Original Article

Study the outpatients' prescription pattern of antibiotics in paediatric populations of two hospitals

Katta Venkatesh Ramanath, B. V. B. Balaji

Deparment of Pharmacy Practice, Sri Adichunchanagiri College of Pharmacy, B. G. Nagara, Nagamangala Taluk, Mandya District, Karnataka, India

Address for correspondence:
Prof. K. V. Ramanath,
Associate Professor, Sri Adichunchanagiri College of Pharmacy, B. G. Nagara, Nagamangala Taluk, Mandya District - 571448, Karnataka, India.
E-mail: kvr1075@gmail.com

ABSTRACT

Objective: To assess the outpatients prescription pattern of antibiotics in paediatric population of a rural and an urban hospital.
Materials and Methods: A prospective, cross-sectional and interventional study was carried out in the paediatric departments of Adichunchanagiri Hospital and Research Centre and Jabilli Children HospitalRajahmundry for a period of 7 months, after taking permission from the ethics committee. The consent/assent of the patients was taken, and their data and prescription information was collected by using a patient data collection form This was done for a period of 3 months in each hospital. The collected information was subjected for suitable statistical analysis.
Results: A total of 1170, hospital 1: 915/218 and hospital 2: 255/175, prescriptions were screened. Out of which 218 and 175 were contained antibiotics, and the average number of drugs was (2.84 ± 0.11) and (3.61 ± 0.15) for hospital 1 and 2, respectively. The prescriptions contained only one antibiotic. No drug interaction (DI) and adverse drug reactions (ADRs) were found. Most common diseases found were lower respiratory tract infections (LRTI) and upper respiratory tract infections (URTI) (hospital 1), and fever and LRTI (hospital 2). Commonly prescribed antibiotic class and drugs was penicillin-amoxicillin (hospital 1), cephalosporins-cefixime, cefuroxime, and cefalexin (hospital 2). The antibiotic combination used was amoxicillin + clavulanic acid. The average total prescription cost and antibiotic cost was Rs. 106.66 and Rs. 70.32 (hospital 1), and Rs. 245.41and Rs. 113.32 (hospital 2), respectively.
Conclusion: The prescribing pattern of antibiotics was rational in both the hospitals.

Key words: Adverse drug reaction, antibiotic, drug interaction, outpatient, paediatric

INTRODUCTION

The paediatric population comprises of 20-25% of the total world population, out of which 40% of India's population is prone to acute and chronic infectious disease because of the incomplete development of their physiological conditions.[1] Drug therapy is considered as the major component of paediatric management in hospitals. Effective medical treatment of paediatric patients is based on an accurate diagnosis and optimum course of therapy/medication regimen. Infants and children are the most vulnerable population groups to contract diseases. Antibiotics are used to combat or treat communicable infectious diseases which help in reducing the morbidity and mortality. According to the National Ambulatory Medical Care Survey (NAMCS), antibiotics is the second leading drug which is being prescribed or considered for treating infectious diseases in children.[2,3,4] Therefore, a proper selection of antibiotics along with prescribing of appropriate doses, formulation, pharmacokinetic profiles, response, and adverse drug reactions (ADRs) must be considered very seriously; otherwise they may lead to fatal effects and promote the spread of antibiotic resistance (over use or misuse).[5,6] The ultimate goal of this is to achieve rational and cost-effective medical

Access this article online	
Quick Response Code:	Website: www.archivepp.com
	DOI: 10.4103/2045-080X.111578

care, particularly in the economically developing countries.

Antibiotics are playing a vital in today's medical practice. Even though they have some side effects, its overall benefits outweigh the risk. Nowadays many paediatric physicians are including antibiotics in their prescriptions as an empirical therapy without considering it to be rational or irrational. The irrational use of antibiotics is leading to destruction of microflora, emergence of multi drug resistant microorganisms, and clinical symptoms like toxic megacolon and pseudomembranous colitis. All these are responsible for serious infections in the outpatients. This irrational use has lead to the development of "super bugs", use of more combination of antibiotics, and fearing the experts about future availability of antibiotics. Therefore, an effective step should be taken for rational use, especially in the paediatric population.[7-10]

Hence the present study was carried out to know the outpatients prescription pattern in paediatric patients of a rural and an urban hospital (hospital 1 and hospital 2, respectively).

