



TO STUDY PREVALENCE, CLINICAL FEATURES, AND ETIOLOGY OF URINARY TRACT INFECTION IN CHILDREN BETWEEN 6 MONTHS TO 5 YEARS OF AGE AT TERTIARY HEALTH CARE CENTRE IN CENTRAL INDIA

Paediatric Medicine

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ABSTRACT

Background: Urinary tract infections (UTI) is one of the most common and serious infections found in children. The present study was undertaken to estimate the overall prevalence, clinical presentation, and antibiotics sensitivity of UTI in children within 6 months to 5 years of age. **Method:** Total 156 children in between 6 months to 5 years of age diagnosed with UTI and who were admitted in department of paediatrics were studied during the period of 1 year from 1st January 2021 to 31st DEC 2021. **Result:** The overall prevalence of UTI (6.3%) in children 6 months to 5 years of age and 7.3% in children <1 year of age. Fever (85.9%) was the most common clinical feature followed by dysuria (44.23%) and vomiting (35.3%). Among culture positive cases majority (53.2%) grew *E. coli*. The positive culture was seen in 47.8%, 8.1% and 3.7% of children with pus cells >5 and >10 and numerous/HPF respectively indicating validity of the definition of significant pyuria as pus cells >5 pus cells in centrifuged urine sample. Most of the children with culture positive were shown sensitive to cephalosporins, amikacin and nitrofurantoin. **Conclusion:** Clinician should be aware of the possibility that febrile children may have UTI and should consider obtaining a urine culture specimen as part of their diagnostic evaluation. Patient who are presented ideally with fever and dysuria, should be evaluated for UTI. Pyuria of >5 pus cells/HPF in centrifuged sample should be considered as significant pyuria and further evaluation should be done promptly to initiate and to prevent morbidity and long term sequelae.

KEYWORDS

Urinary tract infection (UTI); Antibiotics; *E. coli*; Cephalosporins, Pyuria

INTRODUCTION

Urinary tract infection (UTI) is one of the most encountered genitourinary diseases in paediatric practice. In children most cases of UTI's occurs by age of 5 years, with peaks during infancy and toilet training. Prevalence of afebrile symptomatic UTI's in children over age 1 year is 8% and prevalence in febrile infant is 7%. During the first year of life the male: female ratio is 2.8:5.4 and beyond 1-2 years ratio is 1:10 [1]. Fever along with significant bacteriuria, pyuria in children with undocumented sources of infections must be presumed to be symptoms of pyelonephritis, an invasive infection of the renal parenchyma requiring prompt treatment [2].

Although, most UTI 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 [3]. Those with gross reflux or obstruction and those who have a delay in therapy for UTI. Among children under 2 years of age with recurrent urinary infections, putting them at higher risk for renal scarring, as many as one-third being asymptomatic [4]. However, it is essential to identify infections of the urinary tract in children and institute prompt treatment in order to reduce the potential for lifelong morbidity. Progressive renal damage from unrecognised pyelonephritis in childhood may lead to hypertension and chronic renal failure in later life [5].

The clinical diagnosis of UTI is difficult, due to nonspecific or vague symptomatic spectrum seen in children [5], often clinical diagnosis needs to be supported with confirmatory tests like urine culture, which guides in treatment of the infection. However, adequate treatment of acute UTI depends on knowledge of the local pattern of causative pathogens, their antimicrobial resistance and the associated underlying risk factors. The changing pattern of antimicrobial susceptibility of bacterial pathogens causing acute UTI is a growing problem. Consequently, many organisms including those causing acute UTI may ultimately develop high resistance to many antibiotics in current use. Moreover, organisms not known to be common in causing acute UTI may emerge as important causative pathogens.

Therefore, the knowledge of the local pattern of urinary pathogens and their susceptibility to various antimicrobials are essential for selection of the appropriate treatment of UTI [6]. The present study was undertaken to estimate the overall prevalence, clinical presentation and antibiotics sensitivity of UTI in children within 6 months to 5 years of age and to also to assess the aetiology of UTI.

