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PREVALENCE OF URINARY TRACT INFECTION IN FEBRILE CHILDREN BETWEEN 1-5 YEARS OF AGE

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Abstract

Aim: The aim of the study was taken to find the prevalence of UTI in febrile children one year to five years of age.

Material and methods: This Prospective observational study was done the Department of Pediatric, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India for 1 year. Total 100 Febrile children aged 1 to 5 years were include in this study. The fresh urine sample was subjected for urinalysis and culture and sensitivity. Urine was centrifuged at 2500 rpm for 20-30 min, supernatant was decanted and sediment was examined under microscope for hematuria, and leukocyturia. Presence of ≥ 5 pus cells/HPF in a centrifuged urine sample was taken as significant pyuria. Culture and sensitivity was performed in that patient as per the standard Methods. **Results:** Out of 100, 45% were males 55% were females; 47% cases were < 2 years. Maximum cases for the study of urinary tract infection were in the age < 3 years (78%). According to Modified Kuppu Swamy scale, 10% were belong to upper middle, 46% lower middle, 35% upper lower class and 9% belong to lower class. However only 1% participants belong to upper class. Gender wise, majority of female children belong to lower middle (57.77%) and upper lower class (32.73%) and in male category also. 14 children (14%) showed pyuria in centrifuged urine sample; among these, 42.86% (6) were males and 57.14% (8) were female participants; statistically the difference was not significant (Table 3); majority (42.86%) were between 1-2 years of age. Growth > 10^5 CFU/ml of single organism was considered as significant bacteriuria. Culture positivity was 50%, in this *Esch. coli* was the predominant (21.43%) isolate, followed by *Klebsiella* (14.29%), *Pseudomonas aeruginosa* and serratia (7.14%) species.

Conclusion: The culture positivity was 14% which is significant in the pediatric group. Hence any child with fever, UTI also should be suspected.

Introduction

Urinary tract infection (UTI) is a significant health problem that commonly affects children.[1] It is estimated to be the third most common cause of fever in children after gastrointestinal infections and respiratory diseases.[2] UTI at this critical and vulnerable age group is associated with considerable morbidity because it can lead to serious complications such as hypertension, renal scarring, and end-stage renal failure.[3] Clinically, children with acute pyelonephritis often present with high fever, abdominal pelvic pain, and urinary symptoms. However, these symptoms are not specific and they may occur in lower urinary tract infections such as cystitis.[4] On clinical basis, the differentiation between both conditions is challenging. Therefore, further investigations are required to determine the accurate diagnosis and prognosis.[2] The prevalence of UTI among children is variable in literature, and many predisposing factors are known to increase the risk of this condition among this age group. These factors are either intrinsic related to the integrity of the immune system and the urological organs, or extrinsic predisposing the child to pathogenic organisms. Intrinsic factors include immune deficiency states, immunoglobulin A levels in urine, and blood group antigens types. Extrinsic risk factors include constipation, non-circumcision in boys, obstructive uropathy, and urolithiasis. [5] Accordingly, clinicians caring for young children are frequently faced with the decision of whether or not to obtain a urine sample for urinalysis and culture. Knowledge of the prevalence of UTI among different subgroups of children can assist clinicians in selecting children who would benefit from further diagnostic testing. Using prevalence rates as an estimate of the prior probability of disease is the first step in evidence-based practice. In children with a very low pretest probability of disease, routine diagnostic testing is not necessary. In fact, in such children, an indiscriminate approach to diagnostic testing might lead to more harm than benefit. In contrast, in children with high pretest probability of disease, routine diagnostic testing would be appropriate. In a survey of 300 academic and community paediatrician's regarding diagnostic testing in infants with unexplained fever, baseline risk was important in determining diagnostic decisions.[6] Specifically, only 10%