MATERIALS AND METHODS

This was a prospective cross-sectional and interventional study which was conducted in the paediatric department of two hospitals-Adichunchanagiri Hospital and Research Centre, B. G. Nagara (a rural hospital: Hospital 1) and Jubilee Children Hospital, Rajahmundry (an urban hospital: Hospital 2) for a period of 7 months (3 months in each hospital + 1 month of write-up).

A clearance by the ethics committee was obtained from Adichunchanagiri Hospital and Research Centre (Ref: AIMS/EC/601/2010-11, Dated: June 22, 2010).

Study criteria

Inclusion criteria

- All the paediatric patients between 1 month-16 years of age.
- Prescriptions containing antibiotics.

Exclusion criteria

- Patients from neonatal intensive care unit (NICU).

Source of data

Patient data relevant to the study was obtained from outpatients' prescriptions, their lab reports, and direct interview.

Material used

A well designed patient data collection form was developed by consulting physicians, paediatricians and the staff of pharmacy practice department.

Study procedure

Initially, a clearance form the ethics committee was obtained. Prescriptions of outpatients were reviewed prospectively for antibiotics in the paediatric departments of a rural and an urban hospital. The caretaker relative of the patient was informed about the study and their consent/assent was taken.

Determination of prescription pattern

In both the hospitals, prescriptions of outpatients were screened for antibiotics and entered in the patient data collection form.

The collected prescriptions were analyzed for the most commonly used antibiotic and its category, indication, rationality of the prescription (number of antibiotics prescribed, appropriateness of dose, dosage form, drug interactions (DI) and ADRs). Prescriptions were reviewed for the rationality by using MICROMEDEX (software available in the department) and other tertiary sources. Pharmacoeconomic evaluation like total cost of each prescription and antibiotic cost was calculated by using latest editions of tertiary sources and direct interaction with community/hospital pharmacy/patient.

Statistical methods

Descriptive statistical analysis has been carried out in the present study.

RESULTS

A total of 1170 (hospital 1: 915/218 and hospital 2: 255/175) outpatient prescriptions were screened in two hospitals (a rural and an urban private hospital). In the rural hospital, a total of 915 prescriptions were screened out of which only 218 prescriptions contained antibiotics whose patients accepted to give the assent/consent. Whereas, in the urban hospital, out of 255 prescriptions, only 175 contained antibiotics whose patients accepted to give the assent/consent. A total of 393 prescriptions were assessed in the rural and urban hospital. The percentage of patients in this study was 55.48% (218) and 44.52% (175) in the rural and urban hospital, respectively. In the rural hospital, the percentage of male patients was more, that is, 59.17% (129) as compared to the urban paediatric hospital, that is, 40.82%. The percentage

of female patient was found to be more in the urban hospital (51.42%) [Figure 1].

Table 1 shows that in the rural hospital, the percentage of patients aged < 1 year is 8.71% and the same in urban hospital is 6.85%. The percentage of paediatric patients aged between 1-4 years in the urban hospital is 62.28% and the same in the rural hospital is 27.06%. This clearly indicates in the age group of <1-4 years the rural population is more prone to infections as compared to the urban population. This may be because of environmental influences like air, food, and water pollution. Interestingly, at the age of >4-8 years, the paediatric patients show an equal or slightly higher percentage. More interestingly in the rural hospital, 24.77% and 22.01% of paediatric patients were observed in the age range of 8-12 and 12-16 years. However, only 1.71% or absence of the same was seen in the urban hospital. This clearly indicates that the paediatricians of the urban hospital are more knowledgeable about health and available health-related facilities as compared to the paediatricians of the rural population.

