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Drug utilization Pattern for upper Respiratory Tract Infections in Pediatrics, at a university teaching hospital, New Delhi

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ABSTRACT

Drug utilization studies in children identify major therapeutic problems and may allow estimation of prevalence of diseases in children. Very few studies provide information on pattern of drug use and antibiotic prescribing rates for upper respiratory tract infections in children. This study was aimed to assess the prescribing trends for upper respiratory tract infections in Pediatrics, at a university teaching hospital New Delhi, India. A prospective observational drug utilization study was carried out in a pediatric unit of a university teaching hospital in New Delhi, India for a period of 4 months. Patients (n = 363) who attended the pediatric unit with the age newborn to 14 years suffering from Upper respiratory tract infections (URTIs) and willing to participate were included in the study and the data collected from the pediatric unit were analyzed. A total of 363 patients suffering from URTIs were studied. We found a higher percent of male patients (54.28%) as compared to females (45.17%), among those maximum children (26.17%) were in the age group of 0 to 2 years. This may be due to either a high susceptibility for infections at a younger age or due to a relatively greater concern for infant's health. Maximum number of patients (101) received 5 drugs per prescription followed by 4 drugs per prescription received by 79 patients. Average number of drugs per prescription was found to be 3.75. Most commonly prescribed category of drugs was found to be antibiotics (93%) followed by cough and cold preparations (92.28%), vitamins (89.53%) and antihistaminics (87.32%). Surprisingly, antipyretics and analgesics constituted only 59.78% of prescriptions. The high prescribing rate of antibiotics was an area of concern. The most frequently prescribed drugs were found to be amoxicillin-clavulanic acid combination. The results of the present study are attempts to highlight the importance of strategies that have to be implemented to optimize medication use at the pediatric department for URTIs.

Key words: *Utilization pattern, URTIs in Pediatrics, Streptococcus pneumoniae*

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INTRODUCTION

Acute infections of upper respiratory tract (URT) are the most common infections in childhood. Although viruses are a frequent cause of upper RTIs these may lead to secondary bacterial infections such as otitis media (OM) and sinusitis [1,2]. The common bacterial pathogens responsible for these infections were reported to be *Streptococcus pneumoniae* (25%), *Haemophilus influenzae* (20%), *Moraxella catarrhali* (12%) and others (13%) [3], among these, the infections causes by *S. pneumonia*e are considered to a major cause of morbidity and mortality among children [4]. Otitis media is now known to be the most common childhood infection leads annually to the death of over 50,000 children under 5 years. Children

tend to be more susceptible to OM because the anatomy of their eustachian tube is shorter and more horizontal facilitating bacterial entry into the middle ear [5]. The most common pathogen responsible for acute OM is *S. pneumoniae*. Other infections of the URT including sinusitis, pharyngitis etc. also occurs more frequently in children as compared to adults [5].

The treatments of RTIs frequently involve the use of antibiotics. The propensity to prescribe antibiotics partially arises from the fact that they are effective in reducing complications particularly pneumonia [3]. A systematic review of studies demonstrated that antimicrobial therapy provided resolution of symptoms in about 95% of patient as compared to 80% in placebo treated patients [5]. In another review however, a protective advantage of antibiotics over placebo against secondary complications was evident from 12 randomized clinical trials [2]. However, the predominance of viral etiologies raises doubts about the real efficacy of such treatments. Further, the wide spread use of these antibiotics particularly in infections of non-bacterial origin has contributed to emergence of increasingly resistant bacterial strains [6]. Inspite of the controversy, antimicrobial treatment is still considered as an appropriate management strategy [5].

While a large number of drug utilization studies of URTIs are available for adults all over the world [7], a very few studies provides information on drug use pattern and antibiotic prescribing rates for URTIs in children. Since pharmacodynamic and pharmacokinetic are different in children and adults, it is important to carry out such studies in children [8]. Further, children generally fail to comply with therapeutic regimens due to either inconvenient dosing schedule and/or large number of medicines prescribed etc. It is well documented that safe and effective therapy is possible only when patients are well informed about the medication and their use. Drug utilization studies in children may thus identify major therapeutic problems in pediatric and may allow estimation of prevalence of diseases in children.

Drug utilization research is an important part of medical audit that plays a significant role in pharmaco-epidemiological studies. This is because it reports the extent, quality, determinants and outcome of drug exposure. In addition, it helps in evaluating rationale uses and coast control of several medications prescribed in the hospital. Pharmaco-epidemiological studies describing prescribing pattern of physicians are very few from developing countries [9]. The aim of this study was to assess drug prescribing trends, average number of drug per prescription, the WHO core indicators for drug utilization and prescription coast during patients visit at the hospital.

