Original Research Article

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

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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 little attention has been focussed on identification of UTI in febrile children. Quite often child receives antibiotics empirically without adequate evaluation of UTI. Hence it is essential to identify UTI in febrile children to institute prompt treatment and to reduce the threat of lifelong morbidity. **Objective:** To determine - 1) the prevalence of UTI in all febrile children, from 2 months to 5 years of age and 2) the validity of urinary tests (urine analysis and urine culture) in the diagnosis of urinary tract infection. **Materials and Method:** Hospital based prospective study includes 100 children from 2 month to 5 years with febrile illness admitted in the upgraded department of Paediatrics, Patna Medical College & Hospital, Patna. Data related to age, sex, predisposing factors will be noted. Urine samples collected by– 1) Clean midstream catch in children more than 2 years and 2) Bag collection in children less than 2 years. Urine analysis and urine culture has to be done in all these patients.USG abdomen to be done in patients with culture positive UTI. **Results & Conclusion:** Our present study reveals the overall prevalence rate of UTI as 10%. The prevalence rate in children <1 year of age was highest (4%). All the children with pyuria of > 5 pus cells/HPF of centrifused 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.

Keywords: Urinary tract infection; Prevalence; Pyuria; Significant growth.

Introduction

Children with fever comprise a major proportion of our practice in outpatient department of Paediatrics and Emergency Medicine department. Fever is one of the most common reason for children below 5 years of age to attend the Emergency or outpatient department. Unlike occult bacteraemia very minor attention has been emphasised on the identification of infections of urinary tract in children in the paediatric department, despite current information that suggests a very high prevalence of urinary tract infections along with associated significant morbidity in these children. Very often, child receives antibiotics empirically, without any adequate evaluation for urinary tract infection. Fever many times is often the only symptom in children with urinary tract infections.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.Recent studies using renal parenchyma-avid nuclear scans to determine urinary tract infections has revealed that more than 80% of children less than 5 years of age with febrile urinary tract infection have pyelonephritis[1,2,3].Pyelonephritis usually lead to renal scarring in 30 - 65% 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 2 years of age with recurrent urinary infections, putting them at higher risk for renal scarring, as many as one-third being asymptomatic[6].It is essential to identify infections of 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. A study conducted in Sweden had showed that focal renal scarring caused by pyelonephritis in children carried a 25% risk for hypertension, a 10% risk for renal failure and a 15% risk for toxemia during pregnancy as an adult [7].The present study is undertaken to estimate the overall prevalence of infections of urinary tract in children with fever from 2 months to 5 years of age and also to assess the validity of urinary tests like urine analysis and urine culture for the diagnosis of urinary tract infection.

Methods

Our present study was conducted in the Upgraded department of Paediatrics, Patna Medical College & Hospital, during the period March 2019 to Febuary 2020.

Selection of Patients

Febrile children less than 5 years attending the out-patient department or admitted in the hospital over a period of 12 months were included in our study.

Inclusion Criteria

1. Febrile children from 2 month to 5 years.
2. Fever (axillary temperature ≥37.8℃)

Exclusion Criteria

1. Children below 2 months and above 5 years.
2. Any child who has received antibiotics 48 hours prior were not be included in the study.
3. Children with known congenital genitourinary anomalies.

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Methods of study

100 children were considered in our 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, diarrhoea, urinary disturbances and other system involvement was obtained.A complete physical examination with significant investi-gations were 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 were done in culture positive cases, in 2 cases MCU was done and then the detailed data was entered in the proforma.

Collection of urine sample

Urine samples were collected from all 100 children. In children under 2 years of age urine was collected by a bag collection method and children above 2 years clean midstream sample was collected.

a) Bag collection method: Children < 2 years, the genitalia was cleaned with soap and water and the person collecting the sample must wash hands before touching the bag or bottle for collecting urine sample. In male children prepuce is retracted if possible and in female children < 2 years the labia is 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.

b) Midstream urine sample : After the above precautions are taken the child was allowed to pass urine and then midstream urine sample was collected in sterile bottle and then sent for culture and sensitivity.

