Original Article

Study of Aetiology and Prevalence of Urinary Tract Infection in Febrile Children less than Five years age

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ABSTRACT

Background: Urinary tract infection (UTI) is one of the most common pediatric infections. It distresses the child, concerns the parents, and may cause permanent kidney damage. Febrile infants younger than 2 months constitute an important subset of children who may present with fever without a localizing source. The workup of fever in these infants should always include evaluation for UTI.

Aims and Objectives: 1). To determine the prevalence of urinary tract infection in febrile children, less than 5 years of age. 2). To know the etiology by assessing the validity of microscopic urine analysis and urine culture in the diagnosis of urinary tract infection.

Materials and Methods: Total 370 febrile children between age group of 1 month to 5 years were taken up for the present study and were evaluated for the causes. Those who had UTI where pus cells >5/HPF were included in the study and were further investigated on Urince culture, and USG.

Results: Out of 370 children between 1months to 5 years of age presenting with febrile period, 48 children had UTI. Urine Culture and USG abdomen of the subjects revealed 73% pyuric children showed no growth on culture, and in those who have shown growth, E.Coli (69.33%) was the commonest organism followed by Acinetobactor. Pseudomonas (7.6%).

Conclusion: Clinicians 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. E. coli, which was the most common causative pathogen of UTI in children.

Keywords: Urinary tract infection, pyuria, E.Coli, under five children.

INTRODUCTION

Children with fever comprise a substantial proportion of the practice in outpatient department and Emergency Medicine. Fever is the most common reason for children under 5 years of age to visit Emergency/outpatient departments. Unlike occult bacteraemia or severe bacterial illness (in infants and children) little attention has been focused on the identification of urinary tract infections in febrile children in the emergency department, despite recent information that suggests a high prevalence of urinary tract infections and significant associated morbidity in these patients. Quite often, child receives antibiotics empirically, without adequate evaluation for urinary tract infection. Fever, however, is often the only symptom in children with urinary tract infections.

Fever and significant bacteriuria and 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 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. [1,2,3]

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.[4, 5] 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[2, 5] those with gross reflux or obstruction and those who have a delay in therapy for urinary tract infection.

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.

It is essential to identify urinary tract infections in febrile children and institute prompt treatment to reduce the potential for lifelong morbidity. Progressive renal damage from unrecognized pyelonephritis in childhood may lead to hypertension and chronic renal failure in later life.[6]

A study from Sweden showed that focal renal scarring caused by pyelonephritis in children carried a 23% risk for hypertension a 10% risk for end- stage renal disease, and a 15% risk for toxemia during pregnancy as an adult.[7] Approximately 13% to 15% of End - stage renal disease is thought to be related to urinary tract infection in childhood that was often unrecognized and therefore, undertreated.[8] The present study is undertaken to estimate the prevalence of urinary tract infection in febrile children less than 5 years of age and to assess the validity of routine microscopic urine analysis and urine culture in the diagnosis of urinary tract infection.

Aims and Objectives

1. To determine the prevalence of urinary tract infection in febrile children, less than 5 years of age.
2. To know the etiology by assessing the validity of microscopic urine analysis and urine culture in the diagnosis of urinary tract infection.

MATERIALS AND METHODS

The present study was conducted in the Department of Pediatrics, Chalmeda Anand Rao Institute of Medical Sciences during the period of January 2017 to June 2018 (i.e. period of 18 months).

Selection of Patients

Febrile children less than 5 years attending the outpatient department or admitted in the hospital over a period of 18 months were included in the study.

Inclusion Criteria

- Febrile children between 1 month to 5 years.
- Fever (rectal =38.3°C (or) auxiliary temperature =37.8°C).

Exclusion Criteria

- Children below 1 month and above 5 years.
- Any child who has received antibiotics 48 hours prior were not included in the study.
- Children with known congenital genitourinary anomalies.

370 children were included in the study, data related to age, sex, nutritional status, socioeconomic status and predisposing risk factors like urethral instrumentation, bowel habits etc, were noted. 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 thorough physical examination with relevant investigations was carried out in all patients. Routine blood counts, urine analysis was done and those showing pus cells >5 per HPF in centrifuged urine sample were taken as study group and urine culture sensitivity was done in them, USG examination was done, in culture positive cases.

Of 370 cases a sample of urine was collected. In children under 2 years of age urine was collected by a bag and in others midstream sample was collected. In children below 2 years of age the genitalia was cleaned with soap and water and person collecting sample washed hands before touching the bottle or bag for collecting urine sample. In males prepuce retracted if possible, in females below 2 years labia was split apart and washed.

