

Original Research Article

Prevalence of urinary tract infection in febrile preschool children

Swatantar Singh¹, Sangeeta Parihar^{2*}

¹Department of Pediatrics, ²Department of Gynecology, Government District Hospital, Rajouri, Jammu and Kashmir, India

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***Correspondence:**

Dr. Sangeeta Parihar,

E-mail: drsangeetaparihar12345@gmail.com

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ABSTRACT

Background: Children with fever is a common and comprise a substantial proportion of the practice in outpatient department and emergency department. Little attention has been focused on the identification of urinary tract infection (UTI) in febrile in infants and children in the emergency department, despite recent information that suggests a high prevalence of urinary tract infections and significant associated morbidity in these patients. The present study is undertaken to estimate the prevalence of urinary tract infection in febrile preschool children (less than 5 years of age) in febrile children.

Methods: Febrile children less than 5 years attending outpatient department or admitted in Department of Paediatrics were enrolled into the study. Children below 1 month and above 5 years; any child who has received antibiotics 48 hours prior to evaluation; children with known congenital genitourinary anomalies; and were excluded from the study. Children with symptoms suggestive of UTI were interviewed using structured case record form (CRF). All symptomatic children were referred for urine routine microscopy and culture tests.

Results: The prevalence of culture positive cases for UTI was 6.36%. Male infants and female infants affected equally. But females affected more in the age between 1 years to 5 years as compared to males. Apart from fever, the commonest symptoms were dysuria, abdominal pain, vomiting, chills and rigors and loss of appetite. More than two-third of the patients with CP-UTI have *E. coli* as causative organism for UTI. Overall most sensitive antimicrobials were Ceftriaxone.

Conclusions: UTIs in preschool children are often having vague and variable symptoms, often fever is the only symptoms. An untreated UTI can lead to subsequent damage and impairment of renal structure and function, it is very important to diagnose and treat UTI in preschool children.

Keywords: Febrile illness, Pre-school children, Prevalence, Under five-year-old children, Urinary tract infection

INTRODUCTION

Children with fever is a common and comprise a substantial proportion of the practice in outpatient department and emergency department.¹ Little attention has been focused on the identification of urinary tract infection (UTI) in febrile in infants and children in the emergency department, despite recent information that suggests a high prevalence of urinary tract infections and

significant associated morbidity in these patients.² Quite often, child had received antibiotics empirically, without adequate evaluation for urinary tract infection. Fever, however, is often the only symptom in children with urinary tract infections.³ UTI is one of the commonest bacterial illness among febrile infants and preschool children with a reported prevalence between 4.1% to 7.5%.⁴⁻⁶ UTI is responsible for 4 to 10% of febrile children admitted to the hospital. It is also the third

commonest infection in pediatric age group after respiratory and gastrointestinal infections.⁷ Typical urinary complaints are rare, often vague, below the age of 5 years. Most of these infections in the first 2 years of life are “occult” and most infection remains undiagnosed, unless detected in are not routinely tests. The children may be represented with characteristic features of upper and lower UTI like, abdominal pain, vomiting and fever with chills and rigors, and/or suprapubic pain.⁸ Sometimes only fever is present, and it has been accepted as a clinical marker of pyelonephritis-renal parenchymal involvement.⁸ Fever with significant bacteriuria and pyuria in children without obvious sources of infections must be presumed to be symptoms of pyelonephritis, an invasive infection of the renal parenchyma requiring prompt treatment. The studies using renal parenchyma-avid nuclear scans to determine the presence of urinary tract infection have revealed that more than 75% of children under 5 years of age with febrile urinary tract infection have pyelonephritis.⁹⁻¹¹ Pyelonephritis leads to renal scarring in 27% to 64% of children with urinary tract infections in this age group, even in the absence of underlying urinary tract abnormalities.^{12,13} Most urinary tract infections that lead to scarring or diminished kidney growth occur in children younger than 4 years of age especially among infants in the first year of life.^{10,13} Among children under 3 years of age with recurrent urinary infections, putting them at higher risk for renal scarring, as many as one-third being asymptomatic.¹⁴ It is essential to identify urinary tract infections in febrile children and institute prompt treatment to reduce the potential for lifelong morbidity.¹⁵

The present study is undertaken to estimate the prevalence of urinary tract infection in febrile preschool children (less than 5 years of age) in febrile children visiting Government District Hospital, Rajouri, Jammu and Kashmir.