Method of urine analysis

The urine samples obtained from the above techniques were then subjected for urinalysis and urine culture and sensitivity. The urine specimens were centrifuged in a chamber, 10 ml of urine was span 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 Haematuria and Leukocyturia. In our study >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 0.01 millilitre caliberated loop. All plates were then incubated at 35- 37℃ 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 >105 /ml organisms of a single species of bacteria were considered to be significant.Samples with insignificant growth, mixed growth of two or more pathogen or growth of non-pathogens were not considered to be culture positive.

Positive Urine culture

A positive urine culture was defined as growth >105 Colonies of a single urinary tract pathogen / ml of specimen in a clean mid-stream of urine.

Observation and Results

During the 1 year study period, a total of 100 patients were studied between the age group of 2 months to 5 years, to determine the prevalence of UTI in all febrile patients.

1. Age distribution among the study population and UTI cases as shown in figure 1. Sex distribution among the study population and UTI cases as shown in figure 2. Foci of infection among UTI Cases and its distribution as shown in figure 3. Association of UTI with Duration of Fever / Voiding Difficulties / Phimosis as shown in figure 4. Association of Pyuria and culture positive UTI cases– 9 cases showed significant pyuria among 10 culture positive UTI cases (figure 5). Urine culture growth patterns among the UTI Cases – the most common organism isolated in the culture was E. Coli (50%) followed by Klebsiella (30%) and then Pseudomonas and Proteus (10% each)(table 1). Sensitivity Pattern of the organisms grown on culture – Among the organisms grown, most of them had shown antibiotic sensitivity to Gentamycin and Cefotaxim followed by Amikacin (Table 2) .USG finding in all the UTI cases– USG was done in all the 10 UTI cases, among them 5 were normal and among the remaining 5 cases 4 showed significant abnormality involving the renal system (most commonly Cystitis) (Table 3).

Table 1: Urine Culture growth patterns among the UTI cases.

Culture Growth	No of Cases		
	Male	**Female**	**Total**
E. Coli	2	3	5
Klebsiella	1	2	3
Pseudomonas	0	1	1
Proteus	1	0	1

Table 2: Sensitivity pattern of organisms grown on urine culture.

Antibiotic Sensitivity	No of Cases
Gentamycin	3
Nitrofurantoin	1
Cefotaxim	3
Amikacin	2
Cefoperazone	1

Table 3: USG finding in all the UTI cases.

USG	MALE	FEMALE
Cystitis	1	1
B/L Hydronephrosis with thickened bladder wall	1	0
B/L Hydronephrosis with PUJ obstruction	1	0
Bladder calculi	0	0
Hepatomegaly	0	1
Rt PE with Ascitis	0	0
Normal	2	3

