

**Original Article****Bacteriological Profile and Antimicrobial Sensitivity Pattern of Urinary Tract Infection in a Tertiary Care Hospital of Bangladesh**Laila Shamima Sharmin,¹ Md. Azizul Haque,² Fardoushi Begum,³
ASM Kazi Shamim Parvez,⁴ Md. Belal Uddin⁵**Abstract**

Pediatric urinary tract infections (UTI) are associated with significant morbidity and potential long term complication like extensive renal scarring leading to end stage renal disease. Prompt diagnosis and early initiation of treatment is necessary to prevent long term complications. Knowledge about bacteriological profile of pediatric urinary tract infections and their antimicrobial sensitivity pattern is helpful for initiation of empirical antibiotic treatment. The aim of this study was to identify the causative bacteria and antimicrobial sensitivity pattern of community acquired UTI in children attending outpatient department of a tertiary level hospital of Bangladesh. This was a cross-sectional study conducted in pediatric outpatient department of Rajshahi Medical College Hospital, Bangladesh over 6 month period from 1st January 2017 to 30th June 2017. Children aged < 12 year who presented with clinical features suggestive of urinary tract infection were subjected for urinary routine and microscopic examination and culture. Colony counts of the culture positive cases were done and antibiotic sensitivity and resistance patterns were studied. Samples with colony count of $\geq 10^5$ CFU/ml were considered significant. Among the 134 clinically suspected cases significant bacteriuria was found in 81 (60.45%) children. *Escherichia coli* was the most common isolate (74.1%) followed by *Proteus* (9.8%), *Klebsiella* spp. (8.6%), *Pseudomonas* (6.2%) and *Staphylococcus saprophyticus* (1.2%). *E. coli* was found to be highly sensitive to imipenem, amikacin, nitrofurantoin and ciprofloxacin. *Klebsiella* showed good sensitivity against ciprofloxacin and imipenem whereas *proteus*, *Pseudomonas* and *Staphylococcus saprophyticus* showed sensitivity against imipenem, amikacin and ciprofloxacin. Increased resistance was noted against the commonly used empirical antibiotics such as cephradine, cefuroxime, cefixime, ceftriaxone and co-trimoxazole. Therefore, selection of empirical therapy should be based on local bacteriological profile and their antimicrobial sensitivity pattern.

KEY words: UTI, bacteriological profile, antimicrobial sensitivity

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Introduction

Urinary tract infection is a bacterial infection that affects part of the urinary tract. It is a common bacterial infection in infants and children both in community and hospital setting. UTI is considered as an important cause for a significant number of

outpatient visits.¹ The incidence varies according to age, race and sex. It is estimated that 1% of boys and 3% of girls develop UTI during the first ten years of life. Males are affected more than females in the first year of life whereas females are more affected after 1 year of age.² Urinary

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tract infection in children is associated with high morbidity and long term complications like renal scarring, hypertension, and end stage renal disease. Rapid diagnosis and prompt treatment is necessary to minimize renal scarring and progressive kidney damage.³ The American Academy of pediatrics has recommended empirical and early treatment of UTI, based on the susceptibility pattern of the antimicrobials to reduce the risks of pyelonephritic scarring.⁴ The spectrum of etiologic agents causing UTI and their antimicrobial resistance pattern has been continuously changing over the years. It depends on time, geographical location and age of patients.^{5,6} Hence the choice of empirical therapy should be based on local experience of bacteriological profile and antibiotic sensitivity pattern. There is a paucity of data concerning antibiotic therapy for UTI in the developing world and increasing rates of antimicrobial resistance among has caused growing concern in both developed and developing countries.⁷ The aim of our study was to determine the bacteriological profile and antibiotic sensitivity pattern of community acquired urinary tract infections (UTI) in children attending pediatric outpatient department of a tertiary level hospital of Bangladesh.

Materials and Methods:

This was a cross-sectional study done in outpatient department of Rajshahi Medical College Hospital,

Results

During the study period 134 patients were clinically suspected and undergone investigations for UTI. Out of them 81 patients (60.45%) had confirmed UTI. Among the confirmed UTI cases 35 (43.2%) were male and 46 (56.8%) were female (Figure 1). Males were more commonly affected in <1 year age group and females were more commonly affected in older age group (Figure 1).