of clinicians believed that a urine culture was indicated if the probability of UTI was 1%, whereas 80–90% would obtain a culture if the probability of disease was 3–5%, and all would do so if the probability exceeded 5%. Whether a certain child has a 2% or a 10% baseline probability of UTI makes a difference to the practicing clinician. Prevalence was defined as the proportion of children with the target disorder among patients undergoing diagnostic testing.[7] High fever with temperature of 39.5°C or more is the single best predictive parameter.[8,9] The risk of APN increases when bladder infection occurs in patients Vesicoureteral reflux (VUR), because colonized lower tract urine then has direct retrograde access to the upper tract.[10] It is essential to identify UTIs in febrile children and institute prompt treatment to reduce the potential for lifelong morbidity. With this a study was taken to find the prevalence of UTI in febrile children one year to five years of age.

Materials and Methods

This Prospective observational study was done the Department of Pediatric, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India for one year.

Inclusion criteria

- Febrile children aged 1 to 5 years

Exclusion criteria

- Children on antibiotics 48 hours prior to the sample collection
- congenital genitourinary anomalies

Methodology

A complete history related to the onset, duration of fever and associated symptoms such as nausea, vomiting, diarrhea, pain abdomen, urinary disturbances, other systems involvement was obtained. Socioeconomic status was categiorised as per modified kuppuswamy scale.[11] A thorough physical examination with relevant investigations was carried out in all patients. Routine urine analysis and culture sensitivity was done. Suprapubic aspiration and mid stream urine sample were collected based on the child response.

The fresh urine sample was subjected for urinalysis and culture and sensitivity. Urine was centrifuged at 2500 rpm for 20-30 min, supernatant was decanted and sediment was examined under microscope for hematuria, and leukocyturia. Presence of ≥ 5 pus cells/HPF in a centrifuged urine sample was taken as significant pyuria. Culture and sensitivity was performed in that patient as per the standard Methods.[12]

Statistical analysis: Statistical analysis was done by using SPSS software version 21.0. Chi-square test was used to assess the association between different categorical variables; $P<0.05$ was considered statistically significant.

Results

In the present study, total 100 participants were included, 45 (45%) were males 55 (55%) were females; 47 (47%) cases were < 2 years. Maximum cases for the study of urinary tract infection were in the age < 3 years (78%). Minimum age in the study group was 1 year and maximum age in the study group was 5 years (Table 1)

Table 1: Distribution of study participants with age and gender

Age in months	Male=45	Female=55	Total=100
Below 24	17(18)	30(29)	47 (47)
24-36	20(21)	11 (9.5)	31 (31)
36-48	4 (5)	8(8)	12 (12)
48-60	4 (4.5)	6 (7.5)	10 (10)
Total	**45 (45)**	**55 (55)**	**100(100)**

According to Modified Kuppu Swamy scale, 10 (10%) were belong to upper middle, 46 (46%) lower middle, 35% (35) upper lower class and (9%) belong to lower class. However only 1% participants belong to upper class. Gender wise, majority of female children belong to lower middle (57.77%) and upper lower class (32.73%) and in male category also. (Table 2)

Table 2: Gender wise socioeconomic status distribution among the study participants

Class	Male=45	Female=55	Total=100
Upper class	1	0	1
Upper middle	6 (7)	4 (4)	10 (10)
Lower middle	19 (20)	26 (26)	46 (46)
Upper lower	17(17)	18 (18)	35 (35)
Lower	2 (3)	7 (7)	9 (9)
Total	**45 (45)**	**55(55)**	**100 (100)**

In the present study, 14 children (14%) showed pyuria in centrifuged urine sample; among these, 42.86% (6) were males and 57.14% (8) were female participants; statistically the difference was not significant (Table 3); majority (42.86%) were between 1-2 years of age.