In rural hospital, 1.83% of prescriptions contained single drug, whereas none of such kind was found in the urban hospital. The 3 drug containing prescriptions were found to be almost equal in the rural and urban hospital, that is, 42.66% and 42.28%, respectively. Whereas 4 and 5 drug containing prescription percentages were found more in urban hospital (37.71%, 13.14%) as compared to the rural hospital. Interestingly, even 6 drug containing prescriptions' percentage was found less in rural when compare to urban hospital (0.09%). This clearly showed that rural hospital is more concerned about economic conditions and rationality. Also, the rural one being a teaching hospital is more concerned about the economic conditions compared to the urban hospital.

Another, interesting result that was found in both the hospitals was the use of only one antibiotic. This showed the concern of hospitals about antibiotic utilisation.

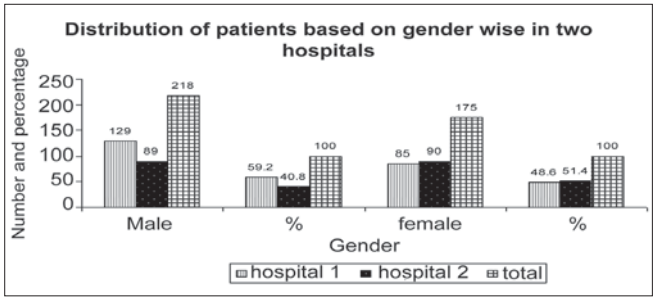

Figure 1: Gender-based distribution of outpatients in two hospitals

The prescriptions containing two or more drugs were for supportive treatment. The various supportive drugs being used in rural and urban hospitals are paracetamol 74 (33.94%), 1 (0.57%); cough syrups 24 (11.09%), 01 (0.57%); multivitamins 10 (4.58), 38 (21.71%); cough syrups + multivitamins 08 (3.6%), 07 (4.00%); paracetamol + cough syrups + multivitamins 07 (3.21%), 51 (29.14%); and paracetamol + multivitamins 19 (8.71%), 77 (44.00%); respectively. Whereas in rural hospital the other supportive drugs that are being used are antihistamines 14 (6.42%), cough syrups + antihistamines 6 (2.75%), cough syrups + paracetamol 34 (15.59%), cough syrups + antihistamines + multivitamins 2 (0.09%), paracetamol + antihistamines 11 (5.04%), and anti histamines + multivitamins 1 (0.04%). Interestingly, 8 prescriptions of the rural hospital did not contain any supportive therapy in whereas the others contained supportive drugs along with antibiotics. On the other hand, all the prescriptions of urban hospitals contained supportive drugs.

The comparison of rural and urban hospital showed that paracetamol and paracetamol + multivitamin combinations usage was more [Table 2].

The most widely prescribed antibiotic class in rural hospital was penicillin (amoxicillin-50.98%) followed by cephalosporin's (cephalexin-18.8%, cefixime-11.92%,

Table 1: Age-based distribution of outpatients

Age (years)	Hospital 1	%	Hospital 2	%
<1	19	8.71	12	6.85
1-4 years	59	27.06	109	62.28
>4-8	54	24.77	51	29.14
>8-12	48	22.01	3	1.71
>12-16	38	17.43	0	0
Total	218	100	175	100

Table 2: Distribution pattern of total number of drugs in the outpatient prescriptions

Total number of drugs in the prescription	Hospital_1 (*N*)	%	Hospital_2 (*N*)	%
1	4	1.83	0	0
2	74	33.94	10	5.71
3	96	42.66	74	42.28
4	41	18.80	66	37.71
5	1	0.045	23	13.14
6	2	0.09	2	1.14
Total	218	100	175	100
Mean±SD	2.84±0.11		3.61±0.15	

and cefuroxime-0); macrolides (azithromycin-8.71%); and fluoroquinolones (ciprofloxacin-4.58%).