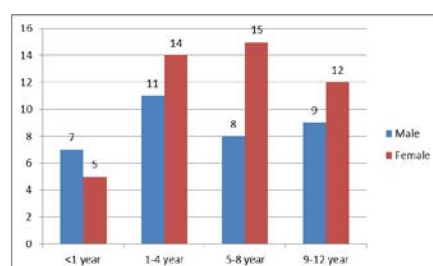


Figure 1: gender distribution of different age group

Common uropathogens isolated were *Escherichia coli* (74.1%), *Proteus* (9.8%), *Klebsiella* spp. (8.6%), *Pseudomonas* (6.2%) and *Staphylococcus saprophyticus* (1.2%). Table 1 show organisms isolated in different sex groups. In both sex groups, *E. coli* was the commonest organism isolated.

Bangladesh from 1st January 2017 to 30 th June 2017. Children aged < 12 year who presented with clinical features suggestive of urinary tract infection were sent for routine and microscopic examination of urine along with culture and sensitivity. Pyuria was defined by presence of ≥ 5 White blood cells/High power field in centrifuged urine or ≥ 10 WBC/HPF in uncentrifuged urine. Significant bacteriuria was considered if a single organism was cultured at concentration of more than 10^5 colony forming unit (CFU) per ml of a clean-catch midstream single urine sample. Confirmed UTI was defined by the presence of significant bacteriuria and pyuria in a symptomatic child. Only the confirmed UTI cases were enrolled for the study and relevant data like age, sex were recorded in case record form after taking informed consent from parents. The following cases were excluded: children with prolonged catheterization, having known urinary tract malformations, glomerulonephritis, other inflammatory diseases like vasculitis (SLE and others), asymptomatic bacteriuria, current prophylactic treatment with antibiotic and children getting antibiotics within seven days prior to sample collection. Culture with polymicrobial growth was considered as contamination and was excluded from the study. SPSS version 19.0 for windows (SPSS Inc, Chicago) was used for data analysis. Ethical issues were addressed duly.

Table 1: organisms isolated according to different sex group

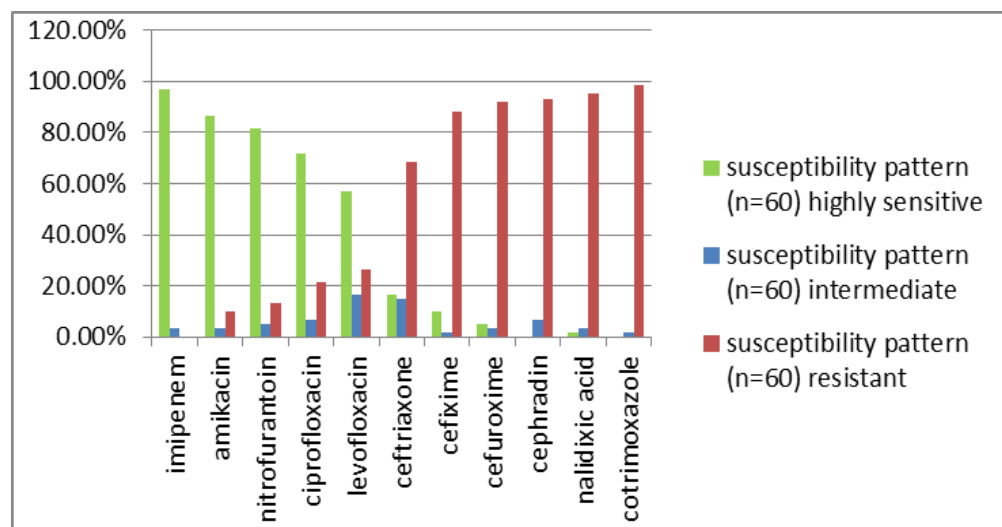
Sex	E. coli	Klebsiella	Proteus	Pseudomonas	Staphylococcus saprophyticus
Male	28	1	5	1	0
Female	32	6	3	4	1
Total	60 (74.1%)	7(8.6%)	8 (9.8%)	5 (6.2%)	1(1.2%)

In all age group E. Coli was the commonest pathogen isolated (Table 2).

Table 2: organisms isolated in different age groups

Age group	E. coli	Klebsiella	Proteus	Pseudomonas	Staphylococcus saprophyticus
<1 year	12	0	0	0	0
1-4 year	21	2	2	0	0
5-8 year	17	1	1	3	1
9-12 year	10	4	5	2	0
Total	60 (74.1%)	7 (8.6%)	8 (9.8%)	5 (6.2%)	1 (1.2%)

Regarding the antimicrobial sensitivity pattern E. coli was found to be highly sensitive to imipenem, amikacin, nitrofurantoin and ciprofloxacin. Increased resistance was noted against co trimoxazole, nalidixic acid, cephradine, cefuroxime, cefixime and ceftriaxone. (Figure 2)

Figure 2: susceptibility pattern of E. coli

Klebsiella showed good sensitivity against ciprofloxacin and imipenem, whereas proteus, pseudomonas and Staphylococcus saprophyticus showed sensitivity against imipenem, amikacin and ciprofloxacin (Table 3).

