: Prescribing indicators among outpatient cases

Parameter	Number
Total number of ARI patients prescription seen	2587
Total number of patients given antimicrobial agent	452
Total number of patients prescriptions analyzed	200
Total number of antimicrobial prescribed	200
Average number of Antimicrobial per encounter	1
Percentage of encounter with an injection prescribed	00

Percentage of FDCs prescribed 54
 The prescribing frequency of various classes of antimicrobials in patients is shown in Table 3, Figure 2,

Table 3: Class of antimicrobials prescribed

Class of antimicrobial agent	URTI	LRTI
Penicillins	131	23
Macrolides	28	00
Cephalosporins	18	00

Table 3 shows the class wise distribution of antimicrobials. Penicillins were the most commonly prescribed antimicrobial. It was given to 154 patients (77 %) followed by macrolides in 28 patients (14 %).

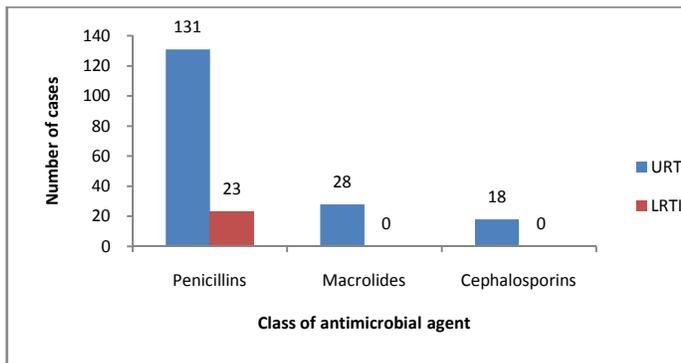


Figure 2: Class of antimicrobials prescribed

Table 4: Distribution of prescription according to individual drug

Antimicrobial Agents	No. of prescriptions with AMAs (n=200)	Percentage (%)
Amoxicillin	46	23
Amoxicillin + Clavulanic acid	108	54
Azithromycin	28	14
Cefixime	09	4.5
Cefpodoxime	09	4.5

Table 4 shows that amongst AMAs, Amoxicillin + Clavulanic acid was prescribed in 108 patients (54 %) followed by Amoxicillin 46 patients (23 %), azithromycin 28 patients (14 %), Cefixime 9 patients (4.5 %), Cefpodoxime 9 patients (4.5%).

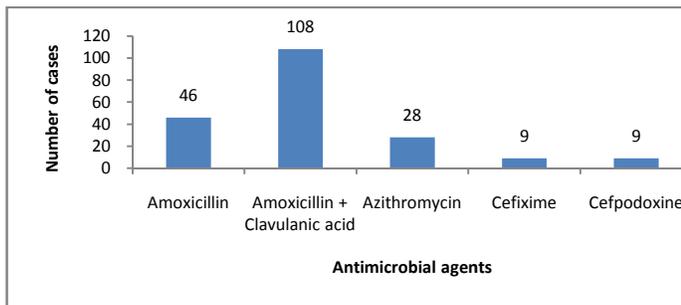


Figure 3: Distribution of prescription according to individual drug

Table 5: Fixed drug combinations (FDC) prescribed

FDC	No. of cases
Amoxicillin + Clavulanic acid	108

Drug formulations prescribed

The analysis of drug formulations used according to our study revealed that 175 patients were prescribed syrups and 25 patients were given tablets as shown in Table no. 8 and Figure 6.

Table 6: Various formulations used

No. of cases	Total	Syrup	Tablets
	200	175	25

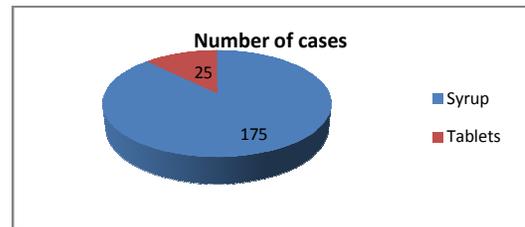


Figure 4: Various formulations used

Schedule and availability

All drugs prescribed were on hospital schedule and prescribed from hospital Pharmacy. All the drugs were prescribed with generic names.

