

Original Research Article

Prevalence of urinary tract infections in febrile children less than five years of age: a chart review

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ABSTRACT

Background: In children less than five years of age, fever is the most common reason to visit emergency/outpatient pediatric departments. Quite often, the child receives antibiotics empirically, without adequate evaluation for urinary tract infection. The objectives of this study were to evaluate the prevalence of urinary tract infection (UTI) in febrile children, less than 59 months of age.

Methods: Records of 370 children between 1 to 59 months of age, attending the department of paediatrics with febrile illness were reviewed. Data related to age, gender, socioeconomic status, nutritional status, clinical diagnosis, abdominal ultrasound, urinary microscopy and urine culture were analysed.

Results: Records of 370 children were evaluated, among them, 240/370 (64.86%) children were below two years, and 130/370 (35.13%) were above two years. 165/370 (44.6%) were males, and 205/370 (55.4%) were females. The overall occurrence of urinary tract infection as defined by significant pyuria was 48/370 (12.9%) in children less than five years of age. The prevalence of UTI in children less than one year of age was 26/370 (7%), whereas it was 15/370 (4%) in less than two years of age and 7/370 (1.8%) between two to five years. Among pyuric patients, 13/48 (27%) had a urine culture positive reports. The positive urine culture was seen in 6/13 (46%) of children with pus cells > 5/HPF and remaining 7/13 (54%) in children with pus cells >10/HPF. *E. coli* was the predominantly [9/13 (69%)] seen organism in urine cultures.

Conclusions: In present study, the overall occurrence of UTI in children less than five years was 13%. Only 3.5% of children had culture-positive UTI. 46% of positive cultures were found in children having urine pus cells > five /HPF in the centrifuged sample, it is recommendable that children with pyuria should be evaluated thoroughly to initiate prompt treatment and have a successful outcome.

Keywords: Children, Febrile, Infants, Prevalence, Pyuria, Urinary tract infection

INTRODUCTION

In children less than five years of age, fever is the most common reason to visit emergency/outpatient pediatric departments. Quite often, the child receives antibiotics empirically, without adequate evaluation for urinary tract infection.¹

Urinary tract infections include 10% of all febrile children, 13.6% of febrile infants and 7% of febrile

newborns.² Among the children younger than five years of age, most urinary tract infections lead to scarring or diminished kidney growth and mainly seen in infants in the first year of life.³

It is crucial to recognize urinary tract infections in febrile children and a slip in diagnosis could have long-term consequences like renal scarring with its adverse effects.⁴ Fever and significant bacteriuria and pyuria in children should be suspected of pyelonephritis, since acute

pyelonephritis consists of 2/3 of febrile UTIs in early childhood.⁵ Untreated pyelonephritis results in renal scarring, hypertension and end-stage renal disease.⁶ Approximately 13% to 15% of end-stage renal disease is thought to be related to urinary tract infection in childhood.⁷ To this purpose, we estimated the prevalence of urinary tract infection in febrile children less than five years of age.

METHODS

This retrospective chart review was conducted in the department of paediatrics, Narayana Medical College and Hospital, Nellore, during the period of 1st October 2012 to 1st June 2014 (i.e. 20 months). Records of Febrile children aged between one month to 59 months with fever, (axillary temperature $\geq 37.6^{\circ}\text{C}$) attending the out-patient department or admitted to the hospital were evaluated.⁸ Excluded records were children who have received antibiotics within the 48 hours period before admission or having congenital genitourinary anomalies.

Data related to age, sex, nutritional status, socioeconomic status and predisposing risk factors like urethral instrumentation, bowel habits, onset and duration of fever and associated symptoms such as nausea, vomiting, diarrhoea, urinary disturbances, routine blood counts, complete urine analysis and reports of urine cultures were noted

Presence of more than five pus cells in HPF in a centrifuged urine sample was considered as significant pyuria. A positive urine culture was considered as the growth of $>10^5$ colonies of a single urinary tract pathogen.

Statistical analysis

Data was presented as numbers, percentages and simple averages. Data were analysed using SPSS Version 21, IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.

RESULTS

Records of 370 children were evaluated, among them, 240/370 (64.86%) children were below two years, and 130/370 (35.13%) were above two years. Demographic, socioeconomic status and nutritional status are shown in Table 1, clinical diagnosis in Table 2 and ultrasonography details of urinary tract abnormalities in Table 3.^{9,10}

165/370 (44.6%) were males, and 205/370 (55.4%) were females. The overall occurrence of urinary tract infection as defined by significant pyuria was 48/370 (12.9%) in children less than five years of age. The prevalence in children less than one year of age was 26/370 (7%), whereas it was 15/370 (4%) in less than two years and age was and 7/370 (1.8%) between two to five years.

Table 1: Demographical, nutritional, social and bacteriological features of children with pyrexia and pyuria.

