Original Article

Indian Journal of Trauma and Emergency Pediatrics
Volume 8 Number 2, May - August 2016
DOI: http://dx.doi.org/10.21088/ijtep.2348.9987.8216.3

Study of Clinical Profile and Predisposing Factors in Children with Culture Positive UTI in the Age Group 1 month to 5years

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Abstract

Background: Urinary tract infection is the third most common bacterial infection in infants and children. Incidence varies with age and sex. Various anatomical, functional and immunological factors predispose to urinary tract infections like structural abnormalities of urinary tract. Varied spectrum of clinical features are seen in this infections. This study was done to find out the major predisposing factors and the commonest signs and symptoms of urinary tract infections. *Methods:* This case control study included fifty children between 1 month to 5 years of age with symptoms suggestive of urinary tract infection with positive urine culture. Fifty age and sex matched children with normal urine culture results were taken as controls. Radiological evaluation carried out in all cases of UTI. MCU was advised in all children less than 2 years of age with UTI. Data was analyzed using the Statistical Package for Social Science (SPSS). The independent t-test was used for comparison of data between two groups. *Results:* The maximum number of cases were in the age group of 1month – 1year Female to male ratio of 1:0.88. 80) of cases were first episode of UTI and there were 70% of simple UTI. Fever was the main symptom. In 80% cases E coli was isolated by culture and sensitivity. The major abnormal findings in ultrasound was bilateral hydronephrosis. *Conclusions:* The majority of children with UTI were in one month to one year age group with male preponderance. Majority of children had simple UTI and ultrasound evaluation was normal. Timely management of constipation, voiding dysfunction, attention to perineal hygine and treatment of pinworm infestations are recommended. The importance of exclusive breast feeding and circumcision in the prevention of UTI also needs to be emphasized.

Keywords: UTI; Predisposing Factors; Dysuria; Hydronephrosis; Under Five Children.

Introduction

Urinary tract infection is the third most common bacterial infection in infants and children in developing countries after respiratory and gastrointestinal tract infections. The incidence of urinary tract infection in children is influenced by age and sex. In general UTI occurs in 3-5% of girls and 1% of boys during childhood [1]. The incidence of symptomatic UTI in term neonates is approximately 1% and in preterm 3%, both with male preponderance with a ratio of 5:1 [2]. During infancy UTI is more common in boys than girls and thereafter higher in girls with male to female ratio of 3-5:1 [3]. After the age of one year, the prevalence of UTI in boys decreases to 1.9%, where as girls it increases to 8.1%.

The commonest age for the occurrence of the first symptomatic UTI is the first year of life in both sexes, particularly in males, and mainly affects the upper urinary tract [4]. In boys, most urinary tract infections occurs during the first year of life. After the first urinary tract infection 60-80% of girls will develop a second urinary tract infection within 18 months [5]. Urinary tract infections are much more common in uncircumcised boys [6]. The risk for UTI in uncircumcised boys is 5-10 fold higher than in circumcised boys, with the greatest risk being in boys aged less than one year [3].

There are many host risk factors that predispose to UTI in children like anatomic, functional and

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immunologic. E.coli is the most common infecting pathogen in children accounting for more than 80%, followed by klebsiella and proteus. There are more than 150 strains of E.coli. However fewer than 10 serotypes of E.coli account for UTI(01, 02, 04, 06, 07 & 075) [7].

The clinical manifestations of UTI in under five children is highly variable often making clinical diagnosis very difficult, especially in infants and young children. Infants and young children often present with nonspecific features and thus a high index of suspicion is necessary for the diagnosis. In fact UTI should be suspected in any child with unexplained fever beyond three days [1].

Urinary tract is s relatively common site of infection in infants and young children. The urinary tract is normally sterile. UTI occurs when bacteria, fungi or parasites invade the urinary tract. UTI is diagnosed by the growth of a significant number of organisms of a single species in the urine in presence of symptoms. Urinary tract infections are of interest to clinicians for several reasons. First, they are a common cause of symptoms and second, they may indicate a serious underlying abnormality of the urinary tract such as obstructive uropathy.

UTI in children can be a cause of significant morbidity if not managed properly, especially when associated with predisposing factors like abnormalities of the urinary tract, progress to renal scarring, hypertension and chronic renal insufficiency. Infants and young children are at greatest risk of renal damage. Hence prompt diagnosis and management of UTI and its predisposing factors are of utmost importance, especially in infants and young children. This study highlights the predisposing factors of UTI in under five children, its frequency, clinical profile and bacterial agents involved, so that early diagnosis and proper management can be instituted to decrease the long term morbidity.