Urine was collected in bag, around 10 ml of urine was transferred into sterile bottle and sent for culture and sensitivity. In children above 2 years midstream urine sample was collected. After taking the above precautions child was allowed to pass urine, mid stream sample was collected in sterile bottle and was sent for culture and sensitivity.

RESULTS

370 Febrile children between age group of 1 month to 5 years were taken up for the present study. The study was conducted from January 2017 to June 2018 in the Department of Pediatrics of our institute.

In the present study Table 1: of 370 cases 165(44.5%) were males, 205(55.4%) were females, 100 cases were <1year (27.02%).

Maximum case of urinary tract infection were in the age <2 year (64.8%) minimum age in the study group was 2 months and maximum age in the study group was 60 months. A total of 370 children were evaluated in the study.

Table 1: Age and sex distribution

Age	Sex		
	Male	Female	Total
<1 year	40(24.24)	60(29.26)	100(27.02)
1-2 year	75(45.45)	65(31.70)	140(37.83)
>2 year	50(30.30)	80(39.02)	130(35.13)
Total	165	205	370

Table 2: Age and sex distribution of subjects

Age	Sex		
	Male	Female	Total
<1 year	6(23.07)	10(45.45)	16(33.33)
1-2 year	8(30.77)	4(18.18)	12(25.00)
2-3 year	4(15.38)	1(4.55)	5(10.42)
3-4 years	5(19.23)	4(18.18)	9(18.75)
4-5 years	3(11.54)	3(13.64)	6(12.50)
Total	26(100.00)	22(100.00)	48(100.00)

With urine showing >5 pus cells/HPF. In the present study (Table 2) 48 children (12.9%) showed pyuria in centrifuged urine sample of which 26(54.16%) were males and 22 (45.8%) were females. Majority were <2 years 58%.

Table 3: Socia Economic Status

SES	Sex		
	Male	Female	Total
Class – I	14(53085)	12(54.55)	26(54.17)
Class – II	12(46.15)	10(45.45)	22(45.83)
Total	26(100.00)	22(100.00)	48(100.00)

Majority of children belong (Table 3) to class II (54%) and class III (45.8%) according to modified prasad's classification of socio economic status.

Table 4: Distribution of subjects bases on nutritional status (IAP-Classification) in pyuric children showing >5 pus cells /HPF

Nutrition	Sex		
	Male	Female	Total
Normal	18(69.23)	8(36.36)	26(54.17)
I	2(7.69)	8(36.36)	10(20.83)
II	2(7.69)	3(13.64)	5(10.42)
II with K	1(3.85)	2(9.09)	3(6.25)
III	1(3.85)	1(4.5)	2(4.17)
IV	2(7.69)	------	2(4.17)
Total	26(100.00)	22(100.00)	48(100.0)

Nutritional status of majority of children was normal (54%) 20% were in grade I PEM, 10% were in grade II PEM, 4% belong to class III and class IV.

Table 5: Urine culture report of the subjects

Urine culture report	Sex		
	Male	Female	Total
No growth	18(69.2)	17(77.27)	35(72.91)
E.coli	5(19.23)	4(18.18)	9(18.75)
Acinetobacter	-----	1(4.55)	1(2.08)
Citrobacter	1(3.85)	---	1(2.08)
pseudomonas	1(3.85)	----	1(2.08)
Serratia species	1(3.85)	----	1(2.08)
Total	26(100.00)	22(100.00)	48(100.00)

In our study (Table 6) growth >105 CFU/ml of single organism was considered significant growth 73% of pyuric children showed no significant growth on urine culture. Among positive cultures 69.33% showed E.coli, 7.6% showed Acinetobacter, citrobacter, pseudomonas, and serratia species

Table 6: Abdominal ultrasound scans findings in culture positive children

Abdominal Ultrasound	Sex		
	Male	Female	Total
Bilateral hydronephrosis with thickened bladder wall with cystitis	1		1
Bilateral moderate pleural effusion with ascites		1	1
Crossed fussed ectopic left kidney/ mild hepatosplenomegaly	1		1
Dilated non-peristaltic bowel loops (small) possibility of paralytic ileus/ intestinal obstruction		1	1
Evidence of large bladder calculi	1		1
Features suggestive of bilateral moderate hydro nephroureterosis /cystitis	1		1
Gross ascitis punctuate discrete spots in lung parenchyma seen	1	1	
Lt sided minimal pleural effusion minimal free fluid in the peritoneal cavity	1		1
Massive hydronephrosis (Left side)	1		1
Mild hepatosplenomegaly		1	1
Normal		1	1
Rightt sided hydronephrosis with PUJ obstruction with dysplastic kidney on Right side	1		1
Suggestive of hepato splenomegaly	1		1
Total	8	5	13