MATERIALS AND METHODS

This hospital based prospective observational study was conducted in the Department of Paediatrics, at tertiary care hospital and medical college during the period of 1 year from 1st January 2021 to 31st DEC 2021. Before initiation of study Institutional Ethical Committee approval was obtained and written informed consent from all the patients was taken. Total 156 children in between 6 months to 5 years of age diagnosed with UTI under below mentioned definition of UTI who were admitted in department of paediatrics were enrolled.

- Laboratory definition of UTI: In the present study more than 5 pus cells/HPF in a centrifuged urine sample to be taken as significant pyuria. OR
- On culture of urine, a colony count of more than >105 /ml organisms of a single species were considered significant.
- Laboratory definition of recurrent UTI: recurrent UTI is defined as two or more UTI In 6months or 3 or more UTI in 1 year.

Children suffering with any chronic illness, immunodeficiency disorders or who were hemodynamically unstable, any child who has received antibiotics 48 hours prior, children with known congenital genitourinary anomalies were excluded from this study.

All information regarding their age, sex, socioeconomic class and various predisposing factors like instrumentation of the urethra, voiding difficulties were collected. A complete history related to the onset, duration of fever and associated symptoms such as nausea, vomiting, diarrhea, urinary disturbances, other system involvement was obtained. A complete physical examination with significant investigations were carried out in all children. The blood investigations and urine analysis along with urine culture and sensitivity were done. USG examinations were done, in culture positive cases, in MCU was done and then the detailed data was entered in the proforma.

Method of Urine Analysis

Urine samples were collected from all the 156 children. In children under 2 years of age urine was collected by a bag collection method and in children above 2 years clean midstream sample was collected. The urine samples obtained from the above techniques were then subjected for urinalysis and urine culture and sensitivity. The urine specimens were then centrifuged in a chamber, 10ml of urine was spun at the rate of 2500 rpm for about 30 minutes, and the supernatant fluid was then decanted off and the remaining sediment was resuspended in the

chamber. The urine was then examined under microscope for Hematuria, and Leukocyturia. In present study more than 5 pus cells /HPF in a centrifuged sample of urine was considered as significant pyuria and culture and sensitivity was performed in that child.

Method of Urine Culture:

The clean mid-stream catch urine was inoculated into blood and Mac Conkey agar plates using a 0.01 millilitre calibrated loop. All plates were then incubated at 35-37 degree celcius for about 24 hours under aerobic condition in order to obtain accurate colony count. On culture of the mid-stream sample of urine, a colony count of more than 105 /ml organisms of a single species of bacteria were considered to be significant. Samples with insignificant growth, mixed growth of two or more pathogens or growth of non-pathogens were not considered to be culture positive.

Positive Urine Culture:

A positive urine culture was defined as growth of >105 colonies of a single urinary tract pathogen/ml of specimen in a clean mid-stream of urine, >103 by Catheterization technique, any Count by Suprapubic aspirate.

OBSERVATIONS AND RESULTS

During the study period, a total of 156 children in between 6 months to 5 years of age diagnosed with UTI were studied, out of them 101 were below 2 years of age and 55 were above 2 years. 70 were males and 86 were females. Overall prevalence rate of UTI in present study was 6.3% with maximum prevalence of children <2 years age (7.3%) and <1 year was (6.7%). According to modified Kuppuswamy's Socio-Economic Status Scale Majority of the subjects belongs to Class 5 (44.2%) followed by Class 4 (28.2%) as shown in table 1.

Table 1: Socio-demographic data of study population

Age		Sex		Total
		Male	Female	
Age groups	6 months to 1 year	20	18	38(24.3%)
	>1 year -2 years	26	37	63(40.3%)
	>2-5 years	24	31	55(35.4%)
Socio-economic status	Class 1	02	04	6(3.8%)
	Class 2	05	07	12(7.69%)
	Class 3	10	15	25(16.02%)
	Class 4	21	23	44(28.2%)
	Class 5	32	37	69(44.2%)
Total		70	86	156(100%)

The pyuria shown by 63 children between 1-2 years of age which was followed by 6 months to 1 year of age shown in table 2.

