

## PREVALENCE AND AETIOLOGICAL FACTORS OF URINARY TRACT INFECTION IN FEBRILE CHILDREN 2 MONTHS TO 2 YEARS

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### ABSTRACT

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#### OBJECTIVES

To determine the prevalence of urinary tract infection and etiological factors in recurrent urinary tract infections in febrile children, 2 months to 2 years of age.

#### METHODS

It was a hospital-based cross-sectional study conducted in the OPD of a tertiary care teaching hospital; 239 children between the ages of 2 months to 2 years with fever of more than 5 days were evaluated for UTI. Those who have >5 pus cells in urine analysis, urine culture was done. Children with recurrent UTI were evaluated by abdominal ultrasonogram, MCU and DMSA scan.

#### RESULTS

Total number of children studied were 239, prevalence of urinary tract infection was 11.3%, 2-6 months of age (18.75%) and 7-12 months of age (14.14%). E. coli constituted 62.96%. Among children with recurrent urinary tract infection, pyelonephritic changes in DMSA scan were present in 4 (36.3%) and VUR was present in 2 (16%) in MCU.

#### CONCLUSIONS

Urinary tract infection is a significant problem to be looked for in febrile children 2 months to 2 years. In recurrent UTI, any underlying problems like VUR should be considered and evaluated.

#### KEYWORDS

Febrile Children, UTI, Recurrent UTI.

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#### INTRODUCTION

Urinary Tract Infection (UTI) is one of the most common serious bacterial infection in febrile infants and young children and more common than bacterial meningitis, pneumonia and occult bacteraemia.<sup>1</sup> It includes 10% of all febrile children, 13.6% of febrile infants and 7% of febrile newborns.<sup>2</sup> About 8% of girls (3% pre-pubertal) and 2% of boys (1% pre-pubertal) experience at least one episode of UTI up to the age of 7 years.<sup>3</sup> Unlike occult bacteraemia or severe bacterial illness (In infants and children) little attention has been focused on the identification of urinary tract infections 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.

UTI may lead to transient renal failure in 40% and permanent renal damage in 5% of patients.<sup>3</sup> Quite often child receives antibiotics empirically without adequate evaluation for urinary tract infection. Fever, however, may be the only symptom in children with urinary tract infections. Fever and significant bacteriuria and pyuria in children without other foci of infections must be presumed to be pyelonephritis and prompt treatment should be commenced.

Acute pyelonephritis consists of 2/3 of febrile UTIs in early childhood.<sup>1</sup> Recent studies using renal parenchyma-avid nuclear scans have revealed that more than 75% of children under 5 years of age with febrile urinary tract infection have pyelonephritis.<sup>4,5,6</sup> Pyelonephritis leads to renal scarring in 27% to 64% of children with urinary tract infections in this age group, even in the absence of underlying urinary tract abnormalities.<sup>7,8</sup> Most urinary tract infections that lead to scarring or diminished kidney growth occur in children younger than 4 years of age, especially in the first year of life.<sup>5,8</sup> It is essential to identify urinary tract infection in febrile children early and institute prompt treatment to reduce the potential for lifelong morbidity.

Optimum treatment results in symptomatic relief, prevents progressive renal damage and urosepsis with immediate bacterial eradication.<sup>9</sup> Progressive renal damage from unrecognized pyelonephritis in childhood may lead to hypertension and chronic renal failure in later life. A study from Sweden showed that focal renal scarring caused by pyelonephritis in children carried a 23% risk for hypertension, a 10% risk for end-stage renal disease and a 15% risk for toxemia during pregnancy as an adult.<sup>10</sup> Approximately, 13% to 15% of end-stage renal disease is thought to be related to urinary tract infection in childhood that was often unrecognized and therefore undertreated.<sup>11</sup> The present study is undertaken to estimate the prevalence and etiological factors of urinary tract infection among febrile children 2 months to 2 years of age.

#### METHODS OF STUDY

This is a hospital-based cross-sectional, observational study. The study was conducted among 239 children with fever for more than 5 days without localizing signs, between the ages of 2 months to 2 years attending the Paediatric OPD of

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Pariyaram Medical College Hospital during one year (From April 1, 2013 to March 31, 2014). The sample size was calculated using the formula  $4p(1-p)/d^2$  where “p” is the prevalence and “d” is the absolute precision. By taking the expected prevalence of UTI as 12.3% and absolute precision of 4.5%, sample size was estimated to be 213. A detailed proforma for collecting data related to age, sex, nutritional status, socioeconomic status (Using Kuppuswamy Socio-economic status scale) and predisposing risk factors like urethral instrumentation, bowel habits, etc. was prepared. Complete history related to the onset of fever, duration associated symptoms such as nausea, vomiting, diarrhea, urinary disturbances and other system involvement was obtained.

Thorough physical examination was done in all patients. Routine blood counts, urine analysis were done for all patients and those showing pus cells >5 per HPF in centrifuged urine sample were taken as study group and urine culture sensitivity were done. If recurrent UTI ( $\geq 2$  episodes), a thorough physical examination and USG abdomen/renal function test/DMSA/MCU was done for that patient to find out the abnormalities that predispose to recurrent infections. The details of the history, physical examination as well as laboratory findings were entered in the proforma.

**STATISTICAL ANALYSIS**

The data were entered into Microsoft Excel 2007 and were analysed using Epi Info 7 software. The results were described using frequencies and proportions. Inferential statistics like Chi square test and Fisher exact test were used in appropriate situations to test the significance of association between various etiological factors and occurrence of UTI.