METHODS

It was a cross-sectional, prospective, observational, non-interventional study, carried out to analyse the prevalence of urinary tract infection in febrile preschool children (less than 5 years of age) in febrile children visiting Government District Hospital. The study was conducted in Department of Paediatrics, Government District Hospital, Rajouri, Jammu and Kashmir between July 2014 to June 2015. The study was approved by Human Research Ethics Committee. Written informed consent was obtained from parents of children before enrolling them into the study.

Inclusion criteria

- Febrile children less than 5 years attending outpatient department or admitted in Department of Paediatrics, Government District Hospital, Rajouri were enrolled into the study.

Exclusion criteria

- Children below 1 month and above 5 years; any child who has received antibiotics 48 hours prior to evaluation; children with known congenital genitourinary anomalies; and were excluded from the study.

Children with symptoms suggestive of UTI were interviewed using structured case record form (CRF). All symptomatic children were referred for urine routine microscopy and culture tests. From all children, sample of urine was collected. In children less than 2 years of age urine was collected by a bag and in others midstream sample was collected. Urine culture was done using blood agar and Mac Conkey agar by using a 0.001 ml calibrated wire loop and observed for 48 hours. Culture proven UTI cases were started on appropriate sensitive antibiotics. The patients were advised for the follow-up. During follow up, urine culture was done whenever recurrence of UTI was suspected.

Operational definition

Febrile child

Children with history of fever (Temperature; rectal $\geq 38.3^{\circ}\text{C}$ or axillary temperature $\geq 37.8^{\circ}\text{C}$).¹⁶

Urinary tract infection

Urinary tract infection is defined as growth of a significant number of organisms of a single species in the urine, in the presence of symptoms. Significant bacteriuria is growth with a colony count of $>10^5/\text{ml}$ of a single species in a mid-stream clean catch urine sample.¹⁷

Statistical analysis

The collected data was entered in the excel sheet. The data was analysed using descriptive statistics. The test variables were compared using Chi-square test for qualitative variables and Student's test for quantitative variables. The p-value <0.05 was considered statistically significant for difference and association between variables.

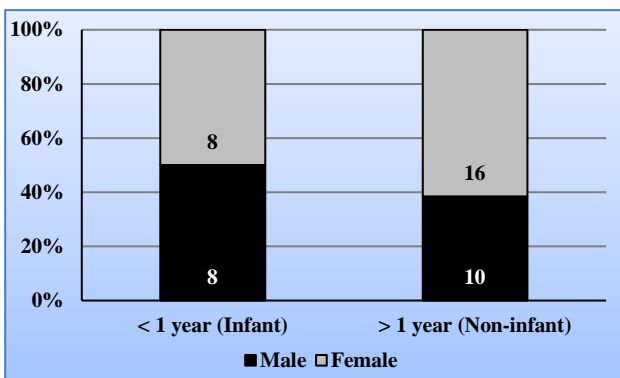
RESULTS

During the study period, authors have screened total 660 preschool children (under 5 years of age) with fever. Out of this total 660 febrile children, 42 children found to be culture positive cases for UTI (CP-UTI). The prevalence of culture positive cases for UTI in this study was 6.36%. In the prospect of age, 16 (38.10%) children were found to be infant and 26 (61.90%) children were found to be of age between 1 years to 5 years. Females were predominantly affected with CP-UTI in comparison of males with M:F ratio of 1:1.6 (Table 1).

Table 1: Characteristics of febrile children.