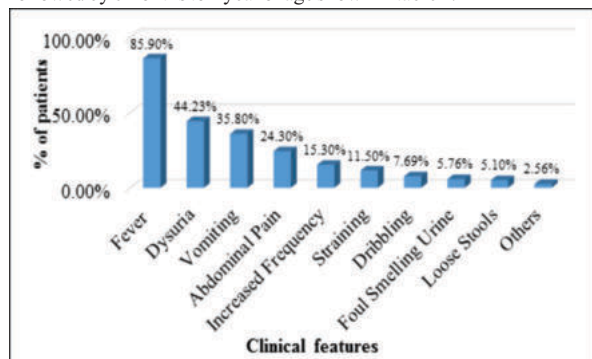


Figure 1: Distribution of clinical features shown by UTI diagnosed patients

Table 2: Age and sex distribution of subjects with urine showing >5pus cells/HPF

Age		Sex		Total
		Male	Female	
6 months to 1 year		20	18	38(24.3%)
1 year -2 years		26	37	63(40.3%)
2-3 years		12	13	25(16.02%)
3-4 years		08	10	18(11.5%)
4-5 years		04	08	12(7.6%)
Total		70	86	156(100%)

The fever as a clinical feature seen in 134(85.9%) cases, in 60(38.46%)

cases duration of fever was 1 to 5 days and in 74(47.4%) cases duration of fever was more than 5 days.

Among the 156 UTI cases 134(85.9%) subjects having fever as main clinical feature followed by dysuria 69(44.2%), vomiting 56(35.8%) and abdominal pain as depicted in figure 1. Since majority of children were < 5yrs of age, urinary symptoms constituted a comparatively less percentage.

Among 156 patients who shown significant pyuria, 93 patients (59.6%) shown culture positive. Among culture positive cases majority (53.2%) grew E. coli as shown in figure 2. The positive culture was seen in 47.8%, 8.1% and 3.7% of children with pus cells >5 and >10 and numerous/HPF respectively indicating validity of the definition of significant pyria as pus cells >5 pus cells in centrifuged urine sample.

USG abdomen done in 156 children to rule out complication of UTI, 27(17.3%) children shown cystitis followed by 15(9.6%) derbies in urinary bladder which was followed by Urinary bladder calculi (7%), Hepatosplenomegaly (5), Phimosis and Unilateral hydronephrosis (3 each), Ascites and B/l hydronephrosis (2 patients each) and B/l renal scarring found in 1 patient.

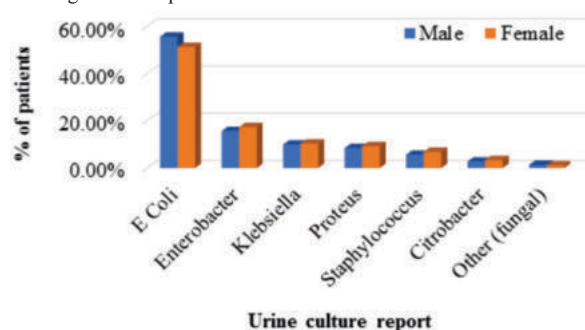


Figure 2: Showing distribution of urine culture

Most of the children with culture positive were shown sensitive to 3rd generation cephalosporins followed by nitrofurantoin as shown in table 3.

Table 3: Antibiotics Sensitivity Pattern of The Organism grown on Culture.

