JK SCIENCE

Antibiotic Prescription Patterns in Children for Upper Respiratory Tract Infections and Diarrhea

Miti Maniar, Ira Shah, Sudha Rao

Abstract A cross sectional study to determine the antibiotic usage trend in children with URTI and Diarrhea in 140 children under 15 years of age visiting the Pediatric OPD. Forty four (31%) patients received antibiotics of which 5 (11.3%) patients received combination antibiotics. Eighteen (24%) patients with nasopharyngitis, 2(16%) patients with pharyngitis, 7(100%) patients with tonsillitis, 7(22.5%) patients with acute diarrhea, 5(62.5%) patients with dysentery and 5(83%) patients with chronic diarrhea received antibiotics. (p=0.014). Amoxicillin (33%) and macrolides (44%) are preferred for nasopharyngitis and only macrolides are used for pharyngitis (100%), while cefixime is used predominantly for acute diarrhea (29%) and dysentery (40%). Metronidazole (60%) is the preferred antibiotic for chronic diarrhea. All five (11%) combination antibiotics prescriptions were for diarrhea and no combinations were given for URTI [p value = 0.003]. From 110 children having symptoms < 1week, only 30 (27%) were given antibiotics while out of 29 children having symptoms for > 1week, 14 (48%) were given antibiotics (p value=0.031). Antibiotic prescriptions were judicious and seen in 31% of children with URTI and diarrhea. However use of antibiotics in nasopharyngitis should be minimized. Also use of combination antibiotics especially in children with diarrhea should be discouraged.

Key Words

Antibiotic, Upper Respiratory Tract, Infections, Diarrhea

Introduction

Appropriate antimicrobial drug use is defined as use that maximizes therapeutic impact while minimizing toxicity and the development of resistance. In practice, this involves prescribing antimicrobial therapy when and only when it is required and is beneficial to the patient, targeting therapy to the desired pathogens, and using the appropriate drug, dose, and duration. Appropriate antimicrobial drug use should not be interpreted simply as reduced use, because these drugs offer valuable benefits when used appropriately. It is overuse and misuse that must be decreased to reduce the selective pressure favoring the spread of resistance (1). Acute upper respiratory tract infection (ARI), acute watery diarrhea (ADD) and viral fever are the common childhood illnesses accounting for the major proportion of pediatric outpatient visits. Only a small proportion of these patients (<20%) require antibiotic therapy (2). Studies have shown that there is an inappropriate use of antibiotics, especially the broad-spectrum antibiotics, for these common childhood illnesses, which has contributed largely to the development of antibiotic resistance (2). Antonio da Cunha *et al* in Brazil showed that 28% of the antibiotic prescriptions for children with acute respiratory infections were inappropriate (3).

With rare exceptions, URTIs have a viral etiology. When symptoms are severe, and particularly when they are accompanied by muscle aches and fatigue, influenza and Para influenza infections are the most common causes, whereas rhinoviruses predominate when symptoms are mild. Other important causes of upper respiratory tract infection in adults include adenovirus and respiratory syncytial virus. Most cases of uncomplicated upper respiratory tract infection in adults resolve spontaneously. The duration of illness typically is 1 to 2 weeks, and most patients feel much better within the first week. A small proportion of upper respiratory tract infections become complicated by bacterial sinusitis or pneumonia (4). Physicians might mistake some patients' clinical features of diarrhea as features of dysentery, leading to unnecessary prescription of

From the Department of Pediatrics, B.J. Wadia Hospital for Children, Parel, Mumbai- 400012, India. Correspondence to :Dr Ira Shah, Department of Pediatrics, B.J. Wadia Hospital for Children, Parel, Mumbai- 400012, India.



antibiotics. Overuse of antibiotics in the treatment of acute diarrhea in children is common (5). Because of the rising cost in health care, lack of uniformity in prescribing attitudes and the emergence of antibiotic resistance, monitoring and controlling antibiotic use is of growing concern and strict antibiotic policies are warranted, especially in a country like ours where a larger section of the society is very poor and the living conditions are unhygienic. This study was undertaken to provide insight into the variation in antibiotic prescribing patterns in a tertiary pediatric hospital in the city of Mumbai.