Whereas in urban paediatric hospital, the most widely prescribed class of drugs was cephalosporin's (cefalexin-8.75%, cefixime-34.28%, and cefuroxime-24) followed by quinolones (norfloxacin- 17.14%, ofloxacillin-2.28%), penicillin (amoxicillin-9.14%), and macrolides (azithromycin-4.57%). Interestingly, no sulphonamides and fluroquinolones were used. The results clearly stated that pencillins and cephalosporin's are widely used drugs [Table 3].

Figure 2 shows that patients of rural hospital were given more combinations of antibiotics as compared to that of urban hospital. In both the hospitals, the combination drug used was amoxicillin + clavulanic acid (hospital 1: 8%, hoapital-2: 5.4%). Whereas no other combination of antibiotic usage was found in urban hospital. Whereas cefixime + clavalunic acid (3.66%) was the next commonly used combination in rural hospital followed by sulphamethaxazole + trimethoprim (2.29%). Ciprofloxacin + Tinidazole (0.91%) combinations was used less when compared others.

Table 4 shows that more cases of lower respiratory tract infections (LRTI) (49.54%) occurred cases in rural hospital followed by upper respiratory tract infections (URTI) (17.43%), acute GE (10.09%), and fever (10.50%). Whereas in urban hospital occurrence of fever (37.14%) was common followed by LRTI (32.57%) and acute GE (14.85%). Whereas cases of urinary tract infection (UTI) were more in urban paediatric hospital (5.71%) as compared to rural hospital (3.20%).

Table 5 shows various classes of drugs used for different diseases. In rural hospital, amoxicillin (56) was more widely used followed by cephalexin (34) and cefixime (6). Whereas in urban hospital drugs of cephalosporin class was used more (cefixime-26 followed by cefuroxime-19). Amoxicillin was the only one that was used for LRTI. This clearly states that in rural hospital, guidelines were followed because

Table 3: Distribution of class and type of antibiotic prescribed

Class of antibiotic prescribed	Hospital 1 (*N*=218)	%	Hospital 2 (*N*=175)	%
Penicillin				
Amoxicillin	111	50.98	16	9.14
Cephalosporin	67	30.73	117	66.85
Cefalexin	41	18.8	15	8.75
Cefixime	26	11.92	60	34.28
Cefuroxime	0	0	42	24
Quinoline	5	2.29	34	19.42
Norfloxacin	0	00	30	17.14
Ofloxacin	0	0	4	2.28
Macrolide	19	8.71	8	4.57
Azithromycin				
Sulphonamide	6	2.75	0	0
Sulphamethaxazole				
Fluoroquinolone	10	4.58	0	0
Ciprofloxacin				
Aminoglycoside	0	0	0	0
Total	218	100	175	100

Table 4: Details on distribution pattern of out patient's disease

Disease diagnosed	Hospital 1 (*N*)	%	Hospital 2 (*N*)	%
LRTI	108	49.54	57	32.57
URTI	38	17.43	9	5.14
Fever	23	10.5	65	37.14
Acute GE	22	10.09	26	14.85
Tonsilitis	6	2.75	8	4.57
UTI	7	3.2	10	5.71
Others	14	6.42	0	0
Total	218	100	175	175

LRTI=Lower respiratory tract infection, URTI=Upper respiratory tract infection, Acute GE=Acute gastroenteritis, UTI=Urinary tract infection