Materials and Methods

This was a case control study conducted in department of paediatrics in a teaching and referral institution from June 2014 to June 2015. Fifty children of either sex between 1 month to 5 years of age with symptoms suggestive of urinary tract infection with positive urine culture results were included in the study after getting informed consent from the caretaker. Children below 1 month and more than 5 years with negative urine culture were excluded from the study. Fifty age and sex matched children with normal urine culture results were taken as controls.

Symptoms suggestive of UTI included fever, dysuria or straining during urination, increased frequency, poor stream, or dribbling, urgency, polyuria, cloudy urine, abdominal pain, nausea, vomiting, irritability, failure to thrive, diarrhea and facial puffiness. These children were subjected to urine microscopy and urine culture and sensitivity studies. Urinary tract infection was diagnosed by urine microscopy showing pyuria (>5puscells/HPF) and by a positive urine culture as suggested by the growth of a significant number of organisms of a single species in presence of urinary symptoms. The growth was significant when it yielded urinary pathogens in any number in suprapubic aspirate or $>10^5$ CFU/ml in mid stream clean catch specimen. Relevant details required for our study were taken by detailed interview of the parents, clinical examination findings and from investigation results.

Past history of UTI and details regarding prophylaxis and details regarding pre-existing renal diseases were taken and other risk factors during the antenatal period were noted. For identifying the significance of host factors predisposing to UTI detailed history including following points were sought; bowel habits, voiding dysfunction, personal and perineal hygine, pinworm infestation, breast feeding and circumcision status in male child. Any second attack of UTI is considered as recurrent UTI. Complicated UTI is defined as presence of high grade fever, toxicity, persistent vomiting, dehydration and renal angle tenderness. Simple UTI as one with low grade fever, dysuria, frequency, urgency but none of above symptoms. All data were condensed and analysed using suitable statistical methods to reach the conclusion.

Radiological evaluation carried out in all cases of UTI. Abdominal sonography was performed within 2-4 weeks but for complicated UTI it was done before discharge from hospital. MCU was advised in all children less than 2 years of age with UTI

Results

Among the 50 children diagnosed with UTI, the maximum number of cases were in the age group of 1 month – 1year i.e. 20 cases(40%) and 40% were in the age group of 1 -3 years with remaining 20% in 3 – 5 years. There were 23 males (46%) and 27 females (54%) with female to male ratio of 1:0.88.

In our study there were 40cases (80%) of first episode of UTI and 10cases (20%) were of recurrent

UTI. There were 35 cases (70%) of simple UTI and 15 cases (30%) of complicated UTI. One child had UTI following catheterization and MCU.

Table 1: Presenting symptoms of UTI

Symptoms	No. of cases	Percentage (%)
Fever	37	74
Dysuria or straining during micturation	32	64
Dribbling of urine	17	34
Increased urinary frequency	22	44
Abdominal pain	17	34
Excessive cry	15	30
Back ache or loin pain	7	14
Nausea or vomiting	5	10
Cloudiness of urine	5	10
Polyuria	5	10
Facial puffiness	3	6
Diarrhea	2	4
Foul smelling urine	2	4
Failure to thrive	1	2

Most of the patients had fever as the main symptom (74%) followed by dysuria or straining during urination(64%).

Table 2: Bacteriological isolates in children with UTI

Organism	No. of cases	Percentage (%)
E.coli	40	80
Klebsiella	4	8
Proteus	2	4
Enterobacter	1	2
Pseudomonas aeruginosa	1	2
Staphylococcus aureus	1	2
Enterococci	1	2

In 80% cases E coli was isolated by culture and sensitivity of urine samples followed by klebsiella in 8% and proteus in 4% of cases.

Table 3: Sonological findings

USG findings	No. of cases
Hydronephrosis unilateral	1
Hydronephrosis bilateral	3
Dilatation of ureter	1
Bladder hypertrophy	2
Post void residual urine	1

Table 4: Host factors predisposing to UTI

	Predisposing Factors	No. of cases	Percentage (%)	No. of controls	Percentage (%)	P value
A	Voiding dysfunction(1-5years)(postponing voiding/infrequent voiding)	5	10	1	2	<0.05
B	Constipation	13	26	5	10	<0.05
C	Poor perineal hygine	20	40	9	18	<0.05
	i. Wiping from back to front(females)	7	14	3	6	
	ii. Fecal soiling of undergarments	4	8	2	4	
	iii. Urinary soiling of undergarments	9	18	4	8	
D	Pinworm infestation(1-5years)	9	18	3	6	<0.05
E	Uncircumcised males	22	96	18	78	>0.05
F	Lack of exclusive breast feeding(1-6months)	6	12	2	4	<0.05

Ultrasound was normal in 42cases (84%) and abnormal in 8 cases (16%). The major abnormal findings were bilateral hydronephrosis in 3 cases, bladder hypertrophy in 2 cases and unilateral hydronephrosis, dilatation of ureter, post void residual urine in each one of remaining three cases.