Table 3: sensitivity pattern of non E. Coli bacteria

Organisms	Sensitivity to antibiotics							
	Imip (%)	Amk (%)	Nitro (%)	Cipro (%)	Levo (%)	Cefuro (%)	Cefix (%)	Ceftr (%)
Klebsiella (n=7)	4(57.1)	2(28.6)	1(14.3)	5(71.4)	2(28.6)	1(14.3)	1(14.3)	1(14.3)
Proteus (n=8)	7(87.5)	6(75)	--	2(25)	3(37.5)	--	1(12.5)	1(12.5)
Pseudomonas (n=5)	5(100)	5(100)	--	4(80)	1(20)	--	--	--
Staph. saprophyticus (n=1)	1(100)	1(100)	1(100)	1(100)	1(100)	--	--	--

Imip=Imipenem, Amk=Amikacin, Nitro=Nitrofurantoin, Cipro=Ciprofloxacin, Levo=Levofloxacin, Cefuro=Cefuroxime, Cefix=Cefixime, Ceftr= Ceftriaxone

Discussion

In this study overall male: female ratio of UTI was 1:1.3. That is comparable to other studies in Bangladesh.⁵ Bouskraoui M et al and Malla KK et al found male: female ratio of 1:1.9 and 1:2 respectively, where the sex ratio was slightly different.^{8,9} The spectrum of bacteria causing UTI and their antimicrobial sensitivity pattern has been continuously changing over the years, both in community and in hospitals. In our study *E. coli* (74.1%) was the commonest organism isolated, followed by *proteus* (9.8%), *klebsiella* (8.6%), *pseudomonas* (6.2%) and *Staphylococcus saprophyticus* (1.2%). Abu Saleh Ahmed et al conducted a study in BSMMU which showed that the incidence of *E. coli*, *Klebsiella* spp, *Enterobacter* spp and *Pseudomonas aeruginosa* in UTI patients were 60.02%, 9.73%, 11.38% and 4.04% respectively. Studies from Iran and Nepal also showed *E. coli* as the commonest organism followed by *Klebsiella*.^{11,12} However in different studies the percentage of *Escherichia coli* (*E. coli*) was different ranging from 30.2% to 90% in collected urine samples.^{1,2,13,14} Regarding susceptibility to antibiotics, *E. coli* showed highest sensitivity to imipenem followed by amikacin, nitrofurantoin and ciprofloxacin. This may be attributed to the fact that these antibiotics have not been widely used in treating UTI cases in Bangladesh. Another study done previously in a

different hospital of Bangladesh showed higher sensitivity to nitrofurantoin, amikacin and ceftriaxone against *E. coli*.¹⁵ Shrestha et al. reported *E. coli* as most sensitive to nitrofurantoin (84.6%), amikacin (80.7%), gentamicin (73%) and ofloxacin (53.8%).² Third generation cephalosporins were found to be having better coverage with relatively low reported resistance in different studies and were suggested for the empiric treatment of febrile UTI.^{13,16} But this study showed increased resistance of *E. coli* to ceftriaxone and other cephalosporins like cephadrin, cefuroxime, cefixime. Most of these antibiotics are used empirically in Bangladesh and resistance of *E. coli* to these commonly used antibiotics appears to be alarming.

Regarding the other less common organisms isolated in our study (*klebsiella*, *proteus*, *pseudomonas* and *staphylococcus saprophyticus*) showed higher sensitivity to imipenem, amikacin and ciprofloxacin but they showed poor sensitivity to nitrofurantoin and oral cephalosporins. These findings were partially comparable to the study conducted in Dhaka Shishu Hospital which showed most of the isolates including *E. coli*, *Klebsiella* and *proteus* had resistance against colistin (CL) (94.55%), followed by cefradine (79.59%), Co-trimoxazole (SXT) (69.39%) nalidixic acid (NA) (66.67%) and ceftazidime (CTM) (48.98%).¹⁷

Conclusion:

This study showed the commonly used empirical antibiotics are less effective for treating UTI in children attending this hospital. Since the spectrum of causative organism for UTI may vary among geographical locations, hospitals and also in different age groups, each institution should carefully plan their empirical antibiotic selection based on the knowledge of local prevalence of bacterial organisms and antibiotic sensitivity pattern. Studies with larger sample size should be done to gather more data about bacteriological profile and susceptibility pattern to antibiotics.

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