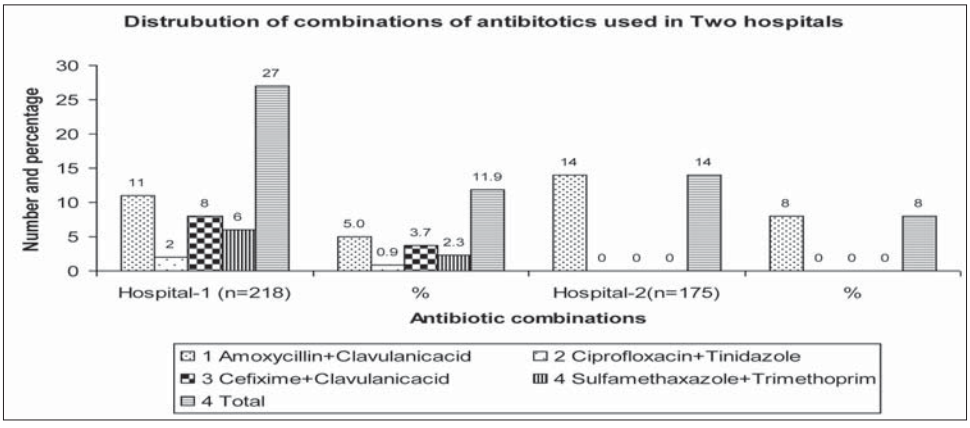

Figure 2: Distribution of combination of antibiotics prescribed in two hospitals

Table 5: Distribution pattern of type of antibiotics used for specific diseases in hospital 1 and -2

Hospital 1

Disease diagnosed	Amox	Cefa	Cefi	Cip	Ery	Nor	A+C	C+C	C+T	S+T	Total
LRTI	56	34	6	1	-	-	6	5			108
URTI	15	-	2	-	19	-	1	1	-	-	38
Fever	13	6	2	-	-	-	-	-	2	-	23
Acute GE	1	1	9	4	-	-	-	1	-	6	22
Tonsillitis	2	-	-	-	-	-	4	-	-	-	6
UTI	1	-	-	1	-	5	-	-	-	-	7
Others	12	-	-	2	-	-					14
Total	100	41	19	8	19	05	11	07	02	06	218

Hospital 2

Disease diagnosed	Amox	Cefa	Cefu	Cefi	Ery	Nor	Oflox	A+C	Total
LRTI	1	4	19	26	-	-	-	7	57
URTI	-	-	-	1	8	-	-	-	9
Fever	-	10	23	33	-	-	-	-	65
Acute GE	-	1	-	-	-	21	4	-	26
Tonsillitis	1	-	-	-	-	-	-	7	8
UTI	-	-	-	-	-	9	-	-	10
Total	2	15	42	60	8	30	4	14	175

Amox=Amoxicillin, Ampi=Ampicillin, Cefa=Cefalexin, Cefu=Cefuroxime, Cefi=Cefixime, Cipr=Ciprofloxacin, Ery=Erythromycin, Oflox=Ofloxacin, Nor=Norfloxacin, A+C=Amoxicillin+clavulanic acid, S+T=Sulfamethoxazole+trimethoprim, C+C=Cefixime+clavulanic acid, C+T=Ciprofloxacin+tinidazole, LRTI=Lower respiratory tract infection, URTI=Upper respiratory tract infection, Acute GE=Acute gastroenteritis, UTI=Urinary tract infection