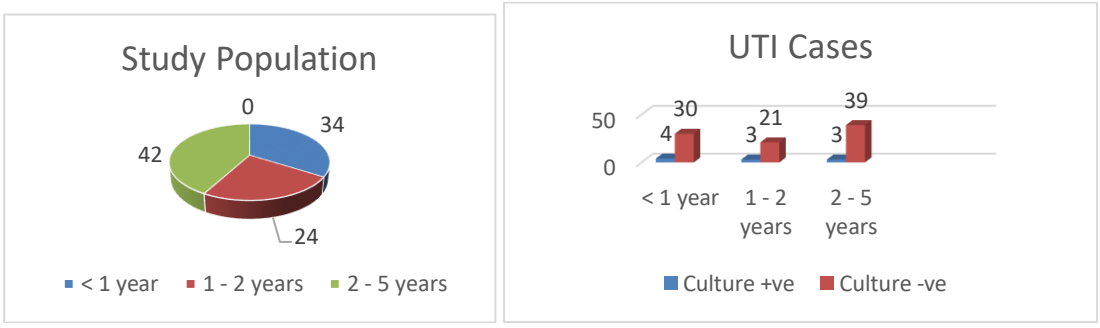

Fig 1:Age distribution among the Study population and UTIcases

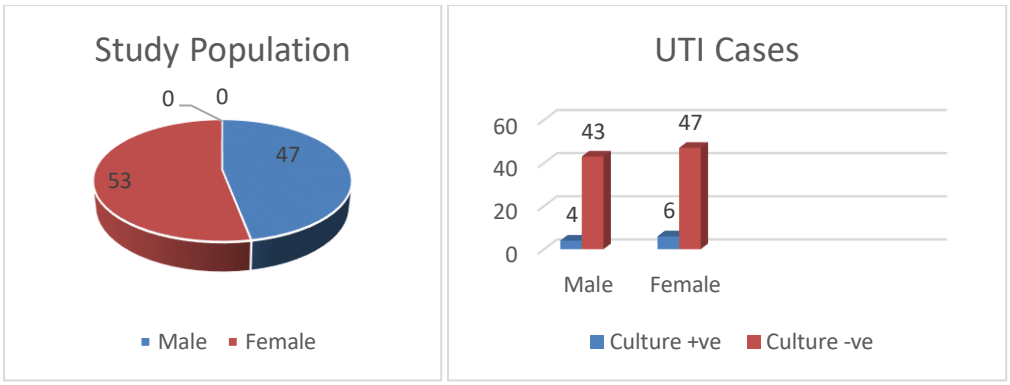

Fig 2: Sex distribution among the Study population and UTI cases

Discussion

Urinary tract infections are one of the most common and serious infection found in children. Ruling out an 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.A total of 100 febrile children were included in the study. Out of 100 patients 47 were males 53 were females and majority of them were within the age group of < 1 year (4%).

Table 4: Prevalence of UTI in Febrile children as

SL.NO	Study	Prevalence
1	Present Study	10%
2	RK Kausal et al	8.4%
3	Dharni Dharaka et al	5.4%
4	Hoberman et al	5.3%

Table 5: Prevalence of UTI in infants

Sl. No	Study	Prevalance
1	Present Study	4 %
2	Shaw K. N et al[1]	3.3 %

Overall prevalence of febrile UTI in infants in our study was 4% higher than compared to report by (Shaw K.N et al 1998) from USA who reported prevalence of 3.3% in febrile infants.

Table 6: Prevalence of UTI in Age group < 2 years.

SL.No	Study	Prevalence
1	Present study	7 %
2	Roberts K et al[8]	4.1%
3	Srivasths et al[9]	2.4%

Table 7: Prevalence of E.coli infection

SL.NO	Study	Prevalence
1	Present study	50 %
2	Bryan CS et al	85%
3	Aravind Bagga et al	90%

Among culture positive cases 50% grew Ecoli followed by Klebsiella 30% and 10% each of pseudomonas, proteus species which correlates well with other studies. Bryan C.S et al[10] (1984) reported E coli as the most common urinary pathogen in 85% of cases. According to

Aravind Bagga et al[11] (2000) 90% of the first symptomatic urinary tract infection and 70% of recurrent infections were due to E coli.As per hospital norms abdominal ultrasound were done in children who showed significant growth in culture which revealed positive results in 5 cases. And among them, 2 cases which revealed hydronephrosis were subjected to MCU (had grade 1 and grade 4 VUR were subjected to prophylactic antibiotics and surgery respectively).In our 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. Hence the presence of pyuria of >5 leukocytes/ HPF in centrifuged sample is a significant of UTI.Hence all medical personnel must be aware about the possibility of UTI infection in febrile children and should consider obtaining a urine culture specimen as part of their diagnostic evaluation.

Conclusion

Our present study reveals similar results of overall prevalence rate of UTI (10%) in febrile children 2 month to 5 years. And the prevalence rate in children <1 year 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.Hence through study we concluded that pyuria of >5 pus cells/HPF in centrifuged sample should considered as significant pyuria and hence further evaluation should be done all cases to promptly initiate antibiotic treatment and also to prevent morbidity and several long term sequelae.

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