Parameters	Male	Female	Total
N	165 (%)	205 (%)	370 (%)
Age			
< 1 year	6 (23.07)	10 (45.45)	16 (33.33)
1-2 years	8 (30.77)	4 (18.18)	12 (25.00)
2-3 years	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 (100.0)	22 (100.00)	48 (100.00)
Socioeconomic status			
Class III	14 (53.85)	12 (54.55)	26 (54.17)
Class IV	12 (46.15)	10 (45.45)	22 (45.83)
Total	26 (100.00)	22 (100.00)	48 (100.0)
Nutrition			
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 (100.00)
Pus Cells			
>5	18 (69.23)	16 (72.72)	34 (70.83)
> 10	3 (11.54)	5 (21.73)	8 (16.67)
Numerous	5 (19.23)	1 (4.55)	6 (12.50)
Total	26 (100.00)	22 (100.00)	48 (100.0)
Culture			
No growth	18 (69.2)	17 (77.27)	35 (72.91)
Positive growth	8 (30.7)	5 (22.7)	13 (27.08)
Total	26 (100.00)	22 (100.00)	48(100.0)

Among pyuric patients, 13/48 (27%) had a urine culture positive reports. Among culture, positive cases majority 9/13 (69%) grew *E. coli* followed by Acinobacter, Citrobacter, Pseudomonas and Serratia in other four specimens.

The positive urine culture was seen in 6/13 (46%) of children with pus cells >5 /HPF and remaining 7/13 (54%) in children with pus cells >10 /HPF, indicating the validity of the definition of significant pyuria as pus cells >5 in a centrifuged urine specimen.

DISCUSSION

Urinary tract infections are common, potentially severe infections of childhood. Long standing UTI may result in hypertension and impaired renal function. The present study was a retrospective study conducted in the department between 2012 to August 2014 to determine the magnitude of urinary tract infection in febrile children and also to assess the validity of routine microscopic urine analysis and culture in the diagnosis of urinary tract infection.

Table 2: Clinical diagnosis of children with pyrexia and pyuria.

Diagnosis	Male	Female	Total
Ano-rectal malformation	1	0	1
Bladder calculi	1	0	1
Bronchopneumonia	2	1	3
Complex partial seizures	1	1	2
Dengue fever	4	2	6
Ectopic left kidney	1	0	1
Empyema	2	0	2
Febrile convulsion	2	3	5
Giardiasis	0	1	1
Haemolytic anemia	0	1	1
Hirschsprung's disease with enterocolitis	1	0	1
Hydro nephrosis	3	0	3
Jejunitis with perforation	0	0	0
Juvenile diabetes mellitus	0	1	1
Kwashiorkor with severe anemia	0	1	1
Malaria	2	4	6
Megaloblastic anemia	0	1	1
Meningoencephalitis	0	1	1
Multiple pyemic abscess	1	0	1
Poisoning	1	0	1
Post measles encephalitis	1	0	1
Posterior urethral valve	1	0	1
Pyogenic meningitis	1	0	1
Pyrexia	0	2	2
Rheumatic fever with UTI	1	0	1
Sepsis	0	2	2
TOF with cyanotic spell	0	1	1
Total	26	22	48

Table 3: Abdominal ultrasound features of children with microbiologically proven urinary tract infection.

	Male	Female	Total
Normal	0	1	1
Bilateral hydronephrosis	2	0	2
Bilateral moderate pleural effusion with ascites	1	1	2
Crossed fused ectopic left kidney with mild Hepatosplenomegaly	1	0	1
Dilated non-peristaltic small bowel loops (small)	0	1	1
Large bladder calculi	1	0	1
Nephro Ureterosis	0	0	0
Gross ascities punctate discrete spots in lung parenchyma	0	1	1
Left hydro nephrosis	1	0	1
Right hydro nephrosis	1	0	1
Mild hepatosplenomegaly	1	1	2
Total	8	5	13

The overall occurrence of urinary tract infection as defined by significant pyuria was 48/370 (12.9%) in children less than five years of age. Kaushal et al. reported that it is 12.3% in children <5years.¹¹ In a study conducted at Puducherry the prevalence of UTI in children less than five years of age was 155/524 (29.5%).¹² Another investigator identified 27 (13.5%) showed significant pus cells in urine in children less than 5 years of age.¹³

Children are at risk of developing UTI due to certain anatomic factors. In present study, we detected 46.1% of renal anomalies for the first time (6/13) by USG examination. Accurate diagnosis of these anomalies is vital to facilitate appropriate management of acute illness and follow-up.

Gram negative organisms are those most commonly isolated from urine samples of children with uncomplicated UTI with *Escherichia coli* (*E. coli*) accounting for 70 to 90% of infections.^{14,15} In present study, we observed that, among positive culture cases, 69% grew *E. coli* and seven % each of *Pseudomonas*, *Citrobacter*, *Acinetobacter*, *Serratia* species, which correlates with other studies. Because of economic constraints, urine cultures might have done only in children who showed significant pyuria which revealed a positive culture. Hence the validity of urine examination could not be accurately ascertained. In present study, the positive urine culture was seen in 6/13 (46%) of children with pus cells >5/HPF and remaining 7/13 (54%) in children with pus cells >10/HPF, indicating the validity of the definition of significant pyuria as pus cells > 5 in a centrifuged urine specimen.

CONCLUSION

In present study, the overall occurrence of UTI in children less than five years was 13%. Only 3.5% of children had culture-positive UTI. 46% of positive cultures were found in children having urine pus cells >five /HPF in the centrifuged sample, it is recommendable that children with pyuria should be evaluated thoroughly to initiate prompt treatment and have a successful outcome.

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