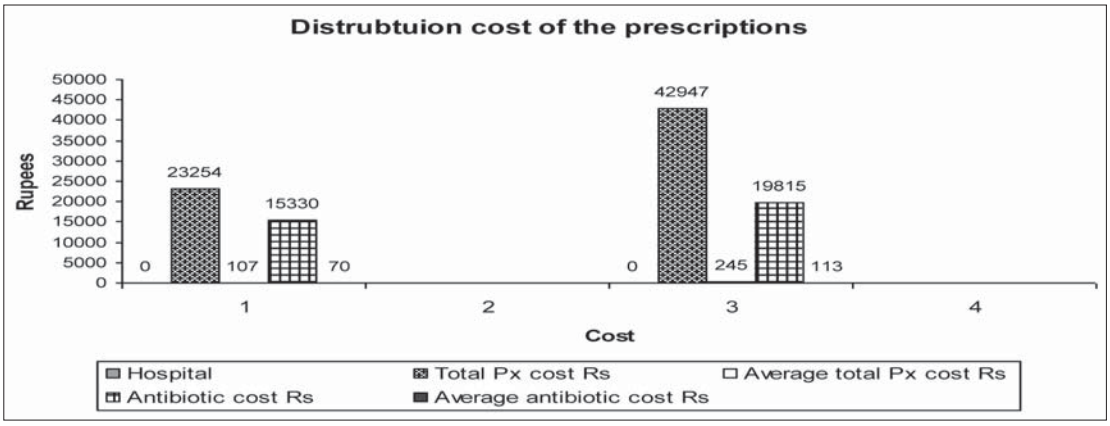

Figure 3: Distribution costs of prescriptions in two hospital

it is a teaching hospital whereas in urban hospital cephalosporin was used because of its resistance and quicker response. No culture sensitivity test was done in both the hospitals. For the treatment of URTI both the hospitals used erythromycin (hospital 1:19, hospital 2:8) followed by amoxicillin only in the rural hospital. In rural hospital, amoxicillin was used for fever followed by cephalosporin's whereas in urban paediatric hospital cefixime (33) was used more commonly followed by cefuroxime (23) and cephalexin (10). For acute GE cefixime (9) was widely used whereas in urban hospital norfloxacin (21) was used. Interestingly for tonsillitis Amoxicillin + clavulanic acid was used (hospital 1:4, hospital 2:7). For UTI norfloxacin was used widely in both the hospitals (hospital 1:5, hospital 2:9).

The total and average prescription cost of rural hospital was Rs. 23,254 and Rs. 106.66; respectively. The total antibiotic cost was calculated as Rs 15,330 and the average of antibiotic cost as Rs. 70.32. Whereas in the urban paediatric hospital the total and average prescription cost was Rs. 42,947 and Rs. 245.41. The total antibiotic cost was calculated as Rs. 19,815 and the average of antibiotic cost as Rs. 113.32. This clearly states that the economic consideration was more in rural teaching hospital as compared to the urban paediatric hospital. This is because it is a teaching hospital and they are concerned about the rural economic conditions of the patients. Whereas, the urban paediatric hospitals are more concerned about the therapeutic outcome in a quicker way [Figure 3].

DISCUSSION

Prescribing pattern is one of the components of the medical audit which helps the prescribers to achieve rational and cost-effective medical care. Most of the infectious diseases need antibiotic treatments. In these study outpatients prescription pattern of antibiotic utilization in two hospitals was studied. Male paediatric patients were more in rural hospital when compared to female, where as in urban hospital the female paediatric patients were more. This may be because the female rural population was less exposed to environmental influences when compared to male. Whereas this may be reverse in urban specialised hospital. Similar results were found in the studies conducted by Palikhe[11] (males-61.9% and female-38.1%) and Kolar and Hromadova[12] (males-58.2% and females-48.1%).

In both the hospitals, more number of patients belonged to the age group of 1- 4 years. This is very natural because in this age, the children's attitude will be more and immune power will be less. Similar type of percentages was observed in the children of age group 4-8 years. Interestingly in the urban hospital, children of the age group 8-16 years, the number of disease occurrence was decreasing as compared to rural. This may be because of more influence of educational activity and health consciousness on the urban paediatric patients. Same results were obtained in the study conducted by Kolar and Hromadova[12] in which the mean of age group was 7.5 years.

Number of prescriptions containing 3 and 4 drugs was more in urban hospital whereas in rural hospital more number of prescriptions contained 2 and 3 drugs. In both the hospitals, these prescriptions generally contained supplementary drugs along with only one antibiotic. In rural hospitals, the percentage of supplementary drugs was more for paracetamol followed by paracetamol + cough syrups. Whereas, the same for urban hospital was paracetamol + multivitamin combinations followed by paracetamol + multivitamin + cough syrups. This showed that the rural hospital was concerned more about the need of drug utilization and economic conditions as compared to urban hospital. Similar results were obtained in a study conducted by Palikhe[11] in which the average number of drugs per patient was found to be 5.01 ± 1.36.