STUDY DESIGN AND METHODOLOGY

The 4 months prospective study that was carried out on upper respiratory tract infections (URTIs) patients attending out-patient department (OPD)/ in-patient department (IPD) pediatrics clinic at Majeedia Hospital, Jamia Hamdard, New Delhi. All patients between 0-14 years of age, irrespective of sex, attending the pediatric OPD and IPD, diagnosed with RTIs were included in the study except mentally retarded, unconscious and untreated patients. The study protocol was reviewed and approved by Jamia Hamdard Institutional Review Board (Approval letter No.: JHIRB- 02/11-05-03-2011). An informed consent was obtained from the patient's parent/guardian for participating in the study. All the observations were recorded in a Drug Utilization Review (DUR) Form that was designed on the basis of WHO format followed by Medication Utilization form, Follow up form, Informed consent form and Weekly Diary Cards were used.

RESULT

General characteristics of the patients

A total of 3469 patients visited the pediatric OPD/IPD, Majeedia Hospital over a period of 4 months. On the basis of inclusion and exclusion criteria, 363 patients were selected for the present study. Among 363 patients, 199 (54.28 %) were male and 164 (45.17%) were female patients. Out of 363 patients, 322 patients visited the OPD and 41 patients admitted in the IPD. The maximum numbers (26.17%) of patients were from the age group 0-2 years and the minimum (6.06%) were from the age group 12-14 years (Table 1).

Drug utilization pattern among patients

Among 363 patients that was included in the study, maximum no. of patients (101) received 5 drugs per prescription followed by 4 drugs per prescription received by (79) patients**.** The category most often prescribed was antibiotics that was found to be 337 (93%) followed by cough and cold preparations in 335 patients (92.28%) (Figure 1)

Table 1. Age and gender distribution amongst URTI patients

Age (years)	Male		Female		Total no. of patients
	OPD	IPD	OPD	IPD	
0-2	55	8	28	4	95
2-4	37	6	33	2	78
4-6	24	4	31	2	61
6-8	21	4	19	2	46
8-10	13	2	20	1	36
10-12	11	2	11	1	25
12-14	10	2	9	1	22
Total	**171**	**28**	**151**	**13**	**363**
% of Patients	**47.10%**	**7.71%**	**41.60%**	**3.58%**	**100%**

Table 2. WHO core drug prescribing indicators in the study population (n=363) at the pediatric department at Majeedia Hospital, Hamdard University, New Delhi, India

Indicators	Values
Average number of drugs per encounter	3.75 ± 1.67
Average number of antibacterial agents per encounter	0.93
Percentage of encounters with an antibiotic	93%
Percentage of encounters with an injection in OPD	1.57%
Percentage of encounters with an injection in IPD	100%
Percentage of encounters with cough and cold preparations	92.28%
Percentage of encounters with antihistaminic	87.32%

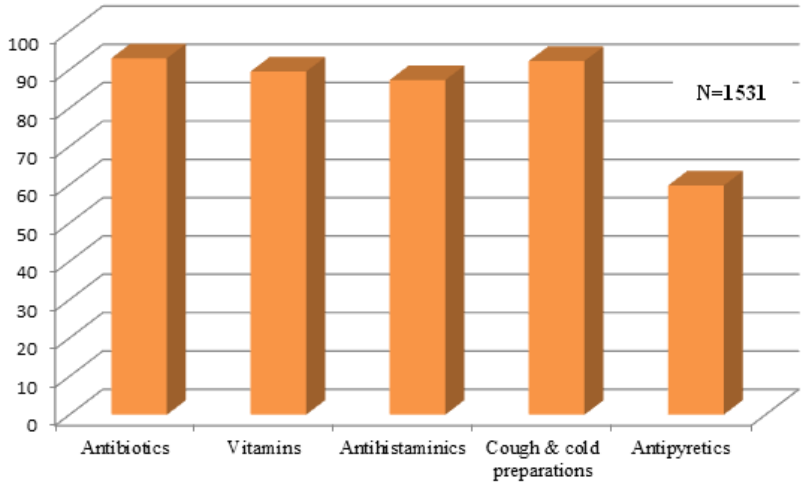

Figure 1. Percentage of different classes of drugs prescribed to 363 patients (n = 1531 prescriptions) in the pediatrics department at Majeedia Hospital

The WHO core indicators of prescribing practices measure the performance of health care providers in several key dimensions related to the appropriate use of drugs. In our study, the average number of antibiotic agents prescribed per patient per course was found to be 0.93 and average number of drugs per prescription was 3.75 ± 1.67. The percentage of antibiotics use was 93%, the percentage of Injectables drug use in OPD and IPD were 1.57% and 100% respectively, about 92% of drugs were prescribed from the cough and cold preparations and 87% were from antihistaminic (Table 2).

