

# **SPECTRUM OF INFECTIOUS DISEASES AND ANTIBIOTIC USAGE IN A PAEDIATRIC OUTPATIENT DEPARTMENT**

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## **Abstract**

The main objective of this study is to analyze the spectrum of infectious diseases in paediatric population and to study the antibiotic usage and selection of the dosage forms in children taking treatment in the outpatient department of the paediatric hospital in Tetovo. A retrospective study was undertaken during 01 January – 30 June of 2012. Drug data and patient characteristic data were computed using Ms. Excel 2007. Among the total number of 3778 patients analyzed during the period of six months, 1463 (38.7 %) of them were prescribed antibiotics, male patients were 829 (56.7%) and female patients were 634 (43.3 %). The majority of patients given antibiotics were aged  $>1 - \leq 3$  years (49.1 %). Incidence of infections was found to be 89.3% (1306 patients), of which upper respiratory tract infections (69.7%) were common among 1020 patients followed by lower respiratory tract infections in 234 (16.0%) cases. Cephalosporins were the commonest antibiotics prescribed (43.6%), among which cefaclor was the leading antibiotic prescribed in 283 (19.3 %) the total patients. Benzathine phenoxymethylpenicillin was the most common antibiotic prescribed in upper respiratory tract infections (23.8%) followed by cefaclor (19.7%). Syrups were the common dosage forms prescribed for all patients in the paediatric age group followed by capsules.

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**Keywords:** Infectious diseases, antibiotic, paediatric, dosage forms

## **Introduction:**

Infants and children are among the most vulnerable population groups to contract illnesses (Sanz EJ. et al, 1989)(Summers RS. et al, 1986). Infectious diseases in children are in general of viral origin rather than bacterial. However, in practice it is extremely difficult for pediatricians to differentiate viral and bacterial infections, therefore the use of antimicrobial agents has become a routine practice and antibiotics are among the most commonly prescribed drugs for the treatment of paediatric illnesses (Dong Soo Kim et al, 1998). Although the key role played by antibiotics in the treatment of infectious diseases should be acknowledged, there are reports of irrational use of antibiotics, which may even lead to destruction of micro flora, emergence of multi drug resistance microorganisms, and clinical symptoms like toxic mega colon and pseudo membranous colitis. All these are responsible for serious infections in the outpatients. This irrational use has led to the development of “super bugs”, use of more combination of antibiotics, and fearing the experts about future availability of antibiotics. Therefore, many considerations must be made for the treatment of infectious diseases and an effective step should be taken for rational use, especially in the paediatric population (S KI. et al, 2008)(Bari SB. et al, 2008)(Ansam S. et al, 2006)(George KK. et al, 2002). To tackle with this problem, global initiatives are trying to promote “antibiotic stewardship”, with the aim of enhancing the appropriateness of antimicrobial use (Céire Costelloe , 2010).

Hence the present study was carried out with the objective of analyzing the spectrum of infectious diseases in children and to study the prescribing patterns of antibiotics, thereby to understand physician’s preferences in prescribing drugs for children, especially antibiotic usage and selection of the dosage forms in paediatric population.

## **Materials and Methods:**

A retrospective study of six months was undertaken during 01 January – 30 June of 2012 in the outpatient department of a paediatric hospital in Tetovo. Paediatric patients of either sex and of age falls between 1 week and 14 years attending outpatient department were included in the study. Patient demographics such as age, sex, diagnosis, drug details which included name of the drug, generic/brand name, dosage form, dose frequency and duration were recorded. The data were recorded for the prevalence of diseases, the drugs prescribing patterns and the results were computed using Ms Excel 2007. The results were expressed as percentage/proportion either as pictorial representation in the form of bar diagram or in the tabular form.

## Results:

### Socio-Demographic data

Among the total number of 3778 patients analyzed during the period of six months, 1463 (38.7 %) of them were prescribed antibiotics. The male patients were 829 (56.7%) and female patients were 634 (43.3 %) which shows males are prone to diseases than female children. The age range of patients who visited the paediatrics outpatient department during the study period was between 1 week and 14 years. Age grouping with the highest attendance were aged  $>1 - \leq 3$  years (49.1 %) followed by infants  $> 4$  weeks -  $\leq 1$  year (20.9%). Neonates up to 4 weeks were less involved in the study (1.9%) (Table 1).

**Table 1:** Pediatric out patients socio-demographic data

Parameters	Number of patients	Percentage
<b>Age</b>		
Neonates (up to 4 weeks)	28	1.9
Infants ( $> 4$ weeks - $\leq 1$ year)	306	20.9
Toddler ( $> 1 - \leq 3$ years)	719	49.2
Pre-school ( $>4 - \leq 6$ years)	240	16.4
School age ( $>6 - \leq 14$ years)	170	11.6
<b>Sex</b>		
Male	829	56.7
Female	634	43.3

### The spectrum of diseases for which antibiotics were prescribed

The most common diseases that were diagnosed in the study population were upper respiratory tract infections (URTI) accounting for 1020 (69.7%) of the patients.