Methods and Materials

A total of 140 children under the 15 years of age with URTI and diarrhea who visited the outpatients department (OPD) at our centre over a period of one month in June 2007 were enrolled for the study. Children coming to the OPD with symptoms of running nose or blocked nose, cough, sore throat, diarrhea, dehydration, fever and other constitutional symptoms such as myalgia and body ache were enrolled for the study. Patients with URTI were classified into suffering with nasopharyngitis, pharyngitis and/or tonsillitis on the basis of following clinical features. Nasopharyngitis was diagnosed on the basis of cough and cold with running nose with or without fever. Pharyngitis was diagnosed on the basis of sore throat, cough, congested pharynx with or without fever. Tonsillitis was diagnosed on the basis of enlarged and congested tonsils with or without fever. Diarrhea was classified into three categories namely, acute diarrhea, dysentery and chronic diarrhea on the basis of following clinical features. Acute diarrhea was diagnosed on the basis of loose motions without blood and mucus for less than one week. Dysentery was diagnosed on the basis of loose motions with blood and mucus for less than one week. Chronic diarrhea was diagnosed on the basis of loose motions with or without blood and mucus for more than two weeks. The prescriptions from the pediatrician and the pediatric residents were noted after obtaining their consent. The data was collected on a case record form. Those children suffering from URTI received symptomatic treatment in the form of antihistaminic, paracetamol, mucolytics, beta agonists, and vitamin supplements. Those children suffering from diarrhea Table1. Incidence of URTI and Diarrhea in Various Age Groups

received symptomatic treatment in the form of oral rehydration solution, zinc supplements and probiotics.

The presumed diagnosis and the antibiotics prescribed along with duration, dosage and dosage schedule were analyzed. Patients receiving more than one antibiotic were classified under those receiving combination antibiotics. Also the duration of symptoms and the antibiotic prescriptions were analyzed. Analysis was also done with respect to the diagnosis and various factors like gender, age, age group and duration of symptoms.

Statistical Analysis

Data was analyzed using the Statistical Program for Social Sciences (SPSS for Windows version 15.0). Differences in categorical data were analyzed using Chisquare tests and p values < 0.05 were considered statistically significant.

Results

A total of 140 patients were enrolled for the study, of which 1 was excluded as he suffered from pneumonia. Male : Female ratio was 86:53. The age of patients ranged from 1 month to 15 years (38% < 1year, 49% 1-5years, 13% > 5 years) with a mean of 30 ± 35 months and median of 18 months. The number of patients with Nasopharyngitis were 75(54%), with Pharyngitis were 12(8.6%), with Tonsillitis were 7(5%), with Acute diarrhea were 31(22.4%), with Dysentery were 8(5.7%) and with Chronic diarrhea were 6(4.3%). URTI(55.3\%) was more common in the age group of 1-5 years and diarrhea (55.3%) was seen more in the age group of < 1 year (Table 1)[p value = 0.036]. 110(79%) patients had duration of symptoms for < 1 week and 29(21%) patients had symptoms for > 1 week. Total 44(31%) patients received antibiotics of which 5 (11.3%) patients received combination antibiotics. The prescription pattern was as mentioned in Table2. Forty (91%) patients received syrups and 4 (9%) patients received tablets.

Antibiotics prescribed for various diagnosis is depicted in *fig1 and table 3*. The pattern of prescription of the symptomatic treatment for URTI and Diarrhea is depicted in *fig 2a and 2b* respectively. Amoxicillin (33%) and macrolides (44%) are preferred for nasopharyngitis and only macrolides are used for pharyngitis (100%), while cefixime is used predominantly for acute diarrhea (29%)

		Age Group				P value	
		<1 year	1-5 years	>1 year		1 vulue	
Diagnosis	URTI	29(30.8%)	52(55.3%)	13(13.9%)	94		
	Diarrhea	24(53.3%)	16(35.5)	5(11.1%)	45	0.036	
Total		53(38%)	68(49%)	18(13%)	139		

www.jkscience.org



and dysentery (40%). All the patients suffering from tonsillitis received antibiotics [amoxicillin(42%) or macrolides(58%)]. Metronidazole (60%) is the preferred antibiotic for chronic diarrhea. All five (11%) combination antibiotics prescriptions were for diarrhea and no combinations were given for URTI [p value=.003]. From 110 children having symptoms < 1week, only 30 (27%) were given antibiotics while out of 29 children having symptoms for > 1week, 14 (48%) were given antibiotics (p value=0.031). Age group (p value = 0.776, p value = 0.124) and sex (p value = 0.159, p value = 0.736) had no statistical difference in antibiotic prescribing pattern as well as type of antibiotic prescribed respectively. The duration for which the antibiotic was given was not significant for a particular diagnosis (p value = 0.282).

