

## Prevalence of urinary tract infection and its antibiotic susceptibility in under five children

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### Abstract

**Background:** Urinary tract infection is a common problem in the paediatric age group and has significant risk factor for long term sequelae. The clinical signs and symptoms of UTI are nonspecific and vague in the first 6 year of age.

**Objective:** To study the prevalence of urinary tract infection in under five febrile children and its antibiotic susceptibility.

**Methodology:** The present cross-sectional study was carried out in the Paediatrics Department of Rohilkhand Medical College and Hospital in Bareilly, Uttar Pradesh.

**Result:** Prevalence of UTI in febrile children in <1 year was 10.5%, <2 years of age was 7.1% and <5 years was 7%. In this study out of 100 febrile children 7 were culture positive, Among urine culture positive

cases. Ceftriaxone has highest sensitivity 85.7% followed by nitrofurantoin 71.4 % whereas ciprofloxacin has highest resistance 42.7%. norfloxacin, cotrimoxazole, ciprofloxacin, gentamycin have similar sensitivity 57.1%.

**Conclusion:** Early detection and treatment of the first infection in infants may be the only way to reduce the incidence of reflux nephropathy and to prevent renal damage.

**Keywords:** UTI (urinary tract infection), PEM (protein energy malnutrition), Culture positive, Antibiotic sensitivity

### Introduction

Urinary tract infection is a common problem in the paediatric age group and has significant risk factor for long term sequelae. The clinical signs and symptoms of

UTI are nonspecific and vague in the first 6 year of age. Urinary complaints are rare below age of 6 years of age. UTI may present in febrile children with other illnesses, without clinical evidence of UTI. Such infections, if untreated can lead to subsequent renal scarring and is an established risk factor for end stage renal disease.<sup>1</sup>

Urinary tract infections an important consideration when an infant is evaluated for first few months of life.<sup>2</sup> In previous studies, UTI has consistently been most commonly diagnosed serious bacterial infection with prevalence varying from 1.8% to 7.5%. An accurate initial diagnosis is important in this setting, as young infant with UTI is risk for renal scarring and concomitant bacteraemia.<sup>3</sup>

The prevalence of UTI in infants and young children 2 months to 2 years of age who have no fever source evident from history and examination is high. The prevalence of UTI in girl's age 2 months to 2 year is more than twice that in boys.

Infants and young children are at high risk than are older children for incurring acute renal injury with UTI like Vesicoureteral reflex.<sup>4</sup> UTI is one of the commonest bacterial illnesses among febrile infants and preschool children with reported prevalence between 4.1% to 7.5%. UTI is responsible for 4 to 10 % children admitted to hospital.

It is also third commonest infection in paediatric age group after respiratory and gastrointestinal infections. The diagnosis of UTI is based, beside on physical examination, on biochemical analysis of urine, bacterial culture of urine, ultrasound scan of kidneys and urinary bladder, and contrast cystography. Urine culture is gold standard for diagnosis and treatment of UTI.<sup>5</sup>

In most cases the cause of urinary tract infections are gram-negative bacteria, while only 10% are caused by

gram positive bacteria. Most UTI occurs due to Escherichia coli and species of genera klebsiella, proteus and puedomonas. the most common cause of UTI among gram positive bacteria are Enterococcus, Staphylococcus and streptococcus. Pathological findings in urine for UTI assumes significant bacteriuria and leukocytouria.<sup>5</sup>

Early diagnosis and prompt antimicrobial treatment are required to minimize renal scarring and progressive kidney disease, unfortunately the resistance of uropathogens to antibiotics has been increasing worldwide and one of the main reasons may be excessive antibiotic consumption for non-bacterial diseases.<sup>6</sup>

As the Children are not able to elicit or be able to give a proper history so it is difficult to diagnose UTI and is often missed. Therefore, it becomes important to diagnose these children to prevent long term complications. There are few Indian studies on this topic. There are few studies available in western Uttar Pradesh; hence this study was conducted

### Materials and methods

The present cross-sectional study was conducted at department of Paediatrics, Rohilkhand Medical college and Hospital, Bareilly, Uttar Pradesh, Febrile under five children attending hospital in Paediatric department at Rohilkhand Medical College and Hospital, Bareilly, U.P. from 1<sup>st</sup> November 2020 to 31<sup>st</sup> October 2021. Ethical approval was taken from the institutional ethical committee.

