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Spectrum of the Microorganisms in Children with Urinary Tract Infection

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Abstract

Background: **To determine the spectrum of microorganisms and their sensitivities in children with urinary tract infection (UTI.)**

Methods: **This study was conducted in Pediatrics department of Holy Family Hospital, Rawalpindi. 150 children between 1 – 12 years of age presenting with fever ≥ 101 °F with duration of 10 days or less without any definite focus of infection were included in the study. Children who already had received antibiotics in previous 48 hours or were comatose, immunocompromised or with congenital urinary tract abnormalities were excluded from the study.**

Results: **Escherichia. coli and Klebsiella were the commonest uropathogens. Other uropathogens obtained were Proteus mirabilis, Enterobacter and Staphylococcus aureus.**
Maximum sensitivity was to co-amoxiclav, cephalosporins aminoglycosides and quinolones. Organisms showed maximum resistance to ampicillin, amoxicillin and nalidixic acid with low resistance to cephalosporins, quinolones and aminoglycosides.

Conclusion: **UTI is a common source of infection among children presenting with unexplained fever. Co-amoxiclav or cephalosporins can be started as an empirical agent that can be changed later according to the culture and sensitivity report.**

Introduction

UTI is the term indicating the invasion by microorganisms of a previously sterile urinary system[1]. It is commonest among the childhood urinary tract diseases with an incidence of 30%[2]. Upto 3 – 5% of the girls and 1 – 2% of the boys will experience one or more episodes[3].

It may present with a range of severity from cystitis to febrile UTI or pyelonephritis or there can be nonspecific symptoms[4]. Esch. coli is the most common infecting pathogen followed by enterobacteria (klebsiella, proteus, pseudomonas, enterobacter), gram positive enterococcus and staphylococcus aureus and saprophyticus[5,6]. There is emerging resistance to various antibiotics during the last decade which is posing a great problem in treating such patients.

One reason for increasing resistance is that in our settings where there is no guideline for antibiotic use, unchecked and irrational use increases the resistant strains of previously sensitive bacteria.

Another possible reason for increasing resistance to pencillin is the widespread use of β-lactam agents in paediatric population especially for otitis media and pharyngitis.

There are very few community based studies ever conducted on this problem especially in our country[7]. This study was conducted to determine spectrum of microorganisms causing UTI and their sensitivity to various antibiotics.

Patients and Methods

This study was conducted in Paediatrics department of Holy Family Hospital, Rawalpindi from August 2003 to September 2004. Children between 1 – 12 years of age who presented with fever ≥ 101 °F with duration of 10 days or less were included in the study. Children who received antibiotics in previous 48 hours or were immunocompromised, comatose or had congenital anomalies of UT were excluded.

Subjects were evaluated by doing urinalysis and culture and sensitivity. Urine was collected by midstream clean catch method in urine culture bottles after cleaning the genitalia with soap and water. Specimens were cultured on CLED medium, incubated aerobically at 37 °C for 24 hours and examined for bacterial growth. Only those samples were considered positive that gave the colony count of > 105 bacteria/ml of a single pathogen.

Results

18 out of 150 patients (12%) were found to have UTI. Esch. coli was found in 13 patients (72%). Klebsiella in 2 patients (11%). Staphylococcus aureus

in 1 (5.5%). Enterobacter in 1 (5.5%) and Proteus in 1 (5.5%) (Table 1).

Table 1. Uropathogens isolated from urinary tract (n = 18)

Organism	No. of patients	Percentage of patients
E.Coli	13	72%
Klebsiella	2	11%
Staphylococcus aureus	1	5.5%
Enterobacter	1	5.5%
Proteus	1	5.5%
Total	18	100%

Table 2. Antimicrobial resistance of urinary tract isolates

Organ-ism	Amoxicillin / Ampicillin	Nalidixic Acid	Cephalosporins	Gentamycin	Quinolones
E.Coli	14 (77%)	10 (55%)	4 (22%)	2 (11%)	2 (11%)
Klebsi-ella	13 (72%)	8 (44.8%)	3 (16.6%)	-	-

Esch. coli showed maximum resistance to amoxicillin, ampicillin and nalidixic acid and maximum sensitivity to co-amoxiclav, cephradine, cefotaxime, ceftriaxone, ciprofloxacin, ofloxacin, sparfloxacin, gentamicyn and amikacin as shown in Table 2. Resistance to nalidixic acid was 55%, gentamycin 11%, cephalosporins and co-amoxiclav 22% and quinolones 11%.Klebsiella showed similar sensitivity as that of Esch. coli. Staphylococcus was sensitive to co-amoxiclav, ciprofloxacin while it was resistant to amoxicillin, cefotaxime, gentamycin and doxycycline. Enterobacter and proteus showed sensitivity to co-amoxiclav and amikacin and resistance to amoxicillin, ampicillin, cephradine, cefotaxime, ceftriaxone, ceftazidime, gentamycin and quinolones. On urinalysis 23 patients (15%) had more than 5 pus cells but their cultures were negative while in 9 patients (6%) urine culture was positive despite negative urinalysis.

Discussion

The study shows Esch. coli to be the commonest organism causing UTI. This is in keeping with the studies carried out by other authors from Pakistan[2,5,6,10,11,16] and the West[8,12,14,17,18].

Klebsiella is the 2nd most leading cause of UTI. Staphylococcus aureus and Enterobacter were isolated in 5.5% which is comparable to other studies done in Pakistan and in the West[2,6,16,19].Proteus mirabilis was isolated in 5.5% which is higher than reported in the studies done by Farooqi et al[6] and others [19].

The resistance pattern of E. coli against ampicillin and amoxicillin has increased to 20 – 25% in the past decade. Khan et al[20] reported that ampicillin is the least effective against E. coli in 1989 but the present study showed an increase in the resistance to almost 77%. This is in keeping with the studies done by Khan and Ahmad[5] and Farooqi[13] and other studies[9,10,16].

Resistance to quinolones emerged in 1997 and resistance reported in this study is same as that shown in the study done by Khan et al[20].The resistance pattern of Klebsiella and Enterobacter species is more or less the same as that of E. coli which is similar to that found in another local study[5].

Staphylococcus aureus and Proteus also showed resistance to amoxicillin and ampicillin which is comparable with other studies[6,12,21,22]. Our study demonstrated that there was not a single antibiotic to which all uropathogens were sensitive All above organisms showed a low rate of resistance to cephalosporins, quinolones and aminoglycosides which is the same as shown in another local study[6].

Studies have established that a normal urinalysis does not rule out UTI in children[15]. Our study also demonstrated this fact.

Conclusion

This study shows that Esch. coli and Klebsiella are the most common organisms causing UTI in children with a maximum sensitivity to co-amoxiclav, third generation cephalosporins, aminoglycosides and quinolones.

A febrile child with or without the specific symptoms should be investigated for UTI with both urinalysis and culture.In a child with suspected UTI, co-amoxiclav or cephalosporins can be used as an empiric agent for therapy.

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