**RESULTS**

Total number of children studied were 239, among them 147 children were below 1 year and 92 above 1 year, 108 were males and 131 were females; 56 children showed significant pyuria (23.4%) and among them 27 children (48.2%) showed culture positivity. The overall prevalence rate of urinary tract infection in the present study was 11.3% with maximum prevalence between 2-6 months of age (18.75%) and 7-12 months of age (14.14%). Among culture positive cases, majority (62.96) grew E. coli followed by Klebsiella (14.81%), Proteus species (11.11%), coagulase negative staphylococci (3.70%) and mixed growth in 7.41%. Urine culture was positive in 27.5% and 100% of children with pus cells 5-10/HPF and >10/HPF respectively.

Proportion of UTI is more in uncircumcised male (13.6%) compared to circumcised male (10%). Good bowel hygiene was present in 10.2% and in 18.2% it was poor. Among 239 children, 206 children were having good bladder hygiene, 33 were having poor bladder hygiene. Proportion of urinary tract infection were 10.2% and 18.2% respectively in good v/s poor bladder hygiene, i.e. higher in those with poor hygiene.

Among 239 children, pinworm infestation was present in 56 and absent in 186. Among children with pinworm infestation 12.5% were having UTI and among children without pinworm infestation 10.9% were having UTI. Proportion of UTI among children with constipation was

15.8%, which is higher compared to those who have regular bowel habits (10.9%).

Among children with recurrent urinary tract infection, features of pyelonephritis in DMSA scan (Enlarged kidneys and photopenic areas) were present in 4 (36.3%) children and grade 3 VUR (Reflux into dilated ureter) was present in 2 children (16%) in MCU and no reflux in rest 10 children (84%).

Age Groups (In Months)	2-6 months	48	20. %
	7th-12 months	99	41.42
	13th-18 months	26	10.88
	19th-24 months	66	27.62
Sex	Males	108	45.19
	Females	131	54.81
Socio-economic Status	Upper	2	0.84
	Upper middle	93	38.91
	Lower middle	125	52.30
	Upper lower	19	7.95
Previous History of UTI	No previous history	222	92.89
	Previous history of UTI	17	7.11
Congenital Anomalies	Absent	235	98.33
	Present	4 (Absent left kidney - 1 Pre-auricular sinus and tag - 3)	1.67
<b>Total</b>		239	100
<b>Table 1: Distribution of study participants across different age group, sex, socio-demographic and clinical variable</b>			

**DISCUSSION**

Urinary tract infections are common, potentially serious infections of childhood. They can cause acute morbidity as well as long-term sequelae including hypertension and impaired renal function. Accurate diagnosis of urinary tract infection is important to facilitate appropriate management and to ensure appropriate evaluation and follow up. Prevalence of UTI in febrile infants in our study, 2-6 months-9 (18.75%), 7-12 months-14 (14.14%), which is slightly higher in contrast to study conducted by R.K. Kaushal et al.<sup>12</sup> (2003) who reported higher prevalence of 8.4% and 12.3% in children <5 years and infants respectively. Prevalence of febrile UTI in infants in our study is higher compared to study by Dharni Dharaka et al.<sup>13</sup> (1993) who reported a prevalence of 5.4% in febrile infants and Hoberman et al.<sup>14</sup> (1993) who reported prevalence of 5.3% in infants. Overall prevalence of febrile UTI in children (11.3%) in our study was higher compared to report by Shaw KN et al.<sup>4</sup> (1998) from USA, who reported prevalence of 3.3% in febrile infants. This difference may be due to exclusion of children who was having other focus of infection.

Because of financial constraints urine cultures were done only in children who showed significant pyuria, which revealed positive culture in 48.2%; 100% of children who showed >10 pus cells were culture positive and 27.50% who showed >5 but <10 pus cells.

Hence, the presence of pyuria of >5 leukocytes/HPF in a centrifuged sample is a significant indicator of UTI. More number of cases were seen in uncircumcised males (13.6%) compared to circumcised males (10%), but the association was not statistically significant. Proportion of UTI in those with good bowel hygiene (No constipation, no faecal soiling, cleaning the perineum with water and wiping from front to back) was 10.2%, which is less compared to those with poor bowel hygiene (18.2%).

Proportion of urinary tract infection is higher in those with poor bladder hygiene-18.2%. But both these associations were not statistically significant. Among children with pinworm infestation, 12.5% were having UTI compared to children without pinworm infestation 10.9%; 11 children had recurrent urinary tract infection and among them 2 children (18%) showed vesicoureteric reflux. According to Chand et al.<sup>15</sup> primary VUR occurs in less than 1% of the general population and as many as 50% of children who present with recurrent UTI will have VUR. More than 75% of children under 5 years of age with febrile UTI have pyelonephritis stated by recent studies using renal parenchyma, avid nuclear scans to determine the presence of UTI.<sup>6</sup> Higher risk for renal scarring is seen in children under 3 years of age with recurrent UTI.<sup>16</sup>

#### CONCLUSION

UTI should be considered as one among the differential diagnosis of fever without localizing signs in infants and children. It is not enough to treat the child with UTI, but to look for any underlying cause like VUR or obstructive uropathy is equally important. As an initial screening test urinalysis is useful and pus cells count of >5/HPF is suggestive of UTI and a count of >10/HPF is highly suggestive of UTI and a culture of the urine is required to confirm the diagnosis. In culture positive UTI, it is always important to do an MCU/DMSA scan to look for VUR and pyelonephritic changes/renal scars, respectively. Prevalence of UTI is more common in 2-6 months and least common in 13-18 months. Prevalence of culture positivity was 100% in those who showed >10 pus cells/HPF in centrifuged sample of urine.

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