### Sample size

In our study, a total of 100 patients were taken which was calculated by the following formula-

Sample size is  $91 \approx 100$  as calculated by  $N = 4(pq/L^2)$ ;  $P = 6.36\%$ <sup>1</sup> (prevalence);  $q = 100 - p$ ;  $L = 5\%$  (Absolute allowable error)

Power of study = 90%

The participants in this study were 100 children.

Febrile children between 1 month to 5 years. Having fever (axillary temperature  $>100^{\circ}\text{F}$ ) by digital thermometer were included in this study.

Any child who had received antibiotics 48 hours prior was not included in the study, Child with known congenital genitourinary anomalies.

And Parents/guardians are not willing to enroll the child in study were excluded from this study.

### Methodology

All children meeting the inclusion criterion were involved in the study. Informed consent was taken from the accompanying parent or guardian for inclusion into the study. The clinical and laboratory data of these patients was recorded on a structured proforma.

A predesignated and pretested Proforma was used to collect information.

complete history was taken and clinical examination was done in all cases to evaluate the causes of fever with special emphasis given to the symptoms of UTI. Routine blood counts, urine analysis, urine culture and sensitivity was done in them.

In children below 2 years of age, urine sample was collected under aseptic precautions by transurethral bladder catheterisation or suprapubic aspiration. In children above 2 years of age, perineum and genitalia was washed with soap and water, freshly void clean catch mid-stream urine sample was collected in sterile containers for urine analysis, culture and sensitivity.

On urine analysis presence of more than 5 pus cells/HPF in a centrifugated urine sample was taken as significant Pyuria.<sup>1</sup>

### On culture of mid-stream urine sample

A colony count of more than  $>10^5$  colony forming units (CFU)/ml organisms of a single species will be considered significant.<sup>7</sup> On culture of urine sample collected by urinary catheterisation: - At least  $10^4$  colony forming units (CFU)/ml will be considered significant.<sup>7</sup> On culture of urine sample collected by suprapubic aspirate: - At least 100 colony forming units (CFU)/ml will be considered significant.<sup>7</sup>

### Results

Out of 100 patients in study 54 were males and 46 were females,  $<1$  year were 19, 1-2 years were 24, 2-3 years were 19, 3-4 years were 15 and 4-5 years were 23 respectively. There was no significant difference in age group in between male & female.

Out of 100 children 15 (5%) males and 13 (13%) female showed pyuria. There was no significant difference in Pus cells in between male & female.

Total 7 out of 100 cases came out to be culture positive. M:F ratio of culture positive cases in age group  $<1$  year of age was 1:1 and in children  $>1$  year of age, there was female preponderance. Majority of children came with chief complaint of only fever (32%) followed by pain abdomen (20%). There was no significant difference in chief presenting complaint in between male & female.

Out of 7 were culture positive cases, 4 (57%) children complaint of only fever, 2 (28.5%) children complaint of urinary complaints and 1 (14.5%) child had other complaints

Organism prevalent in culture positive cases are shown in table -1

Table 1: distribution of urine culture.

Urine culture	Male		Female		Total		
	Number	%	Number	%	Number	%	
No growth	51	94.4	42	91.3	93	93	0.997#
E. coli	3	5.6	1	2.2	4	4	
Pseudomonas	0	0.0	1	2.2	1	1	
Staph aureus	0	0.0	1	2.2	1	1	
Actinobacter	0	0.0	1	2.2	1	1	

# Statistically not significant.

Prevalence of UTI in febrile children in infant was 10.5%, <2 years of age was 7.1% and < 5 years of age was 7%.

The urine culture positive cases showed following antibiotic susceptibility as per table-2

Table 2: distribution of antibiotic susceptibility in urine culture positive under five febrile children.