Table 3: Age wise pyuria among the gender in the study participants; n (%)

Age in months	Male=6	Female=8	Total
Below- 24	2 (14.29)	4 (28.57)	6 (42.86)
24-36	2 (14.29)	2 (14.29)	4 (28.57)
36-48	1 (7.14)	1 (7.14)	2 (14.29)
48-60	1 (7.14)	1 (7.14)	2 (14.29)
Total	**6 (42.86)**	**8 (57.14)**	**14 (100)**

P = 0.874; statistically there was no significant difference

Growth > 10^5 CFU/ml of single organism was considered as significant bacteriuria. Culture positivity was 50%, in this *Esch. coli* was the predominant (21.43%) isolate, followed by *Klebsiella* (14.29%), *Pseudomonas aeruginosa* and serratia (7.14%) species. (Table 4)

Table 4: Distribution of urine culture among the study participants

Culture Report	Male=6	Female=8	Total
No growth/ Contaminated	3 (21.43)	4 (28.57)	7 (50)
Esch. coli	0	3(21.43)	3 (21.43)
Klebsiella	1 (7.14)	1 (7.14)	2 (14.29)
Pseudomonas aeruginosa	1 (7.14)	0	1 (7.14)
Serratia species	1 (7.14)	0	1 (7.14)
Total	**6(42.86)**	**8 (57.14)**	**10 (100)**

Discussion

UTIs are common, potentially serious infections of childhood. UTI may lead to renal scarring, hypertension, and end stage renal disease. UTI mainly due to the ascending infection from urethra descending due to hematogenous route. The diagnosis of UTI in young children is important as it may be the marker of urinary tract abnormalities. Early diagnosis is important to preserve renal function of the growing kidney.

UTI is one of the most important risk factor in development of renal insufficiency or end stage renal disease. Among the pyogenic cases in this study, 42.86% cases were male and 57.14% were female participants. This prevalence is comparable to many studies Shaikh N et al.[13] and Bauchner et al.[14] showed prevalence range from 1.2% to 8%. As per Almofarreh M et al. study, gender is the commonest influencing factor of UTI[15] the studies also reported that the prevalence of UTI is more in female children.[16-18] The anatomical structure as well as less distance with anal region is the main reported cause for more prevalence of UTI among female children. In this study prevalence of UTI in 1-2 years age group was 2% which was similar to P.R Srivasths et al.[19] reported 2.5% prevalence in children <2 years which was lowest reported from a developing country where as Roberts et al.[20] reported 4.1%. When age was considered, highest prevalence was reported to be highest during the first month of life.[21] Fallahzadeh et al.[22] estimated prevalence of UTIs in preschool children and reported a prevalence of 4.4%. It is estimated that at least 1% of boys and 3% of girls develop UTI during first 10 years of life.[23]

In young children with fever the prevalence of UTI in children <2 years presenting with fever has been the subject of several large prospective studies and a meta-analysis.[24] Presence of pus cells in urine, pyuria detection by urine microscopy is a simple exercise. In this report, pyuria was detected in 14% (14) participants. Sandoval et al. reported that the sensitivity of pyuria was just 40% only in the diagnosis of UTI.[25,26] Studies reported that Nitrate reduction test is a better and simple diagnostic technique for the diagnosis of UTI[27] however, it was not performed in the current study. According to Arvind Bagga et al.[28]about 90% of first symptomatic UTI and 70% of recurrent infections are due to *Escherichia coli*, followed by other bacteria such as proteus, *Klebsiella* and *Staphylococcus saprophyticus*. In this study also, *Esch. coli* was the predominant pathogen isolated. As per Sobel et al.[29] Serratia and *Pseudomonas aeruginosa* were the common pathogens cause UTI in pediatric group. Hillary L. Copp and Bogdana Schmidt[30] reported that Esch.coli is the commonest UTI causing microorganism followed by *Enterobacter, Entero-coccus, Klebsiella*.

When socioeconic status was considered, UTI 10 (10%) were belong to upper middle, 46 (46%) lower middle, 35% (35) upper lower class and (9%) belong to lower class. However only 1% participants belong to upper class. In the literature, no studies were found on UTI correlated with socioeconomic status in this area. Lack of personal hygiene and malnutrition are the main reasons for more UTI in low socioeconomic classes.

Conclusion

The culture positivity was 14% which is significant in the pediatric group. Hence any child with fever, UTI also should be suspected.

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