**Table 2:** Diagnosis pattern no (%) in different age groups

Diagnosis	Neonates	Infants	Toddler	Pre-school	School age	Total
	No.(%)	No.(%)	No.(%)	No.(%)	No.(%)	No.(%)
Upper respiratory tract infections (URTI)	7(0.5)	208(14.2)	540(36.9)	166(11.3)	99(6.8)	1020(69.7)
Lower respiratory tract infections (LRTI)	0	60(4.1)	103(7.0)	39(2.7)	32(2.2)	234(16.0)
Gastroenterocolitis	0	10(0.7)	14(1.0)	4(0.3)	7(0.5)	35(2.4)
Skin Infections	21(1.4)	3(0.2)	5(0.3)	0	0	29(2.0)
Urinary tract infections (UTI)	0	1(0.1)	2(0.1)	9(0.6)	12(0.8)	24(1.6)
Fever	0	6(0.4)	13(0.9)	3(0.2)	2(0.1)	24(1.6)

<b>Other*</b>	0	8(0.5)	9(0.6)	7(0.5)	13(0.9)	37(2.5)
<b>Combination**</b>	0	10(0.7)	33(2.3)	12(0.8)	5(0.3)	60(4.1)

\*Other: Colic, submandibular lymphadenopathy, gastralgia, stomatitis, status post operaciones, status post convulsiones, status post pneumonia

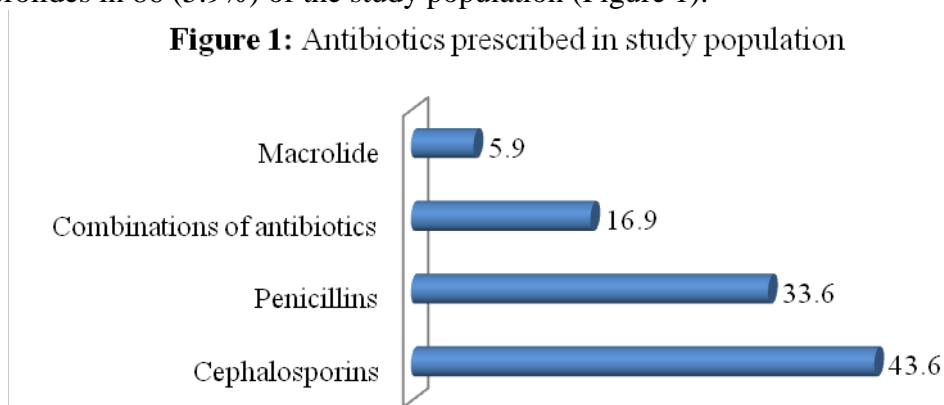
\*\*Combination: Bronchitis + bronchopneumonia, bronchitis + tonsillopharyngitis, laryngitis + bronchitis, enterocolitis + vomiting, vomiting + gastralgia

234 (16.0%) had lower respiratory tract infections (LRTI) followed by gastroenterocolitis diagnosed in 35 (2.4%); skin infections in 29 (2.0%); fever and urinary tract infections (UTI) in 24 (1.6%) of the study population. 37 (2.5%) had other diagnosis and in certain cases 60 (4.1%) prescriptions covered multiple diagnosis. Infection was the most common cause for illness affecting 89.3% of the study population (Table 2).

### Number and type of antibiotics prescribed per patient

A total of 13 different antibiotics among which 1216 (83.1%) as single antibiotic prescriptions and 247 (16.9%) prescriptions of combination antibiotics were prescribed totaling 1463 occurrences. These comprised cephalosporins, penicillins, macrolides and combinations of antibiotics. Cephalosporins were prescribed in 638 (43.6%) of patients followed by penicillins in 492 (33.6%), combinations of antibiotics in 247 (16.9%) and macrolides in 86 (5.9%) of the study population (Figure 1).

**Figure 1:** Antibiotics prescribed in study population



Of the 638 patients prescribed with cephalosporins, majority of them were prescribed with cefaclor 283 (19.3 %) cases, followed by cefalexin in 201 (13.7%) patients; cefadroxil in 136 (9.3%); cefixime in 12 (0.8%) patients; ceftriaxon in 4 (0.3%) and cefuroxim in 2 (0.1%) patients. The penicillins prescribed included benzathine phenoxymethylpenicillin in 273 (18.7%) patients followed by amoxicillin in 207 (14.1%) patients and ampicillin in 12 (0.8%) patients. Azithromycin, a macrolide antibiotic was prescribed in 71 (4.8%) followed by midecamycin in 15 (1.0%) patients. Amoxicillin in combination with clavulanic acid was the commonest

combination of antibiotics prescribed in 246 (16.8%), while sulphonamide/trimethoprim was administered in 1 (0.07%) of the total patients given in combination (Table 3).