Discussion

The emerging problem of antibiotic resistance has become a major threat to the medical field. Excessive and inappropriate use of antibiotics has been a major contributor to this ever-growing problem. The majority of common childhood illnesses are caused by viruses which do not require antibiotics. The proportion of antibiotic prescription was 33% in the present study as against the WHO recommendation (6) of 20% antibiotic use for these common childhood illnesses which is however less, than in a similar study at Chennai (2), India where 79.4% children were prescribed antibiotics. Penicillins were the commonest antibiotic prescribed in the Chennai study unlike ours in which macrolides were the commonest. Macrolides and amoxicillin + clavulanic acid were the commonest antibiotic prescribed in our study for URTI. In New Zealand, GPs also prescribed amoxicillin and amoxicillin-clavulanate most frequently to treat URTIs (7). Unnecessary use of amoxicillin and co-amoxiclav can increase the risk of selective pressure and colonization with resistant organisms. The common cold (nasopharyngitis) is never an indication for antibiotic treatment and its natural history suggests mucopurulent rhinitis or cough for even upto 2 weeks does not necessarily point to bacterial infection (8). Antibiotic treatment is beneficial to children with this syndrome only if symptoms persist for 10-14 days without improvement (9). Yet 24% of patients with nasopharyngitis received antibiotics. The Centre for Disease Control does not recommend antimicrobials for pharyngitis in the absence of undiagnosed Group A Streptococci (GAS) where viral etiology is generally prevalent. Penicillin V remains specifically recommended for pharyngitis(10). Penicillin V, the recommended antimicrobial for pharyngitis was never prescribed, despite its safety, efficacy, narrow spectrum and low cost. The preferred antibiotic for pharyngitis though was macrolides. This may be due to risk of penicillin anaphylaxis and unavailability of rapid diagnosis of group A streptococci and higher incidence of rheumatic fever in developing countries. In a similar study at Trinidad (11), Amoxicillin(51.6%) was most frequently recommended for tonsillitis and azithromycin (29.7%) was also prescribed for tonsillitis. In our study also amoxicillin and azithromycin were preferred for

Name of The Antibiotic	<u>N=44</u>	Mean Duration (Days)	Dosage Schedule (N)	Mean Dosage (Mg/Kg/Day)		
Macrolides	14 (32%)	4	12 OD 2 BID	14		
Amoxicillin + Clavulanic Acid	9 (20.5%)	5	5 BID 3 TID 1 QID	39 (Amoxicillin)		
Cefixime	7(16%)	6	6 BID 1TID	14		
Metronidazole	5(11.5%)	5	1 BID 4 TID	20		
Norfloxacin + Metronidazole	3 (6.8%)	6	1 BID 2 TID	23 (Metronidazole)		
Cotrimoxazole	2(4.5%)	5	BID	29 (TMP)		
Nitazoxamide	2(4.5%)	3	BID	15		
Ofloxacin + Ornidazole	1 (2.2%)	5	BID	10 (Ofloxacin)		
Cefixime + Metronidazole	1(2.2%)	7	BID	35 (Metronidazole)		

Table 2. Antibiotic Prescribing Patterns

Vol. 15 No. 2, April- June 2013



Table 3. Antibiotics and Diagnosis

Diagnosis	Name of The Antibiotic							То	tal P Value	
	Macro lides	Amoxycllin	Cefi xime	Metronidazole	N +OR	Cotrimoxazole	NTe	O+OR	С+М	
Nasopharyng itis	8(44%)	6(33%)	3(16%)	0	0	1(5%)	0	0	0	18
Ph aryn gitis	2(100%)	0	0	0	0	0	0	0	0	2 0.014
Tonsillitis	4(58%)	3(42%)	0	0	0	0	0	0	0	7
Acute Diarrhe a	0	0	2(29%)	1(14%)	1(14%)	1(14%)	1(14%)	1(14%)	0	7
D yse ntry	0	0	2(40%)	1(20%)	1(20%)	0	0	0	1(20%)	5
Chronic Diarrhe a	0	0	0	3(60%)	1(20%)	0	1(20%)	0	0	5
TOTAL	14	9	7	5	3	2	2	1	1	44

