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Original Research Article

Study of prevalence of urinary tract infection in febrile children less than 5 years of age

Madhubalan T., Chidambaranathan S.*, Yazhini E.

Department of Pediatrics, Rajah Muthiah Medical College and Hospital, Annamalai University, Tamil Nadu, India

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***Correspondence:**
Dr. Chidambaranathan S.,
E-mail: arvindr84@gmail.com

ABSTRACT

Background: Fever is the most common reason for children under 5 years of age to visit the OPD. Unlike other foci of infection, only a little attention has been focused on the identification of UTI in febrile children. Quite often child receives antibiotics empirically without adequate evaluation of UTI. To determine the prevalence of UTI in all febrile children, from 2 months to 5years of age.
Methods: The study included children admitted with bronchiolitis in between during the period of December 2018 to March 2019 at Department of Pediatrics, Raja Muthiah Medical College and Hospital. Totally 200 consecutive children from 2 months to 5 years admitted in the pediatric department Data related to age, sex, predisposing factors will be noted. Urine analysis and urine culture have to be done in all these patients. USG abdomen to be done in patients with culture positive UTI.
Results: Among the 200 cases, the prevalence of UTI was higher among females (10%) than males (8%). Among the culture-positive cases UTI, an underlying focus of infection was present in 89% of cases and only 11% of cases did not have any foci. In this study, the % of cases with a duration of fever more than 5 days was 57, as compared to 43% in patients with fever less than 5 days. Among the 19 UTI cases, 5 of them presented with voiding difficulties and all the 5 cases had significant growth on culture. There was a significant association between UTI cases and voiding difficulties.
Conclusions: Hence through this study, authors concluded that pyuria of >5 pus cells /HPF in the centrifuged sample should be considered as significant pyuria and hence further evaluation should be done in all these cases to promptly initiate antibiotic treatment and also to prevent morbidity and several long term sequelae.

Keywords: Prevalence, Pyuria, Significant growth, Urinary tract infection

INTRODUCTION

Children with fever comprise a major proportion of practice in the outpatient department of Pediatrics and Emergency Medicine department. Fever is one of the most common reasons for children below 5 years of age to attend the Emergency or outpatient department.[1] Unlike occult bacteremia, very minor attention has been emphasized on the identification of infections of the urinary tract in children in the pediatric department, despite current information that suggests a very high prevalence of urinary tract infections along with associated significant morbidity in these children.[2] Very often, the child receives antibiotics empirically, without an adequate evaluation for urinary tract infection. Fever many times is often the only symptom in children with urinary tract infections.[3] 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.[4] Recent studies using renal parenchyma - avid nuclear scans to determine

urinary tract infection has revealed that more than 80% of children less than 5 years of age with febrile urinary tract infection have pyelonephritis.[5] Pyelonephritis usually leads to renal scarring in 30% to 65% of children with urinary tract infections in this age group, even in the absence of underlying urinary tract abnormalities.[6] 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 who with gross reflux or obstruction and those who have a delay in therapy for urinary tract infection.[7] 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.[8] It is essential to identify infections of the urinary tract in children and institute prompt treatment in order to reduce the potential for life long morbidity. Progressive renal damage from unrecognized pyelonephritis in childhood may lead to hypertension and chronic renal failure in later life.[9]

METHODS

The study included children admitted with bronchiolitis in between during the period of December 2018 to March 2019 at Department of Pediatrics, Raja Muthiah Medical College and Hospital. Totally 200 consecutive children from 2 months to 5 years admitted in the pediatric department Data related to age, sex, predisposing factors will be noted. Urine analysis and urine culture have to be done in all these patients. USG abdomen to be done in patients with culture positive UTI Febrile children less than 5 years attending the outpatient department or admitted in the hospital over a period of 12 months were included in this study.

Inclusion criteria

- Febrile children from 2 months to 5years.Fever (auxiliary temperature ≥37.8℃).

Exclusion criteria

- Children below 2 months and above 5 years. Any child who has received antibiotics 48 hours prior was not be included in the study.

Children with known congenital genitourinary anomalies. 200 children were considered in this study. And 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 was carried out in all children. The blood investigations and urine analysis along with urine culture and sensitivity were done in all these children. USG examination was done, in culture-positive cases, in 2 cases MCU was done and then the detailed data was entered in the proforma. Urine samples were collected from all the 200 children. In children under 2 years of age, urine was collected by a bag collection method and in children above 2 yrs, a clean midstream sample was collected.

RESULTS

During the 12-month study period, a total number of 200 patients were studied between the age group of 2 months to 5 years, to determine the prevalence of urinary tract infection in all febrile patients. It also assessed the validity of investigations in diagnosing urinary tract infections.

Table 1: Age distribution among the study population.

Age group (in years)	Number	%
< 1	69	35
1-2	47	23
2-5	84	42

The study population had 200 subjects in the age group of 2 months- 5 years. The mean age group of the total population was 2 years 6 months. Among the 200 children included in this study, the majority of the children were in the age group of 2-5 years (42%). Among the 200 patients, 95 were males (47%) and 105 were females (53%). The ratio of male: female was 0.9:1. (Table 1).

Table 2: Age wise distribution among UTI cases.

Growth in culture			% of positive cases
Age (in years)	Yes	No	
<1	8	61	12
1-2	5	42	11
2-5	6	78	7

The incidence of UTI is more common among the <1-year age group. The incidence in <1 yr was highest (12%), 1-2 yrs had an incidence of 11 % and >2 yrs the incidence was 7 % (Table 2).

Table 3: Foci of infection among UTI cases.