MCU was done in 7 children, out of which 5 cases had normal study and only 2 children showed abnormality. One child had posterior urethral valve and the other had VUR.

There was statistically significant correlation between following predisposing factors and the risk of UTI in children below 5 years, namely bladder habits in the form of infrequent voiding or postponing act of micturation, bowel habits like constipation, poor perineal hygine in the form of wiping from back to front in girl children and pinworm infestation. There was no clear cut evidence in our study that circumcision has a protective role. Exclusive breast feeding has a protective effect in UTI as evidenced by P value <0.05.

Discussion

The maximum number of patients in this study were in the age group of one month to one year (40%). This corresponds to the findings of the study by Winberg J. et al [8] and Freidman AL [4] also found that commonest age for occurrence of the first symptomatic UTI was in first year of life in both sexes particularly males.

Overall distribution of UTI in this age group was more in female children with male to female ratio 0.88:1. But in infancy male preponderance with male to female ratio of 1.5:1. Beyond infancy there was striking female preponderance. This is in contrast to study by Craig JC et al which shows that during first year of life, male to female ratio was 2.8 to 5.4:1 [3].

In our study there were 73% cases of simple UTI and 27% cases of complicated UTI. Incidence of complicated UTI is more common in male infants. This finding corresponds to the study by Friedman AL [4] and Winberg J et al [8].

Most of the children with UTI had fever of low grade as the main symptom (74%) followed by dysuria or straining during urination(64%). Many children presented with nonspecific symptoms like excessive cry, nausea or vomiting.

In our study commonest bacteria associated with UTI was E coli, followed by klebsiella and proteus. This finding corresponds with that of Azar Munir Qureshi [9].

There were many host factors that predispose to UTI in under five children. Voiding dysfunction in the form of infrequent voiding and postponing act of micturation were obtained in 5 cases (10%) and similar findings were observed in study done by Mingin GC et al [10]. History of constipation was obtained in 13 cases (26%) and found to have significant association with UTI. Similar finding was noticed in studies by Yazbeck. S [11] and Dohil R et al [12].

In total, poor perineal hygine was seen in 20 cases (40%) of UTI, which was a very significant number. In female children history of wiping action from back to front was obtained in 7 cases (14%), history of fecal soiling of undergarments in 4 cases (8%) and urinary soiling of undergarments was seen in 9 cases (18%). These findings corresponds to findings of study done by Strom BL et al[13] and Loening BV [14].

In our study history suggestive of pinworm infestation was obtained in 9 cases (30%) which was stastically significant and similar findings were noted in study done by Simon RD [15].

In our study there were 22 cases (96%) male children with UTI were uncircumcised and only 1 case (4%) was circumcised. Winsel et al found an association between an intact foreskin and UTI, especially in infancy [16]. A study by Ginsburg CM et al showed that more than 90% of boys with febrile UTI during infancy were uncircumcised [15].

In the age group of 1-6months there were 9 cases with UTI, out of which only 3 babies were exclusively breast fed and remaining were fed partly on breast milk and partly on artificial milk or cow's milk. Similar findings were noted in study done by Piscane A et al that exclusive breast feeding has protective role against UTI [17] and same findings were noted by Prentice A [18].

Conclusion

The majority of children with UTI were belonged to one month to one year age group with male preponderance and in rest of the age groups it was female preponderance. Fever was the predominant symptom in majority of cases and E coli was the commonest organism isolated from urine followed by klebsiella and proteus. Majority of children had simple UTI and ultrasound evaluation was normal in majority of children. The host predisposing factors associated with increased susceptibility to UTI in under five children were constipation, voiding dysfunction, poor perineal hygine and pinworm

infestation. The factors associated with reduced susceptibility to UTI include circumcision and exclusive breast feeding.

Hence, in order to reduce the risk of UTI in children prompt and timely management of constipation, voiding dysfunction, attention to perineal hygine and treatment of pinworm infestations are recommended. The importance of exclusive breast feeding and circumcision in the prevention of UTI also needs to be emphasized.

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