Characteristics	Total (N=660)		Culture positive cases (N=42)	
	N	%	N	%
Age (years)				
<1 (Infant)	142	21.52	16	38.10
>1 (Non-infant)	518	78.48	26	61.90
Gender				
Male	364	55.15	18	42.86
Female	296	44.85	24	57.14

According to Figure 1 for distribution of the culture positive cases of UTI according to age and gender, male infants and female infants affected equally with 8 cases of CP-UTI in both genders. But females affected more in the age between 1 years to 5 years as compared to males.

**Figure 1: Distribution of the culture positive cases of UTI according to age and gender.**

According to symptomatology (Table 2), it is obvious that all the children of study group had fever as the

commonest symptom as authors have screened febrile children for diagnosis of UTI. Apart from fever, the commonest symptoms were dysuria (18, 42.86%), abdominal pain (17, 40.48%), vomiting (17, 40.48%), chills and rigors (16, 38.10%) and loss of appetite (12, 28.57%) for UTI found in the present study.

Table 2: Distribution of the culture positive cases of UTI according to symptoms (N=42).

Symptoms	Culture positive cases	
	N	%
Fever	42	100.00
Dysuria	18	42.86
Abdominal pain	17	40.48
Vomiting	17	40.48
Chills and rigors	16	38.10
Loss of appetite	12	28.57
Increased frequency	11	26.19
Irritability	11	26.19
Passing high coloured urine	10	23.81
Burning micturition	8	19.05
Dribbling of urine	6	14.29
Cough and cold	5	11.90
Foul smelling urine	3	7.14

According to identification and drug sensitivity of causative organisms in culture media (Table 3), more than two-third (30, 71.43%) of the patients with CP-UTI have *E. coli* as causative organism for UTI. The other causative organisms for UTI were Klebsiella (9, 21.43%) and Proteus (3, 7.14%). Overall most sensitive antimicrobials were Ceftriaxone (22, 52.38%), Amoxicillin (20, 47.62%), Cephalexin (20, 47.62%), Ciprofloxacin (20, 47.62%), Cotrimoxazole (19, 45.24%), and Norfloxacin (19, 45.24%).

Table 3: Drug sensitivity pattern of organisms grown in urine culture.

Drugs	<i>E. coli</i> (n=30)		Klebsiella (n=9)		Proteus (n=3)		Total (n=42)		Overall percentage of sensitivity
	S	R	S	R	S	R	S	R	
Ampicillin	12	18	0	9	2	1	14	28	33.33
Amoxicillin	16	14	3	6	1	2	20	22	47.62
Cotrimoxazole	15	15	4	5	0	3	19	23	45.24
Gentamycin	12	18	5	4	1	2	18	24	42.86
Cephalexin	13	17	5	4	0	3	18	24	42.86
Norfloxacin	14	16	4	5	1	2	19	23	45.24
Ceftriaxone	15	15	5	4	2	1	22	20	52.38
Cephalexin	12	18	7	2	1	2	20	22	47.62
Ciprofloxacin	14	16	4	5	2	1	20	22	47.62

DISCUSSION

UTIs remain the commonest bacterial infection in childhood.¹⁸ The incidence of UTI in children at the age of 6 years of age is 1%-2% in boys and 3%-7% in girls.¹⁸

Authors have screened total 660 preschool children (under 5 years of age) with fever. Out of this total 660 febrile children, 42 children found to be culture positive cases for UTI (CP-UTI). The prevalence of culture positive cases for UTI in this study was 6.36%.

A Nigerian study found out that UTI is common in this group of children with prevalence of 9%.¹⁹ A cross sectional study done by Shaw and Gorelick in 1999 reported, the prevalence rates of UTI in febrile infants in the emergency department as approximately 3-5% with higher rates for white girls, uncircumcised boys, and those without another potential source of fever.⁹ Fallahzadeh et al, estimated prevalence of urinary tract infections in preschool children and reported a prevalence of 4.4%.²⁰ Bauchner et al, in 1987 evaluated the frequency of urinary tract infection in 664 febrile children younger than 5 years of age and reported the prevalence as 1.7%.²¹ According to Hoberman et al, the prevalence of urinary tract infection in febrile infants was 5.3% and the prevalence in infants less than 2 months was 4.6% and in infants with no suspected urinary tract infection, with associated other illnesses the prevalence was 5.1%.²² The prevalence of present study is comparable to all these studies conducted all over the world.