Fever without foci	2
Fever with foci	17
Total	19

Among the culture-positive cases UTI, an underlying focus of infection was present in 89% of cases and only 11% of cases did not have any foci (Table 3). Among the foci of infection, bronchopneumonia accounted for the majority of the cases of UTI followed by sepsis and pyogenic meningitis (Table 4).

Table 4: Distribution of UTI cases with foci of infection.

Foci of infection	No of cases		
	Culture positive	No growth	p value
URI	3	13	0.834
Febrile seizures	2	20	
Bronchopneumonia	4	17	
Pyogenic meningitis	3	30	
Sepsis	3	33	
Dev delay with seizures	1	11	
Dengue fever	1	7	

Table 5: Association between duration of fever and UTI.

Duration of fever	No of cases	
	Growth	No growth
<5 days	8	79
5 days	11	102

In this study, the % of cases with a duration of fever more than 5 days was 57, as compared to 43% in patients with fever less than 5 days (Table 5).

Table 6: Association between voiding difficulties and UTI cases.

Growth in culture			p value
Voiding difficulties	Yes	No	< 0.0001
Yes	5	0	
No	14	181	

Among the 19 UTI cases 5 of them presented with voiding difficulties and all the 5 cases had significant growth on culture. There was a significant association between UTI cases and voiding difficulties (Table 6).

Table 7: Association between phimosis and UTI.

Phimosis	No of cases	%
Present	3	2
Absent	197	98

Table 8: Association of pyuria and culture positive UTI cases.

Growth			p value
Pyuria	Yes	No	< 0.001
< 5 pus cells	2	23	
>5 pus cells	17	-	

Among the 200 cases 3 cases of phimosis were present and all of them showed significant growth in culture (Table 7). Among the 19-culture positive UTI cases 17 cases showed significant pyuria. There was a strong association between significant pyuria cases and culture growth (Table 8).

Table 9: Urine culture growth patterns among the UTI cases.

Culture growth	No of cases		
	Male	Female	Total
E coli	5	6	11
Klebsiella	2	4	6
Pseudomonas	0	1	1
Proteus	1	0	1

According to this study, the most common organism isolated in the culture was *E. coli* which constituted 58%, followed by *Klebsiella* which was 32% followed by *Pseudomonas* and *Proteus*, both of which constituted 5% (Table 9).

Table 10: USG findings in all the UTI cases.

USG	Male	Female
Cystitis	1	2
B/L hydronephrosis with Thickened bladder wall	1	-
B/L hydronephrosis with PUJ obstruction	2	-
Bladder calculi	-	1
Hepatomegaly	-	1
RT pe with ascites	-	1
Normal	4	6

USG was done in all the 19 UTI cases, among them 10 were normal and among the remaining 9 cases, 7 showed significant abnormality involving the renal system. Among the UTI cases, 16% showed features of cystitis in USG followed by 11% showed B/L hydronephrosis with PUJ obstruction (Table 10).

DISCUSSION

Urinary tract infections are one of the most common and serious infections found in children. They are also a serious cause of morbidity and lead to permanent sequelae which include diseases like hypertension and renal failure.[10] An early diagnosis of urinary tract infection is very essential as it aids us in the appropriate treatment of the acute illness and also it also helps us to ensure the correct evaluation and follow up of the child. Ruling out a urinary tract infection is of utmost importance to avoid the unnecessary economic burden of the patients and also to avoid any advert or potentially harmful evaluation and treatment of the child.[11] The Prevalence of febrile UTI in infants in present study was almost similar to the study by Fowler JE et al, who reported a prevalence of 5.4% in febrile infants.[12] The overall prevalence of Urinary tract infection in all febrile children in this study was 9.5% and 4% in children <5 years and infants respectively which is, in contrast, to study conducted by Goldsmith BM who reported a higher

prevalence of UTI among infants. 8.4% and 12.3% in children <5 years and infants respectively.[13] Hinman F Jr er.al had reported a prevalence of 2.48% in children <2 years which was the lowest reported prevalence from a developing country.

Among culture-positive cases 58% grew *E.coli* followed by klebsiella 32% and 5%each of pseudomonas, Proteus species, which correlates well with other studies.[14] According to Hoberman A et al, 90% of the first symptomatic urinary tract infection and 70% of recurrent infections were due to *E.coli.* Also, through this study, various risk factors like phimosis, voiding difficulties and prolonged duration of fever were found to be highly significant. There was no significant association between the socioeconomic status as the cases were unevenly distributed. Also, there was no association between the foci of fever and UTI and hence UTI may occur in children with any underlying foci of infection cases. And among them, 2 cases which revealed hydronephrosis were subjected to MCU.[15] Through this study authors had diagnosed 2 cases of grade 1 and grade 4 VUR and prophylactic antibiotics were started in grade 1 VUR and grade 4 VUR was subjected to surgery.

In this study only 10% of children who showed <5 pus cells were culture positive and all the children who showed >5 pus cells were culture positive.[16] Hence the presence of pyuria of >5 leukocytes/HPF in a centrifuged sample is a significant indicator of UTI.[17] Also the presence of any other potential source of fever such as meningitis, upper respiratory tract infection, bronchopneumonia, otitis media is not reliable in excluding urinary tract infection. Several studies conducted in developed countries have shown a low prevalence rate (1.7-4.1%) of urinary tract infection in febrile children.[18-20]

CONCLUSION

This present study reveals similar results of an overall prevalence rate of UTI (9.5%) in febrile children 2 months to 5 years. And the prevalence rate in children <1 year of age was highest (4%). All the children with pyuria of >5 pus cells/ HPF of centrifuged urine sample were found to have significant growth and hence the association between pyuria >5 pus cells and urine culture is highly significant and hence this test is highly valid.

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