Sensitivity of antimicrobials	e.coli (49)	Enterococci (15)	Klebsiella (10)	Staphylococcus (5)	Proteus (8)
Cefotaxime	74	57	62	17	44
Cefpirome	64	39	21	-	-
Cotrimoxazole	33	14	37	37	75
Norfloxacin	18	28	17	17	31
Nitrofurantoin	94	100	79	87	62
Sparfloxacin	35	57	17	21	-
Nalidixic acid	37	28	37	71	-
Amikacin	58	28	71	17	-

DISCUSSION

In the present study, out of 2476 children admitted in paediatric ward between 6 months to 5 years of age, 156 children showed significant Pyuria with prevalence of 6.3% which is comparable with the study conducted by Shaikh N et al (7%) [7] and Hoberman et al (5.7%) [8]. Among children shown significant pyuria, 64.7% were <2 years of age with an overall prevalence rate of 7.3% in children <2 years (total number of patients admitted in paediatric ward below age of 2 years was 1383), this finding correlated with the Roberts K et al (4.1%) study [9]. The prevalence of UTI in infants was 6.7% (total number of patients admitted in paediatric ward below age of 1 years was 568), which is in contrast to study by Kaushal RK et al (12.3%) [10].

Among culture positive cases 53.5% grew E. coli followed by enterobacter 16.6% and 10.2% klebsiella and 8.9% of proteus species. Thus, E. coli was the most common organism isolated (53.2%) in present study. This was in accordance with other studies in which E. coli was isolated from 61.0% to 72.8% [11-14]. Also, through our study various risk factors like phimosis, voiding difficulties and prolonged duration of fever were found to be highly significant. There was no association between the foci of fever and UTI and hence UTI may occur in children with any underlying foci of infection.

In present study, majority of the subjects presented with Fever as the presenting symptom, followed by dysuria, vomiting and abdominal pain. Since majority of children were <5yrs of age, urinary symptoms constituted a comparatively less percentage. Similar findings are reported in study conducted by Sharma U et al [15] and Sharma A et al [16]. The fever was continuous or intermittent in nature and most of the cases were not classically associated with chills and rigors. Burning micturition is one of the most important clinical features of UTI specially that of the lower urinary tract. In the present study, it was 18.3%. The higher incidence of burning micturition may be age related, as maximum number of patients in the present study was above 5 years of age, who could appreciate the symptoms 12 subjects out 156 who shown significant pyuria did not shown any symptoms, were diagnosed under routine investigations.

In present study were *E. coli* and *Klebsiella* is more sensitive to cephalosporins and nitrofurantoin. Most of the organisms isolated were highly sensitive to nitrofurantoin, amikacin and cefotaxim. Among these, *E. coli* showed sensitivity to nitrofurantoin in 94% and to cefotaxime by 74%, amikacin by 58%. A study done in Turkey also reported highest sensitivity of nitrofurantoin (97.8%) against *E. coli* [17] and also, other studies done in Greece and United Kingdom reported 95.6% and 93.0% [11, 15, 18].

Hence all medical personnels must be aware that the possibility of febrile children may have urinary tract infection and should consider obtaining a urine culture specimen as part of their diagnostic evaluation. Also, the presence of any another potential source of fever such as meningitis, upper respiratory tract infection, bronchopneumonia, otitis media is not reliable in excluding urinary tract infection. As per hospital norms abdominal ultrasound were done only in children who showed significant growth in culture and among them, 1 subject which revealed b/l renal scarring and 2 subjects revealed hydronephrosis subjected to MCU. Some subject shown 2-3 pus cells/hpf in the study were shown culture negative and some shown culture positive but not included in the study as they are not satisfying inclusion criteria, so they were excluded. Some subjects There was significant association between the socioeconomic status as the cases were unevenly distributed but class 4 and class 5 were shown high prevalence.

CONCLUSIONS

Clinician should be aware of the possibility that febrile children may have urinary tract infection and should consider obtaining a urine culture specimen as part of their diagnostic evaluation. The presence of another potential source of fever such as upper respiratory tract infection or otitis media is not reliable in excluding UTI. Patient who are presented ideally with fever and dysuria, should be evaluated for UTI. Patient who are suspected for UTI, should be investigated by URM, UCS and USG abdomen for complication of UTI. Also, we concluded that pyuria of >5 pus cells/HPF in centrifuged sample should be considered as significant pyuria and further evaluation should be done promptly to initiate and to prevent morbidity and long term sequelae.

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