Original Research Article

Prevalence of urinary tract infection in febrile children between one to five years of age

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Abstract

Introduction: It is essential to identify urinary tract infection (UTI) 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:** Study was conducted in GSL Medical College. Febrile children aged 1 year to 5 years attending the outpatient department or admitted in the hospital were included in the study. Socioeconomic status was categorized as per modified kuppuswamy scale. The fresh urine sample was subjected for urinalysis and culture and sensitivity. Chi-square test was used to assess the association between different categorical variables; $P<0.05$ was considered statistically significant. **Results:** Total 200 participants were included with male female ratio 0.87. Maximum cases were in lower middle class and nil participants in upper class. Significant pyemia was detected 13.5% (27) cases, statistically the difference was not significant ($P>0.05$) and culture positivity was 8% (16); *Esch. coli* was the predominant pathogen, followed by *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *serratia spp*. **Conclusion:** The culture positivity was 8% which is significant in the pediatric group. Hence any child with fever, UTI also should be suspected.

Keywords: Infection, Febrile, Urinary tract infection

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 1-5 years of age to visit emergency / outpatient departments. Unlike occult bacteremia or severe bacterial illness (in children) little attention has been focused on the identification of urinary tract infections (UTI) 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.

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UTI affects approximately 7% to 8% of girls and 2% of boys during the first 8 years of life. Fever and significant bacteriuria, pyuria in children with undocumented sources of infections must be presumed to be symptoms of acute pyelonephritis (APN), an invasive infection of the renal parenchyma requiring prompt treatment [1,2].

High fever with temperature of 39.5°C or more is the single best predictive parameter [3,4]. 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 [5].

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

Study was conducted in the department of paediatrics, GSL Medical College from January 2014 to January 2015 Study protocol was approved by the institutional ethical committee. Informed written consent was taken from the parents of all the participants.

Inclusion criteria: Febrile children aged 1 to 5 years attending the outpatient department or admitted in the hospital were included in the study.

Exclusion criteria: Children on antibiotics 48 hours prior to the sample collection and those with known congenital genitourinary anomalies were not included in the study.

Sampling method: Random sampling technique was followed in this research; during the study period, the children who come to the pediatric department, fit inclusion criteria were considered.

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 [6]. 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 practice [7].

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 200 participants were included, 93 (46.50%) were males, 107 (53.50%) were females; 89 (44.5%) cases were < 2 years. Maximum cases for the study of urinary tract infection were in the age < 3 years (75%). Minimum age in the study group was 1 year and maximum age in the study group was 5 years (Table 1).

Table-1: Age, gender wise distribution of study participants; n (%)

Age in months	Male	Female	Total
12-24	32 (18)	57 (28.5)	89 (44.5)
25-36	42 (21)	19 (9.5)	61 (30.5)
37-48	10 (5)	16 (8)	26 (13)
49-60	9 (4.5)	15 (7.5)	24 (12)
Total	**93 (46.5)**	**107 (53.5)**	**200 (100)**

Table-2: Gender wise socioeconomic status distribution among the study participants; n (%)

Class	Male	Female	Total
Upper class	0	0	0
Upper middle	14 (7)	10 (5)	24 (12)
Lower middle	40 (20)	50 (25)	90 (45)
Upper lower	33 (16.5)	35 (17.5)	68 (34)
Lower	6 (3)	12 (6)	18 (9)
Total	**93 (46.5)**	**107 (53.5)**	**200 (100)**

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

Age in months	Male	Female	Total
12-24	4 (15)	7 (26)	11 (41)
25-36	3 (11)	4 (14.7)	7 (26)
37-48	3 (11)	3 (11)	6 (22)
49-60	1 (3.7)	2 (7.4)	3 (11)
Total	**11 (41)**	**16 (59)**	**27 (100)**
P = 0.944; statistically there was no significant difference.			

Table-4: Distribution of urine culture among the study participants; n (%)

Culture Report	Male	Female	Total
No growth/ Contaminated	8 (30)	8 (30)	16 (60)
Esch. coli	0	6 (22)	6 (22)
Klebsiella	1 (3.7)	1 (3.7)	2 (7.4)
Pseudomonas aeruginosa	1 (3.7)	1 (3.7)	2 (7.4)
Serratia species	1 (3.7)	0	1 (3.7)
Total	**11 (41)**	**16 (59)**	**27 (100)**

According to Modified Kuppu Swamy scale, 24 (12%) were belong to upper middle, 90 (45%) lower middle, 34% (68) upper lower class and (18%) belong to lower class. However none of the participants belong to upper class. Gender wise, majority of female children belong to lower middle (45%) and upper lower class (34%) and in male category also, (Table 2)

In the present study, 27 children (13.5%) showed pyuria in centrifuged urine sample; among these, 41% (11) were males and 59% (16) were female participants; statistically the difference was not significant (Table 3); majority (40.74%) were between 1-2 years of age.

Growth > 10^5 CFU/ml of single organism was considered as significant bacteriuria. Culture positivity was 59.25%, in this *Esch. coli* was the predominant (22%) isolate, followed by *Klebsiella, Pseudomonas aeruginosa* (2% each respectively) and serratia (3.7%) species (Table 4).

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, 41% (11) cases were male and 59% (16) were female participants (Table 3). This prevalence is comparable to many studies Shaikh N et al., [8] and Bauchner et al. [9], showed prevalence range from 1.2% to 8%. As per Almofarreh M et al. study, gender is the commonest influencing factor of UTI [10]; the studies also reported that the prevalence of UTI is more in female children [11,12,13]. 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., [14] reported 2.5% prevalence in children <2 years which was lowest reported from a developing country where as Roberts et al., [15] reported 4.1%. When age was considered, highest prevalence was reported to be highest during the first month of life [16]. M.H. Fallahzadeh et al., [17] 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 [18].

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 [19]. Presence of pus cells in urine, pyuria,

detection by urine microscopy is a simple exercise. In this report, pyuria was detected in 13.5% (27) participants. Sandoval et al. reported that the sensitivity of pyuria was just 40% only in the diagnosis of UTI [20, 21]. Studies reported that Nitrate reduction test is a better and simple diagnostic technique for the diagnosis of UTI [22]; however, it was not performed in the current study.

According to Arvind Bagga et al., [23] 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. [24] Serratia and *Pseudomonas aeruginosa* were the common pathogens cause UTI in pediatric group. Hillary L. Copp and Bogdana Schmidt [25] reported that Esch.coli is the commonest UTI causing microorganism followed by *Enterobacter, Entero-coccus, Klebsiella*.

When socioeconic status was considered, UTI is common in lower middle (90), upper lower (68) and lower class (18) and upper middle class (24). 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.

Small sample size, lack of inpatient and outpatient correlation, lack of antibiotic susceptibility testing are the limitations of this study.

Conclusion

The culture positivity was 8% which is significant in the pediatric group. Hence any child with fever, UTI also should be suspected.

What the study adds to the existing knowledge?

The present study established more efficiently that UTI should identified and considered as a common infection in lower socioecomic category.

Author's contributions

- **Dr. Gangina Sriram**: Literature survey, Paper writing
- **Dr. Akula Satyanarayana:** Literature survey
- **Dr. Dumavath Raveendra Naik:** Sample collection, analysis
- **Dr. T Jaya Chandra:** Bench work, statistical analysis, paper writing

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