

Original Articles

Clinico-Laboratory Profile and Drug Sensitivity Pattern in Urinary Tract Infection of Children in a Tertiary Care Hospital

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Abstract

Background: Urinary tract infection (UTI) is common in children. About 7% girls and 2% of boys suffer from symptomatic, culture positive UTI by 6 years of age. These children present with poor feeding, irritability, vomiting, fever, abdominal pain or failure to thrive. Now a days antibiotic resistance is a global problem which hampers appropriate treatment of urinary tract infection in children. This study was done to see clinical profile, common pathogens and their drug sensitivity pattern in UTI.

Methodology: It is a prospective study conducted in Delta Medical College & Hospital, Dhaka. All cases collected from outdoor patient or inpatient who were clinically suspected as UTI were enrolled in this study from January 2015 to July 2017. Total 200 cases were included. History was taken properly. Diagnosis of UTI was confirmed by urinalysis and culture sensitivity (C/S). All informations were recorded in preformed data sheet.

Results: Usual presentations of UTI were fever, abdominal pain, vomiting, constipation, urinary complaints, poor feeding, labial adhesion, jaundice, excessive straining. Out of 200 cases 168 were culture positive. Group III age group (> 1 year-5 year) showed higher rate of UTI. UP to one year of age males were more affected than female and beyond one-year females were more affected than male. Most common isolated uropathogen was *Escherichia coli*. Most sensitive drugs for the pathogen were Imipenem and meropenem (89.39%) - Injectable form and nitrofurantoin (73.48 %) - Oral form.

Conclusion: Presentation of UTI in case of young infant is different from older children. Clinical suspicion is important for early detection of UTI. Before starting antimicrobial therapy, we must do urinalysis and culture sensitive test to prevent recurrent UTI.

Keywords: UTI, Recurrent UTI, Children, Drug resistant.

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Introduction:

UTI is defined as the presence of bacteria in urine along with symptoms of infection. It occurs in as many as 5% of girls and 1 to 2 percent of boys. ¹ The prevalence of UTI varies with age. During first year the male: female ratio is 2.8 - 5.4:1. Beyond 1-2 years, there is a female predominance, with a male: female ratio 1:10. ² UTI in infants can manifest as diverse and non-specific symptoms like fever, sepsis, lethargy, prolonged jaundice, haematuria, poor

feeding, vomiting, diarrhea, irritability, failure to thrive, cloudy or malodorous urine.^{3,4} Uncircumcised male infants less than 3 months of age have a higher prevalence of UTIs compared to their circumcised counterparts (2.4% vs 20.1%), while non-febrile UTIs are more frequent in girls older than 3 years of age.^{5,6,7,8} UTI may be suspected based on symptoms or findings on urinalysis or both. Urine culture is necessary for confirmation & appropriate therapy.² Urine culture is a gold standard to diagnose UTI.⁹ If the culture shows greater than 10^5 colonies of a single pathogen or if there are 10^4 colonies & the child is symptomatic, it is considered a UTI. In young children, urine is usually collected by catheterization or suprapubic aspiration. In toilet trained children midstream urine sample is satisfactory.² The most common bacterial sepsis invading the urinary tract in children is *Escherichia coli* (*E. coli*). Other organisms include *Klebsiella*, *Proteus*, *Enterococcus*, *Pseudomonas* & *Citrobacter*.¹⁰ UTI not only causes acute morbidity, but also is associated with renal scarring, hypertension and chronic kidney disease in the long run, if not treated at an appropriate time with the right antimicrobial agent.²¹

Materials & method:

It is a prospective study carried out from January 2015-July 2017 in the paediatric department. Total 200 highly suspected cases of UTI, from newborn to 18 years aged children were included in our study. History was taken properly, for confirmation Urine for routine microscopic examination (R/M/E) and culture sensitivity (C/S) test were done. All informations were collected in a preformed data. Urine sample was collected by using sterile urobag in case of newborn & young infant. For older children clean catch mid-stream urine was collected. Diagnosis of urinary tract infection was confirmed by urinalysis of > 5 pus cell / high power field & culture sensitivity $> 10^5$ cfu/ml. But children who were symptomatic though urinalysis showed < 6 pus cell /HPF, if C/S was positive with colony count $> 10^4$ cfu /ml also considered as UTI.