Table 7: Final diagnosis in all pyuric children

Diagnosis	Sex		
	Male	Female	Total
Acute URI	1	0	1
Ano-rectal malformation for definitive surgery with fever	1	0	1
Atypical febrile seizures	0	1	1
Bronchitis	0	1	1
Bronchopneumonia with grade III malnutrition	1	0	1
Case of unknown poisoning	1		1
CCHD? TOF with cyanotic spell	0	1	1
Dengue fever	3	2	5
Dengue haemorrhagic fever	1	0	1
UTI with ectopic left kidney	1	0	1
Febrile convulsion	1	0	1
Febrile seizures with URTI	0	1	1
Global developmental delay with fever induced complex partial seizures	0	1	1
Grade III PEM with giardiasis	0	1	1
Haemolyticanaemia/ p.kinase deficiency/iron deficiency anaemia with RTI	0	1	1
Hirschprung's disease with enterocolitis	1	0	1
Hydronephrosis with PUJ obstruction	1	0	1
Jejunitis with perforation (non-specific inflammation on histopathological examination)	0	1	1
Juvenile diabetes mellitus	0	1	1
Kwashiorkor with severe anaemia	0	1	1
UTI with large bladder calculi	1	0	1
Lt sided Empyemo throracis with sepsis with peritonitis	1	0	1
UTI with Lt. pelvicuretric junction obstruction with massivehydronephrosis	1	0	1
Malaria	1	0	1
Megaloblasticanaemia	0	1	1
Meningoencephalitis	1	0	1
UTI with moderate bilateral hydronephroureterosis /cystitis	1	0	1
Multiple pyemic abscess	1	0	1
Neuro-infection/post measles encephalitis	1	0	1
UTI with posterior urethral valve	1	0	
Psychomotor retardation seizure precipitated by fever	0	1	1
Pyogenic meningitis	1	0	1
Rheumatic fever with UTI	1	0	1
Seizure disorder for evaluation (normal growth and development)	1	0	1
Septicemia with microcephaly with craniostenosis	0	1	1
UTI	0	2	2
UTI with febrile seizures	0	1	1
UTI with sepsis with acute renal failure (pre-renal cause)	0	1	1
Viral fever	2	3	5
Total	26	22	48

DISCUSSION

Urinary tract infections are common, potentially serious infections of childhood. They cause acute morbidity as well as long term sequeale including hypertension and impaired renal function. Accurate diagnosis of urinary tract infection is important to facilitate appropriate management of acute illness, and to ensure appropriate evaluation and follow-up. Equally important is accurately ruling out a urinary tract infection to avoid unnecessary cost and potentially harmful treatment and evaluation.

The present study was a prospective study conducted in department of pediatrics, Chalmeda Anand Rao Institute of medical Science over a period of 18 months between January 2017 to June 2018 to determine the magnitude of urinary tract infection in febrile children between 1 month to 5 years and also to assess the validity of routine microscopic urine analysis and culture in the diagnosis of urinary tract infection.

In the present study of 370 cases 165 (44.5%) were males, 205 (55.4%) were females, 100 cases were <1year (27.02%). Maximum case of urinary tract infection were in the age <2 year (64.8%) minimum age in the study group was 2 months and maximum age in the study group was 60 months. A total of 370 children were evaluated in the study.

A total of 370 febrile children were included in the study, out of 370 patients in study 165 were males and 205 were females with Male: Female ratio 1:1.2 and majority of the patients i.e. 64.8% were <2 years.

In our study prevalence of UTI in <2 years age group was 4.1% which was similar to study by Roberts K.et al (1983) who quoted prevalence of 4.1%. [9] Srivasths PR et al (1996) reported a prevalence of 2.48% in children <2 years which was lowest reported from a developing country. [10]

Saravanan S et al (2013) study shows total of 630 Children (1month to 5 years) with fever were evaluated in the study of whom 69(10.9%) children (29 male (42%) and 40 female (57.9%)) had culture proven UTI (68 bacterial and 1due to yeast), of them 22 (31.8%) were 1month to one year, 18 (26.08%) were 1-2 years, 29 (42%) were 2-5 years age. [11] Study conducted by Kaushal RK et al (2003) who reported higher prevalence of 8.4% and 12.3% in children <5 years and infants respectively. [12]