Antibiotic	Sensitive	Resistant	Sensitivity
Ceftriaxone	6	1	85.7%
ampicillin	3	4	42.8%
Norfloxacin	4	3	57.1%
Cotrimoxazole	4	3	57.1%
Nitrofurantoin	5	2	71.4%
Ciprofloxacin	4	3	57.1%
gentamycin	4	3	57.1%

Ceftriaxone has highest sensitivity 85.7% followed by nitrofurantoin 71.4 % whereas ciprofloxacin has highest resistance 42.7%. norfloxacin, cotrimoxazole, ciprofloxacin, gentamycin have similar sensitivity 57.1%.

### Discussion

This study is a hospital based Cross-sectional study carried out in the Department of Paediatrics, Rohilkhand medical college, Bareilly, UP over a period of 12 months to determine the prevalence of urinary tract infection in febrile children aged between

1 month to 5 years of age and its antibiotic susceptibility.

A total of 100 febrile children were included in the study, out of which, 54 (54%) were males and 46 (46%) were females.

Among 100 febrile children, <1year were 19%, 1-2years: 23%, 2-3years: 19%, 3- 4years: 15% and 4-5years: 24% respectively.

In the present study prevalence of UTI in febrile children <5 years was 7.0% which is similar as in Quigley R<sup>8</sup> study where prevalence of 7% was noted, Nether sole PY et al<sup>9</sup> showed prevalence of 4.1% to 7.5%, Ferrara P et al<sup>10</sup> 2.1% to 8.7% and Kaushal RK et al<sup>11</sup>8.4% which is similar to the present study. In contrast to the present study, two different studies (Bauchner et al<sup>12</sup>and Schlager TA<sup>13</sup>) reported low prevalence of 1.7%, whereas Rabasa AI and Gofama MM<sup>14</sup>reported high prevalence of 13.7%.

In the present study prevalence of UTI in febrile children <1year was 10.5% and is almost similar to studies by Kaushal RK et al<sup>15</sup>12 %. In contrast to present study prevalence of UTI in study by Hoberman et al<sup>2</sup> 5.3%, DharniDharakaetal<sup>16</sup> 5.4%, Schlager TA<sup>17</sup> 5.3%, Kanellopoulos TA et al<sup>18</sup> 5.3%, Shaw KN and Gorelick MH<sup>18</sup> 3-5%, Shaikh N et al<sup>20</sup> 7 % and Saleh SI et al<sup>21</sup> 4.1-7.5%.

Out of 100 febrile children, 7(7%) were culture positive of which Male: Female ratio of culture positive cases in the age group of <1year was 1:1, in children >1year was 2:3 with female preponderance.

In this study out of 100 febrile children 7 were culture positive, of which 4(57%) children complaint of only fever, 2 (28.5%) children complaint of urinary complaints and 1(14.5%) children had other complaints. Majority of under-five culture positive children (71.5%)

did not have urinary complaints despite being culture positive.

In this study out of 7 culture positive children, Ceftriaxone has highest sensitivity 85.7% followed by nitrofurantoin 71.4 % whereas ciprofloxacin has highest resistance 42.7%. norfloxacin, cotrimoxazole, ciprofloxacin, gentamycin have similar sensitivity 57.1%.

### Conclusion

UTI is a common pediatric problem with the potential to produce long-term morbidity.

Early detection and treatment of the first infection in infants may reduce the incidence of reflux nephropathy and may prevent renal damage.

Prevalence of UTI in febrile children in infants was 10.5%, < 2 years of age was 7.1% and <5 years was 7%.

under five children having commonly do not present with urinary complaints and more commonly presents with only fever.

E. coli was the most common urinary pathogen causing UTI.

Children with urine analysis showing significant pyuria need further evaluation and prompt initiation of treatment to prevent morbidity and long-term sequelae.

It is recommended to start with ceftriaxone in admitted patients and oral nitrofurantoin in case of OPD patients. Followed by ciprofloxacin or norfloxacin. ampicillin should not be routinely given due to high degree of resistance.

No test can screen accurately for UTI in young children. The urine routine microscopy plus culture tests appear to be the most cost-effective strategy for screening and beginning presumptive treatment for

UTI in febrile young children.

The clinician's major goal for the young child with UTI is early diagnosis in order to eradicate infection in the growing kidney and to allow identification of urinary tract abnormalities before the deterioration of renal function. Early detection and treatment of the first infection in infants may be the only way to reduce the incidence of reflux nephropathy and to prevent renal damage.

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