Cases who had history of recurrent UTI, obstructed uropathy, neurogenic bladder or had associated comorbid condition such as malignancy or started antibiotic therapy before urinalysis were excluded from this study. This study is an original study. It is

not based on any thesis or dissertation. Chi-square test was done to determine the level of significance. Ethical issues were fulfilled before starting the study.

Results:

Among 200 suspected UTI cases, 168 were culture positive. We divided UTI cases into 4 groups. Up to 2 months age group (Group I), >2 month- 1 year age group (Group II), >1 year -5 year age group (group III), > 5 year-18 year age group (group IV). Number of children in group I was 23, in group II was 26, group III was 95, group IV were 24 cases. Usual presentation of UTI for group I was jaundice, fever, excessive straining, not feeding well etc. During toilet training period (Group III) usual presentation was fever, abdominal pain, constipation, labial adhesion, dysuria, straining, poor feeding, febrile convulsion. For group II usual presentation was irregular fever, vomiting, abdominal pain, urinary complaints (increased frequency & urgency), febrile convulsion. School going children (group IV) presented with fever, abdominal pain, urinary complaints, itchy vulva & discomfort. Male: female ratio for group I = 2.7:1, for group II = 1.16: 1, for group III = 1:2, for group IV = 0.55:1. Fifty six point five cases were from preschool age group (group III), Fifteen point five percent cases were from group-II. Fifteen percent cases were from group -IV. Thirteen point six nine percent cases were from group I. In spite of normal pus cell count, 50 cases (30%) were culture positive. Usual pathogens were *Escherichia coli*, *Klebsiella*, *Proteus*, *Enterococcus*, *Staphylococcus*, *Streptococcus*, *Pseudomonas*, *Acinetobacter*. Sensitive drugs for *E. coli* were Imipenem & meropenem (89.39%), amikacin (85.6%), colistin (85%), ceftriaxone (32.7%), cefixime (19.29%) nitrofurantoin (55%), ciprofloxacin (42%), cotrimoxazole (24.56%). Imipenem & meropenem was the most sensitive drug (80%) for *Klebsiella*. Ceftriaxone & gentamicin were the most sensitive drugs (100%) for *Proteus*. Ceftriaxone was the most sensitive drug (75 %) for *Enterococcus*. Vancomycin & amikacin were most sensitive drugs (100%) for *Staphylococcus aureus*. Imipenem, meropenem, ciprofloxacin, ceftazidim & colistin were most sensitive drugs (100 %) for *Pseudomonas*. Ceftriaxone was the most sensitive drug for *Acinetobacter*. Nitrofurantoin (100%) was the most sensitive drug for *Streptococcus faecalis*.

Table I
Age group & gender wise distribution of UTI cases (n= 168)

Age	Male	Female	Total	Chi-square value	P value
Group I (upto2mo)	17 (73.91%)	6(26.09%)	23 (13.69%)	12.019	0.0073
Group II (> 2mo-1 yr)	12(41.38%)	14(58.62%)	26 (15.48%)		
Group III (>1yr-5yr)	34(35.79%)	61(64.21)	95 (56.55%)		
Group IV (> 5 yr)	8(33.33%)	16(66.67)	24 (14.29%)		

Table II
*Age group wise clinical presentations of UTI cases **

Clinical Features	Group -1	Group- II	Group -III	Group-IV	Total
Fever	09	20	53	18	100
Jaundice	14				14
Excessive straining	04				4
Vomiting		15	33	07	55
Not feeding well	05				5
Urinary complain (Increase frequency,Dysuria)	03	16	45	17	81
Febrile convulsion		04	02	01	7
Labial adhesion		03	03		6
Abdominal pain			26	08	34
Valvo-vaginitis				02	2
Omphalitis	04				4

*Patients were presented with one or more symptoms and signs

Table III
Relation between Urinary pus cell & growth of uropathogen (N = 200)

Pus cell	Growth (n=168)	No Growth (n=32)	Chi-square value	P value
< 6	50		22.085	0.0002
06-10	59	15		
11-20	32	10		
21-30	5	5		
Plenty	22	2		