During the study, it was observed that the most frequently prescribed antibacterial were β-lactams (Penicillins and Cephalosporins) (231), followed by macrolides (90) and quinolones (16). Details of type of antibacterial prescribed are given in (Table 3). The most commonly used antibiotic was amoxicillin with clavulanic acid (135, 40.06%) followed by azithromycin (57, 16.91%), cefpodoxime proxetil (33, 9.79%), cefixime with cloxacillin (25, 7.41) (Table 3). All the antibacterial agents were prescribed by their brand names only.

Weekly diary cards were used for daily drug intake to monitor adherence to the prescribed dosage regimen. Criteria for non-compliance were < 80% of recommended intake of prescribed drugs. A total of 189 (52.02%) patients showed a good adherence with the prescribed treatment.

Table 3. Type of antibacterial(s) prescribed

Class	Antibacterial agents	No. of agents prescribed	% patients
Beta-lactams	**Penicillins**		
	Amoxicillin	10	2.96
	Amoxicillin + Clavulanic acid	135	40.06
	Amoxicillin + Cloxacillin	7	2.08
	Total	152	45.1
	Cephalosporins		
	Cefadroxil	5	1.48
	Cefpodoxime proxetil	33	9.79
	Cefixime	16	4.75
	Cefixime + Cloxacillin	25	7.41
	Total	79	23.43
Quinolones	Ciprofloxacin	5	1.48
	Norfloxacin	2	0.59
	Ofloxacin	3	0.89
	Levofloxacin	6	1.78
	Total	16	4.74
Macrolides	Azithromycin	57	16.91
	Clarithromycin	33	9.79
	Total	90	26.7
Grand total		**337**	**100**

DISCUSSION

Infections of the URT are among the commonest of infections and account for a large percentage of consultations in children [10]**.** We found a higher % of male patients (54.28%) as compared to females (45.17%). While sex is a significant epidemiological factor for several diseases, it doesn't seem to have a role in the development and outcome of various infections except urinary tract infections [11]. However, in a recent study conducted in the US, it was reported that males are more susceptible than females to most type of URTI's in all age groups in both adults and children [11]. In our study the higher percentage of males suffering from URTI's also point towards such an association. As regards age of children, maximum children (24.51%) were in the age group of 0-2 years. This may be due to either a high susceptibility for infections at a younger age or due to a relatively greater concern for infant health. Our study also indicates that exposure to drugs, including antibiotics, occurs at a very young age as is reported by others [12].

Maximum number of patients (101) received 5 dugs per prescription followed by 4 drugs per prescription received by 79 patients. Average number of drugs per prescription was found to be 3.75. The number is much higher than others studies conducted in India [13,14] and Saudi Arabia (2.8%) [15]. The difference could be attributed to the differences in the physician practices in the same hospital. An average of 3.75 drugs per prescription indicates polypharmacy. Since polypharmacy increases the risk of adverse effects, drug interactions, increases cost and reduces patient compliance, it is an area of concern requiring intervention.

Most commonly prescribed category of drugs were found to be antibiotics (93%) followed by cough and cold preparations (92.28%), vitamins (89.53%) and antihistamines (87.32%). Surprisingly, antipyretics and analgesics constituted only 59.78% of prescriptions. The high prescribing rate of antibiotics was an area of concern. A significant proportion of upper RTI's such as acute pharyngotonsillitis, acute otitis media, acute sinusitis etc are caused by viruses and are therefore self-limiting [16]. Antibiotics are usually not required. However, signs and symptoms of bacterial and viral etiologies are difficult to distinguish. Routine microbiological or radiographic studies are not practical or possible in all the cases. In our study also, out of 363 prescriptions studied, 337 patients were prescribed antibiotics (93%) and none were advised examination for blood/ culture etc. Our antibiotic rate is however; lower than an Italian study conducted on children where a mean of drug per child were given [10,17]**.** However, it is much higher than the reported rates of antibiotic prescriptions in the Asia-pacific region as a whole (11-67%) [18].

Present study was unable to ascertain the diagnosis of the type of URTI from the prescription as the same was not written on it.

CONCLUSION

The results of this type of studies highlight the importance of strategies that have to be implemented to optimize medication use at the pediatrics department for URTs. Our study highlighted some rational prescription patterns including lesser rate of injections in OPD and a high consultation time given by the pediatricians. The area of concerns was high polypharmacy, high rate of antibiotic prescribing, higher prescription of broad spectrum antibiotics and prescription by brand names only. Initiatives to improve guidelines concerning antibiotics prescriptions for RTIs are recommended.

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CONFLICT OF INTEREST

The authors report no conflicts of interest in this work.

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