In rural hospital, the most widely prescribed class of antibiotics for the paediatric patients was penicillin—amoxicillin followed by cephalosporins—cefalexin and, cefixime; whereas in urban paediatric hospital it was cephalosporin—cefixime, cefuroxime, and cefalexin, followed by quinolones—norfloxacin and ofloxacin. Antibiotics belonging to Penicillin class were found to be used in the studies conducted by Mohan *et al*.,[13] (86.4%)"Palcevski *et al*." (28.96%) and Senok *et al*.,[14] (38.54%). Most of the patients under this study category suffered from respiratory tract infections for which amoxicillin is the drug of choice as per the Centres for Disease Control and Prevention (CDC) recommendations. Ceftriaxone was the leading prescribed drug in inpatients, because of broad spectrum of activity followed by amoxicillin, cefalexin and cefixime which are preferable choice for RTIs. Similar results have been obtained in the studies conducted by Mohan *et al*.,[13] (70.3%) Palcevski *G et al*.[15], (28.96%) and Senok Ac *et al*.,[14] (38.54%).

In the rural hospital more number of LRTI cases was found, than URTI. Where as in urban hospital fever was more commonly found followed by LRTI (32.57%). Whereas UTI cases were more in urban paediatric hospital as compared to rural hospital. The rural paediatric population is more exposed to respiratory diseases because the occupation of their parents is agriculture. Whereas, in the urban patients respiratory disease was second leading disease, because of air pollution. Occurrence of fever was more in urban hospital because of food or air contamination. Similar results, that is, 29.28% of LRTI was found in the study conducted by Sharma *et al*.[16]

In both the hospitals, the most widely used combination was amoxicillin + clavalunic acids whereas remaining combinations were found only in rural hospital. This was because of broad spectrum of activity and as per the recommendations by CDC. Similar results were found in the studies conducted by Ashraf *et al*.[3] (amoxicillin + Clavulanic acid-40.74%) Jha V *et al*.[17] and Ciofi Degil Atti *et al*.[18]

In hospital 1, the drug that was widely used for respiratory diseases (LRTI, URTI) and fever was amoxicillin followed by cefalexin and cefixime. Whereas, cefuroxime and cefixime was widely used in hospital 2.

In the rural hospital, the total and average prescription cost was Rs. 23254 and Rs. 106.66, respectively. The total and average antibiotic cost was Rs. 15,330 and Rs. 70.32, respectively. Whereas in the urban paediatric hospital the total and average prescription cost was Rs. 42,947 and Rs. 245.41, respectively. The total and average cost of antibiotics was Rs. 19,815 and Rs 113.32, respectively.

This clearly states that economic consideration is more in the rural teaching hospital. This is because it is a teaching hospital and takes care of the rural economic conditions of the patients. Whereas, the urban paediatric hospitals are more concerned about the therapeutic outcome in quicker way.

CONCLUSION

The present study concludes that the most commonly prescribed antibiotic class in rural and urban hospital is Penicillin (amoxicillin) and cephalosporins (cefuroxime, cefixime, cefalexin). The most commonly prescribed antibiotic combination is amoxicillin + clavulanic acid. LRTI, fever are the most common diagnosed diseases in both the hospitals. In rural hospital average total cost of prescription was Rs. 106.66 and average antibiotic cost was Rs. 70.32. In urban hospital, the average total prescription cost was Rs 245.41 and average antibiotic cost was Rs 113.12. The total number of drugs and the number of antibiotics prescribed was found to be rational in both the hospitals. However, more rationality was observed in rural teaching hospital as compared to urban hospital based on the economic criteria and utilisation parameter. The present study concludes that the utilization of antibiotics in the paediatric out patients of both the hospitals was found to be rational.

ACKNOWLEDGMENTS

Our sincere pranams to Sri Sri Sri Dr Balaganghadharanatha Maha Swamiji and Sri Sri Nirmalanandha Swamiji, SAC Shikshana trust. We would like to thank Dr B Ramesh, Principal, SACCP; staff and PG Department of Paediatric AH and RC; and Dr. A.Vijay babu, Jabilli Children Hospital, Rajahmundry, Andhra Pradesh for their timely support, permission and suggestions at all stages of this work.