Table IV
Distribution of uropathogen according to age group

Organism	group-I	group -II	Group-III	Group -IV	Total
E. Coli	12	23	79	18	132(78.57%)
Klebsiella	08	02	03	02	15 (8.92%)
Proteus	00	00	06	02	08 (4.76%)
Pseudomonas	00	00	01	01	02(1.19%)
Enterococcus	01	01	02	00	04 (2.38%)
Acinetobacter	00	00	01	01	02 (1.19%)
Staph. spp	02	00	01	00	03 (1.78%)
Strepto..faecalis	00	00	02	00	02 (1.19%)
No Growth	06	05	20	06	32(19%)

Table V
Antibiotic sensitivity pattern

Drugs	E. Coli N= 132	Klebsiella N=15	Proteus N=08	Entero- coccus N=04	Staph. spp N=03	Pseudo monas N=02	Acineto- bacter N=02	Strepto- coccus N=02
Imipenem	89.39	80	87.5	NT	NT	100	50	NT
Meropenem	89.39	80	87.5	NT	NT	100	50	NT
Amikacin	85.6	60	87.5	50	100	50	50	00
Gentamicin	71.97	60	100	50	00	50	50	00
Nitrofurantoin	73.48	33.33	12.5	50	66.66	00	50	100
Ciprofloxacin	50.75	60	75	50	66.66	100	00	00
Ceftriaxone	40.9	33.33	100	75	00	50	100	50
Cefotaxime	32.57	20	62.5	25	00	50	00	00
Cefixime	25.75	13.33	87.5	50	00	00	00	00
Cefuroxime	23.48	00	50	50	00	00	50	00
Ceftazidime	27.27	20	50	NT	NT	100	50	NT
Amoxicillin – clavulanic acid	18.18	6.66	25	25	00	00	00	00
Vancomycin	NT	NT	NT	25	100	NT	NT	50
Colistin	59.84	60	00	NT	NT	100	00	NT
Cotrimoxazole	28.78	33.33	37.5	25	00	50	NT	00

*NT= Not tested

Discussion:

In this study most prevalent age group for UTI was group III (> 1year-5 year), that means during toilet training period (Table 1). Similar result was shown in a study done by Bay AG, Anacleto F & Qureish AM.^{11, 14} In the current study girls were affected more than boys beyond one year of age. During infancy boys were more affected gender (Table 1). This result corresponds to other study.^{11, 12} In the present study the most common presentation was fever, followed by urinary complaints, vomiting, abdominal pain & others (Table II). Similar result was found in a study done in Bangladesh & other countries.^{12,13,14,15} The most commonly isolated uropathogen in this study was E. coli (78.57%) (Table IV). This corresponds with the data obtained by other investigators.^{12,16} Klebsiella was the second most uropathogen in our study. Similar result was shown by a study done by Haghi- Ashteiani et al.¹⁷ But Sharma Gaurav et al showed Staphylococcus as. the second most uropathogen in their study.¹⁶ Other uropathogens found in our study were Proteus, Pseudomonas,

Enterococcus, Staphylococcus spp & Streptococcus.. Similar result was seen in a study done in Philippine.¹¹ E. coli showed highest sensitivity to Imipenem & meropenem (89.39%)(Table V). Similar result was shown by a study which was done by Haghi-Ashteiani et al & Renda Rahima.^{17,18} Most of E. coli isolated in this study were resistance to oral antibiotics that commonly used in general practice. Similar result was seen in a study done in India.^{19,21} In our study the rate of resistance to amoxicillin – clavulanic acid, trimethoprim – sulfamethoxazole, cefuroxime, cefixime & ciprofloxacin among E. coli isolates were 81.82%, 71.22%, 76.52, 74.25% & 49.25% respectively. Highly sensitive oral drug was nitrofurantoin (73.48%). This finding is similar to other reports.^{13, 16, 17} In our study in spite of normal pus cell count in urinalysis, 50 cases (30%) were culture positive (Table III). A study showed up to 50% of patient with significant bacteriuria did not demonstrate a significant number of white cells (> 5 / HPF) in the centrifuged specimen.²⁰

Conclusion:

Presentation of UTI in case of young infant is different from older children. Clinical suspicion is important for early detection of UTI. The antimicrobial susceptibility of urinary pathogens has been changing over the years. So, we must be aware about doing urine for culture sensitivity test before starting antimicrobial therapy to prevent recurrent UTI & to reduce childhood morbidity & mortality. This study shows highly resistant uropathogens to commonly used antibiotics which calls for review of empiric treatment guidelines for UTI.

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