In the prospect of age, 38.10% of children were found to be infant and 61.90% of children were found to be of age between 1 years to 5 years. Females were predominantly affected with CP-UTI in comparison of males with M:F ratio of 1:1.6. But on distribution of the CP-UTI according to age and gender, male infants and female infants affected equally with 8 cases of CP-UTI in both genders. But females affected more in the age between 1 years to 5 years as compared to males. Roberts K et al, studied 193 febrile children less than 2 years and reported a prevalence of urinary tract infection as 4.1%. The prevalence of urinary tract infection in febrile girls was 7.4%.²³ The prevalence of urinary tract infection varies with age. During the 1st year of life, the male: female ratio is 2.8: 5.4: 1. Beyond 1-2 years, there is a striking female preponderance, with a male: female ratio of 1:10.²⁴ In boys, most urinary tract infections occur in the first year of life. Approximately 3-5% of girls and 1% of boys acquire a urinary tract infection. In girls, the average age at the first diagnosis is 3 years, which coincides with the onset of toilet training.²⁴ In males, UTI is more common during neonatal period and early infancy and it gradually declines afterwards.²⁵ About 8% of girls including 3% of prepubertal girls, and 2% of boys including 1% of prepubertal boys experience at least one episode of UTI by the age of 7.²⁶

As the commonest symptom as authors have screened febrile children for diagnosis of UTI, it is obvious that all the children of study group had fever. The other commonest symptoms were dysuria (42.86%), abdominal pain (40.48%), vomiting (40.48%), chills and rigors (38.10%) and loss of appetite (28.57%) for UTI found in the present study. In the study done by Shetty, et al., the similar type of symptomatology found-dysuria (45%), irritability (30%), increased frequency (25%), decreased appetite (25%), and refusal of feeds (15%).²⁷ Vague and variable signs and symptoms may present in early childhood as the patient becoming more specific as the child grows older. Even in the absence of specific signs

and symptoms, a UTI should be included in the differential diagnosis of high-grade fever in preschool children. Asymptomatic bacteriuria may be present in about 3% of preschool age children, about one-third of these children will have some symptoms of UTI eventually.²⁸

More than two-third (71.43%) of the patients with CP-UTI have *E. coli* as causative organism for UTI in the present study. The other causative organisms for UTI were *Klebsiella* (21.43%) and *Proteus* (7.14%). The most common organism for UTI isolated was *E. coli* (80%) followed by *Klebsiella* in the study done by Shetty, et al.²⁷ According to literature, *E. coli* is responsible for over 80% of pediatric UTIs.²⁹ Other common Gram negative organisms responsible for UTI include *Klebsiella*, *Proteus*, *Enterobacter*, and occasionally *Pseudomonas*.³⁰

In the present study, overall most sensitive antimicrobials were Ceftriaxone (52.38%), Amoxicillin (47.62%), Cephotaxime (47.62%), Ciprofloxacin (47.62%), Cotrimoxazole (45.24%), and Norfloxacin (45.24%). In the study done by Shetty, et al, 75% of microorganisms were sensitive to ceftriaxone; 70% were sensitive to gentamycin, norfloxacin and cephalexin; and majority of the organisms were resistant to Ampicillin (55%).²⁷ The usual antimicrobial choices are Cephalosporins, Amoxicillin + Clavulanic acid, or Cotrimoxazole (Trimethoprim + Sulfamethoxazole).²⁸ It is very important to be aware local microorganisms and antibiotic susceptibility.³¹

CONCLUSION

UTIs in preschool children are often having vague and variable symptoms, often fever is the only symptoms. An untreated UTI can lead to subsequent damage and impairment of renal structure and function, it is very important to diagnose and treat UTI in preschool children.

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