REFERENCES

1. Parthasarathi G, Nyfort-Hansen K, Nahata MC. A text book of clinical pharmacy practice. Chennai: Orient Longman Private Limited; 2004. p. 160-89.
2. Gupta N, Sharma D, Garg SK, Bhargava VK. Auditing of prescriptions to study utilization of antimicrobials in tertiary hospital. Indian J Pharmacol 1997;29:411-5
3. Ashraf H, Handa S, Khan NA. Prescribing pattern of drugs in out patient department of child care centre in Moradabad city. Int J Pharm Sci Rev Res 2010;3:1-5.
4. Zhang L, Lovatel R, Nicolete D, Sinzkel E., Matiello J, Staszko K, *et al.* Empiric antibiotic therapy in children with community acquired pneumonia. Indian Pediatr 2008;45:554-8.
5. Arnold SR, Allen UD, Al-Zahrani M, Tan DH, Wang EE. Antibiotic prescribing by pediatricians for respiratory tract infection in children. Clin Infect Dis 1999; 29:312-7.
6. McCaig LF, Hughes JM. Trends in antimicrobial drug prescribing among office-based physicians in the United States. JAMA 1995;273:214-9.
7. S KI, Chandy SJ, Jeyaseelan L, Kumar R, Suresh S. Antimicrobial prescription patterns for common acute infections in some rural and urban health facilities of India. Indian J Med Res 2008;128:165-71.
8. Bari SB, Mahajan BM, Surana SJ. Resistance to antibiotic: A challenge in chemotherapy. Indian J Pharm Educ Res 2008;42:3-11.
9. Ansam S, Ghada AB, Laila A, Waleed S, Rowa AR, Nidal J. Pattern of parenteral antimicrobial prescription among pediatric patients in Al-Watani government hospital in Palestina. An-NajahUniv.J.Res. (N.Sc) 2006;20:191-206.
10. George KK, Narmadha S, Nagarajan M. A study on drug prescribing pattern in Madurai city. Indian J Pharmacol 2002;34:361-2.
11. Palikhe N. Prescribing pattern of antibiotics in paediatric hospital of Kathmandu valley. Kathmandu Univ Med J 2004;2:6-12.
12. Kolar JV, Hromadova R. Analysis of antibiotic utilization in hospitalized paediatric patients. J Chin Clin Med, 2007;2:496-504.
13. Mohan S, Dharamraj K, Dindial R, Mathur D, Parmasad V, Ramdhanie J, *et al*. Physician behaviour for antimicrobial prescribing for paediatric upper respiratory tract infections: A survey in general practice in Trinidad, West Indies. Ann Clin Microbiol Antimicrob 2004;3:11.
14. Senok AC, Ismaeel AY, Al-Qashar FA, Agab WA. Pattern of upper respiratory tract infections and physicians' antibiotic prescribing practices in Bahrain. Med Princ Pract 2009:18:170-4.
15. Palcevski G, Ahel V, Viahovic-Palveski V, Ratchina S, Rosovic-Bazijanac V, Averchenkova L. Antibiotic use profile at paediatric clinics in two transitional countries. Pharmacoepidomol Drug Saf 2004;13:181-5.
16. Sharma R, Chopra VS, Kour G. Use of antibiotics for respiratory illnesses in rural India J Clin Diagn Res 2009;3:1557-61.
17. Jha V, Abid M, Mohanata GP, Patra A, Kishore K, Khan NA. Assessment of antimicrobials use in pediatrics in Moradabadcity. Int J Pharm 2010;3:19-24.
18. Ciofi Degli Atti ML, Raponi M, Tozzi AE, Ciliento G, Ceradini J, Langiano T. Point prevalence study of antibiotic use in a paediatric hospital in Italy. Euro Surveill 2008; 13: pii=19003.

How to cite this article: Ramanath KV, Balaji B. Study the outpatients' prescription pattern of antibiotics in paediatric populations of two hospitals. Arch Pharma Pract 2013;4:21-7.

Source of Support: Nil. **Conflict of Interest:** None declared.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.