DISCUSSION

The present study monitored antimicrobial prescribing patterns in patients treated for ARIs in the pediatric OPD of a tertiary care hospital. In our study, 2587 cases of ARI were seen during study period from September 2013 to February 2014. Out of total number only 452 cases were prescribed antimicrobial agents (17 %). From these 452 cases, prescription of 200 OPD cases were included in study and analyzed. Penicillins were the most commonly prescribed class of drugs (77 %), while macrolides were the second most commonly prescribed (14%). Amoxicillin and clavulanic acid was the most commonly prescribed antimicrobial agent from the penicillin class followed by amoxicillin alone. The predominance of penicillins use was as expected because penicillins are being recommended by most of the published guidelines (e.g. CDC, AAP). However, in a study conducted by MitiManiar *et al*, macrolide was the most commonly prescribed drug class followed by penicillin (amoxicillin + clavulanic acid)¹⁴. In our study, a single antimicrobial agent was prescribed in each prescription irrespective of the diagnosis which shows a favorable trend towards monotherapy. Conversely, a study by Harish Govind Naik *et al* on antibiotic drug utilization in Lower respiratory tract infections at a tertiary care hospital in Maharashtra showed 34.37% of patients on monotherapy and 65.62% patients on polytherapy¹⁵. Usage of more than the

required number of antimicrobials per patient will increase the cost of therapy, the risk of adverse events, drug interactions, and emergence of resistance and may also contribute to non-compliance by patients. Therefore it is preferable to keep the number of drugs as low as possible. All drugs in our study were prescribed by generic name which is in contrast with the study by Harish GovindNaik *et al* which had shown that brand names were used most commonly for prescribing antibiotics¹⁵. Prescribing by generic name helps the hospital pharmacy to have a better inventory control. This will also help the pharmacy to purchase drugs on contract basis, as the number of brands is less, thus reducing the confusion among pharmacists while dispensing. Generic drugs are often more economical than the branded ones. Prescribing by brand name may be an evidence of vigorous promotional strategies by pharmaceutical companies. Regarding the prescribing of FDCs, the present study shows that only one FDC was prescribed in study population. This FDC is from the WHO list of approved FDCs. Potential advantages of FDC's include reduced side effects, increased patient compliance, synergy and increased efficacy and reduced cost¹⁶. Potential disadvantages include inflexible fixed dose ratio, incompatible pharmacokinetics, increased toxicity, physician and pharmacist's ignorance of contents. Most of the published guidelines do not recommend use of antimicrobials in acute respiratory tract infection as the most common etiology for acute respiratory tract infection is viral. Antibiotic treatment is beneficial to children only if symptoms persist for 10-14 days without improvement. The proportion of antibiotic prescription was 17 % in the present study which is as per the WHO recommendation of 20% antibiotic use for these common childhood illnesses¹⁷. This also shows that physicians in our institute are well aware of the guidelines regarding antimicrobial prescription. Good prescribing pattern in our study is suitably aided by the guidelines of our institution which are periodically updated by the administration¹⁹. The findings are in contrast with a similar study done in Chennai¹⁸, India where 79.4% children were prescribed antibiotics. Penicillin group was the commonest antibiotic prescribed in our study for URTI which is similar to the Chennai study.

Strengths

In our study, we have included both URTI and LRTI patients treated on outdoor. This is in contrast with most other studies which were conducted on either URTI or LRTI patient groups singly. Pediatric population is a vulnerable population for drug exposure because of parental pressure on doctors to prescribe medicines. Hence, we have selected this population in our study so that current trends in prescribing antimicrobials in this

particular group can be assessed. Our study included children with a whole spectrum of ARI disease severity, from very mild upper respiratory tract infections (URTI) like those with rhinitis, to severe cases of bronchiolitis and pneumonia. The sample size of our study was large, including 200 participants belonging specifically to the pediatric age group enrolled over a 06 month period. Those studies that have been larger have often looked at all ages, including adults and children, rather than looking specifically at one age group.

Limitations

The study design of the current study was a cross-sectional study design. It does not allow us to understand the trend of the acute respiratory illness over time or the changes in prescribing pattern. Only those patients who were brought to hospital were included in the study. Hence, the results can only be extrapolated to a hospital based population, and may not be representative of the population as a whole.

CONCLUSION

Most common diagnosis was URTI. In this study, 1 – 5 years age group was most common. Penicillin group was most frequently prescribed. All drugs were prescribed by generic names and were given from hospital pharmacy; hence no cost was borne by the patient for the drug therapy for ARI. There was a favorable trend toward monotherapy.

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