In Vishal Kaushik et al (2017) study, Out of 240 children, 22(9.16%) children showed Significant pyuria (>5 pus cells/HPF) in centrifuged urine sample of which 12(54.5%) were males and 10(45.5%) were females. Majority were <2 years (n=11; 50%). 22(9.16%) children showed significant pyuria (>5 pus cells/HPF) in centrifuged urine. [13]

Overall prevalence of UTI in febrile children in our study was 3.5% and7% in children <5years and infants respectively in contrast to Saravanan S et al (2013) prevalence of UTI in febrile children in their study was 10.9% and 11.3% in children <5years and infants respectively. [11]

Overall prevalence of febrile UTI in infants in our study (7%) was higher compared to report by Shaw KN et al (1998) from USA who reported prevalence of 3.3% in febrile infants.[1] Male: Female ratio of culture positive cases in the age group of <2 years was 1:1 and in children >2 years there was male preponderance. Although, children with known renal anomalies were excluded in our study. We detected renal anomalies for the first time (6 out of 13) by USG examination, this explaining the male preponderance in our study.

Saravanan S et al (2013) there was an overall female preponderance in cases of UTI (57.9%).[11] Significant pyuria was seen in 128(20.3%) children, of whom 72(56.25%) were females, 56(43.75%) were males. 40(31.2%) of them were 1 month to1 years, 35(27.3%) were between 1-2 years and the rest 53(41.4%) were 2-5 years of age, 48 (37%).

Nader Shaikh et al (2008) among infants presenting with fever, the overall prevalence of UTI was 7.0%. [14] The pooled prevalence rates of febrile UTIs in females aged 0-3 months, 3-6 months, 6-12 months, and 12 months was 7.5%, 5.7%, 8.3%, and 2.1% respectively.

In a study conducted by Sumit Gupta et al in (2013), results-out of total 820 cases 170 showed significant bacteriuria of which 107(62.94%) had fever.[15] Females showed higher positivity in UTI cases than males with ratio of 1.3:1.

The prevalence of UTI was 11% and was significantly higher in females than in males. Children below 12 months of age had a higher rate of UTI than those 12 months and above.

In a study conducted by Bindu T. Nair, et al in (2018) out of 1000 cases of febrile children with no localizing signs who were included in the study, 370 (37.0%) were females and 630 (63.0%) were males.[16]

Pyuria

In our study out of 370 children 48 children showed significant pyuria (12.9%) 48 of pyuric cases 26% showed significant bacterial growth making an overall prevalence of 3.5%. Among culture positive UTI's 76% were <2 years of age with a overall prevalence of 4.1% in children <2 years and 7% in children <1 year.

Saravanan et al[10] and Vishal Kaushik et al[13] in their study 70% of children who showed numerous pus cells were

culture positive and 54% were culture positive who showed 8 to 10 pus cells and 43% of children showing 6-8 pus cells were culture positive. Hence the presence of pyuria of >5 1eukocytes/HPF in a centrifuged sample is a significant indicator of UTI.

Urine Culture

In our study, growth >105 CFU/ml of single organism was considered significant growth 73% of pyuric children showed no significant growth on urine culture. Among positive cultures 69.33% showed E.coi, 7.6% showed Acinetobacter, citrobacter, pseudomonas, and serratiaspecies. Our study findings are consistant with Bindu T. Nair, et al in 2018, [16] Aravind Bagga et al 90% of first symptomatic urinary tract infection and 70% recurrence infections were due to E.coli. [17]

CONCLUSION

Clinicians 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. Several studies in developed countries have shown a low prevalence (1.7-4.1%) of urinary tract infection in febrile children. Present study, reveals similar overall prevalence of UTI (3.5%) in febrile children1 month to 5 years and 4.1% in children <2 years and 7% in children <1 year of age. Prevalence of culture positivity was 44% in those who showed >10 pus cells/ HPF in centrifuged sample of urine compared to 2.5% in those who showed >5 puscells/HPF. E.coli, which was the most common causative pathogen of UTI in children during the period of this study. E.coli were the leading etiology of pediatric UTI at our center. Treatment should be based on urine culture. Adequate urine tests are necessary to isolate the bacteria, thus narrowing the choice of antibiotic. Appropriate antibiotic and supportive treatment must be considered to ensure a quick recovery and to prevent complications like renal scarring in young children.

CONFLICT OF INTEREST:

The authors declared no conflict of interest.

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