Nitazox ami de=NT; Cefix me+Metronidazole=C+M; N+OR=Norfloxacin+Omidazole; O+OR=Ofloxacin+Ornidazole

Fig 1. Antibiotics (%) Used According to the Diagnosis



Fig 2a. Symptomatic Treatment (%) For URTI



Fig 2b. Symptomatic Treatment (%) For Diarrhea



tonsillitis though azithromycin(58%) was in a greater proportion than amoxicillin(42%). In the Chennai study, 100% of the children suffering from diarrhea were given antibiotics while in our study, 22.5% suffering from acute diarrhea, 62.5% suffering from dysentery and 83% children suffering from chronic diarrhea received antibiotics. Thus the use of antibiotics in our study for diarrhea was judicious. 3rd generation cephalosporin, cefixime was a commonly used antibiotic for diarrhea, similar to the Chennai study. Use of combination antibiotics was also minimum and mainly for diarrhea. However practice of empirical combination antibiotics should be discouraged without a reliable laboratory diagnosis to avoid drug toxicity as well as emergence of resistance.

International guidelines for rational pharmacotherapy have emerged following growing global concerns on increasing multiple resistant strains of upper airway pathogens from antibiotic overuse and misuse in URTIs. These should be modified and adopted as per our country requirement to limit the increasing antimicrobial resistance. While pediatricians may be encouraged to recognize and contain antimicrobial resistance, public educational campaigns on symptomatic care, the expected course of illness, viral etiology of URTIs and the risks of inappropriate antimicrobial use will halt their misuse and encourage non-antibiotic strategies.

Conclusion

Thus to conclude, though antibiotic usage is judicious, use of antibiotics for nasopharyngitis and combination

References

- Bell DM. Promoting appropriate antimicrobial drug use: perspective from the Centers for Disease Control and Prevention. *Clin Infect Dis* 2001; 33 Suppl 3:S245-50.
- 2. Bharathiraja R, Sridharan S, Chelliah LR, Suresh S, Senguttuvan M. Factors affecting antibiotic prescribing pattern in pediatric practice. *Indian J Pediatr* 2005;72(10):877-9.
- 3. da Cunha A. Inappropriate antibiotic prescription to children with acute respiratory infection in Brazil. *Indian Pediatrics* 2003; 40: 7 12.
- 4. Gonzales R, Bartlett JG, Besser RE, *et al.* Principles of appropriate antibiotic use for treatment of nonspecific upper respiratory tract infections in adults: background. *Ann Emerg Med* 2001;37(6):698-702.
- Osatakul S, Puetpaiboon A. Appropriate use of empirical antibiotics in acute diarrhea: a cross-sectional survey in southern Thailand. Ann Trop Paediatr 2007 27(2):115-22.
- 6. WHO (1995), the management of acute respiratory infections in children, practical guidelines for outpatient care, World Health Organization, Geneva.
- Dowell S, Marcy SM, Phillips WR, Gerber MA, Schwartz B. Principles of judicious use of antimicrobial agents. *Pediatrics* 1998;101:165-71.
- 8. Dowell SF, Schwartz B, Phillips WR. Appropriate use of antibiotics for URIs in children: Part II. Cough, pharyngitis and the common cold. The Pediatric URI Consensus Team. *Am Fam Physician* 1998;58:1335-42.
- 9. Rosenstein N, Phillips WR, Gerber MA, *et al.* The Common Cold-Principles of Judicious Use of Antimicrobial Agents. *Pediatrics* 1998;101:181-84.
- Schwartz B, Marcy SM, Phillips WR, Gerbert MA, Dowell SF. Pharyngitis- principles of judicious use of antimicrobial agents. *Pediatrics*1998;101:171-74.
- 11. Mohan S, Dharamraj K, Dindial R, *et al.* Physician behaviour for antimicrobial prescribing for pediatric upper respiratory tract infections. *Ann Clin Microbiol Antimicrob*2004 14:3:11.

antibiotic for diarrhea should be discouraged. Vol. 15 No. 2, April- June 2013