**Table 3:** Drugs used in each class of antibiotics

Antibiotic class	Name	No. of patients n=(1463)	Total (n=1463)
Cephalosporins	Cefaclor	283 (19.3 %)	638 43.6%
	Cefalexin	201 (13.7%)	
	Cefadroxil	136 (9.3%)	
	Cefixime	12 (0.8%)	
	Ceftriaxone	4 (0.3%)	
	Cefuroxime	2 (0.1%)	
Penicillins	Benzathine phenoxymethylpenicillin	273 (18.7%)	492 (33.6%)
	Amoxicillin	207 (14.1%)	
	Ampicillin	12 (0.8%)	
Macrolide	Midecamycin	15 (1.0%)	86 (5.9%)
	Azithromycin	71 (4.9%)	
Combinations of antibiotics	Amoxicillin, clavulanic acid	246 (16.8%)	247 (16.9%)
	Sulfamethoxazole, trimethoprim	1 (0.1)	

### Frequency (%) of individual antibiotic for specific diagnosis

Benzathine phenoxymethylpenicillin was prescribed in highest percentage in upper respiratory tract infections followed by cefaclor. Amoxicillin in combination with clavulanic acid and cefaclor were prescribed in highest percentage in case of lower respiratory tract infections. Cefalexin was the leading antibiotic prescribed in skin infections whereas in urinary tract infections, amoxicillin in combination with clavulanic acid was the common prescribed antibiotic (Table 4).

**Table 4:** Frequency (%) of individual antibiotic for specific diagnosis

Antibiotics	Upper respiratory	Lower respiratory	Skin infections	Urinary tract	Gastroentero	Fever	Other	Combination
Amoxicillin, Clavulanic acid	15.5	20.5	6.9	45.8	5.7	8.3	10.8	31.7
Cefaclor	19.7	20.5	27.6	25	14.3	20.9	13.5	8.3
Cefadroxil	9.8	11.1	3.4	0	11.4	4.2	0	6.7
Amoxicillin	12.3	14.5	3.4	12.5	57.1	8.3	43.3	10
Ceftriaxone	0.1	0.9	0	0	0%	0	2.7	0
Midecamycin	0.6	3.0	0	0	0	0	0	3.3
Benzathine phenoxy-methylpenicillin	23.8	2.6	0	4.2	2.9	50	10.8	10
Cefixime	0.3	3.0	3.4	0	0	0	0	1.6
Azithromycin	2.8	14.9	0	0	0	0	5.4	8.3

<b>Ampicillin</b>	0.2	0.4	6.9	0	2.9	0	2.7	8.3
<b>Cefalexin</b>	14.9	7.7	48.4	8.3	5.7	8.3	10.8	11.7
<b>Sulfamethoxazole, trimethoprim</b>	0	0	0	4.2	0	0	0	0
<b>Cefuroxime</b>	0	0.9	0	0	0	0	0	0

### Dosage forms used in the study population

Table 5 depicts the different dosage forms used in the study population at different age groups. Syrups were the most preferred dosage forms prescribed for 1394 (95.3 %) patients. Capsules were the next preferred dosage form in patients in the age range of 7-14 years (47 patients). Tablets were the least administered dosage form in all age groups.

**Table 5:** Age vs. dosage forms used

Dosage forms	Neonates	Infants	Toddler	Preschool	School	Total (n=1463)
<b>Syrups</b>	28	306	719	239	102	1394 (95.3%)
<b>Capsules</b>	0	0	0	0	47	47 (3.2%)
<b>Tablets</b>	0	0	0	1	21	22 (1.5%)

### Conclusion:

Correct diagnosis of a disease and its management with medicines, constitute important aspects of patient care which is even more important in case of pediatric patients. For this it is very prudent to study the prescribing practice in paediatric patients in order to find out lacunae, if any, and suggest remedial measures to overcome the same.

In the present study, out of 1463 patients included, the age range  $>1 - \leq 3$  years (49.1%) comprised the highest proportion of the patients. Comparatively less cases of disease were found among the neonates (1.9%). The male patients 829 (56.7%) were more as compared the number of female patients 634 (43.3 %).

The diagnostic patterns of outpatients enrolled in the study showed that skin infections were the prevalent diagnosis among the neonates, while upper respiratory tract infections were common diagnosis among the other age groups.

Among the antibiotics cephalosporins were the most frequently prescribed class (43.6%), among which cefaclor was the leading antibiotic prescribed in 283 (19.3 %) cases.

Benzathine phenoxymethylpenicillin was found to be the most common antibiotic prescribed in upper respiratory tract infections followed by cefaclor; amoxicillin in combination with clavulanic acid and cefaclor in lower respiratory tract infections; cefalexin in skin infections whereas in urinary tract infections, amoxicillin in combination with clavulanic acid was

the common prescribed antibiotic. The combination of sulphonamide/trimethoprim was prescribed only in one case of urinary tract infections.

The study showed that syrups were the common dosage form prescribed for all patients in the pediatric age group and capsules/tablets were least preferred. The age at which children can swallow conventional tablets is of great importance for their safety. Liquid medicines are usually recommended for infants and younger children so the ability to mask unpleasant taste with sweeteners and flavours is crucial (Tan E. et al, 2007).

In conclusion, it is necessary to take action to improve prescribing habits in order to reduce the unnecessary usage of antibiotics thus enhance rational antibiotic use. Consequently, physicians must be encouraged to make more use of laboratory investigations and must not depend solely on clinical diagnosis. Establishing benchmarks for antibiotic use will help pediatricians aimed to treat children with known or presumed infections judiciously.

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