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Prevalence of Urinary Tract Infection in Pre School Febrile Children

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ABSTRACT
Urinary Tract Infection (UTI) is a common health issue in preschool children, it can lead to pyelonephritis which can be fatal. Diagnosis of UTI requires urine culture which is difficult to obtain in paediatric patients. To assess the prevalence and diagnostic parameters of urinary tract infection in preschool febrile children. This was a prospective observational study conducted in the department of paediatrics in a tertiary care hospital in western India. A total of 350 febrile children aged 2-6 years attending the OPD and emergency were enrolled. Detail history and clinical examination, urine microscopic analysis and urine culture was done. The Prevalence of UTI was 6.3%. Majority of the culture positive UTI cases (45.5%) were 3-4 years of age group, predominantly girls than boys. Mean temperature of the culture positive subjects were 99.98 degree F. 50% of UTI cases were from Socio Economic Status 3 (SES-3), followed by 41% from SES 2, according to modified Kuppuswamy scale 2020. Most of the (45.5%) UTI cases had normal nutritional status according to IAP Classification. E. coli was the most common organism isolated from urine culture. Urine culture is a gold standard test for diagnosis of UTI. Early initiation of treatment prevents most complications of UTI, so the importance of early diagnosis cannot be overemphasized.

INTRODUCTION

Urinary tract infection (UTI) defined as entry and invasion of pathogens in the urinary tract, involving renal pelvis, renal parenchyma, urethra or urinary bladder, When infection is confined to renal parenchyma or renal pelvis, it is called as upper UTI. While lower UTI is localized infection of bladder or urethra[1]. UTI is a most common bacterial infection and leading cause of febrile illness in preschool children. The reported prevalence of UTI in children were more in girls (3-7%) than boys (1-3%)[2]. UTI is the third commonest infection in children attending hospital after respiratory and gastrointestinal infections[3]. Majority of the children with fever comprises a substantial proportion of the practice in outpatient (OPD) and emergency department[4]. Despite high prevalence of UTI in paediatric population and significant morbidity associated with it, focused identification of UTI in febrile children is comparatively poor. Quite often, a child had been prescribed antibiotics without adequate evaluation for urinary tract infection[5]. There is a wide spectrum of presentation of UTI in younger age group. In preverbal age, UTI presents most commonly with vague signs and symptoms like fever, vomiting, lethargy and irritability. Poor feeding, failure to thrive, jaundice, hematuria or offensive urine are less common as presenting features. In verbal age group, the symptoms and signs become more specific like increased frequency, dysuria, abdominal pain or loin tenderness which is pertaining to urinary tract[6].

Sometimes only fever is present and it has been accepted as a clinical marker of pyelonephritis-renal parenchymal involvement[7]. Fever with significant bacteriuria and pyuria in children without obvious sources of infections must be presumed to be symptoms of pyelonephritis, an invasive infection of the renal parenchyma requiring prompt treatment[8]. Pyelonephritis leads to renal scarring in 27%-64% of children with urinary tract infections in this age group, even in the absence of underlying urinary tract abnormalities[9]. 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. Children < 3 years of age with recurrent urinary infections, putting them at higher risk for renal scarring, as many as one-third are being asymptomatic[10].

Aims and objectives: The present study is undertaken to estimate the prevalence and socio-demographic characteristics of UTI in febrile preschool children.

MATERIALS AND METHODS

This was a hospital based prospective observational study carried out in the department of paediatrics, in a tertiary care hospital, Jaipur, Rajasthan, India, over a period of 12 months from

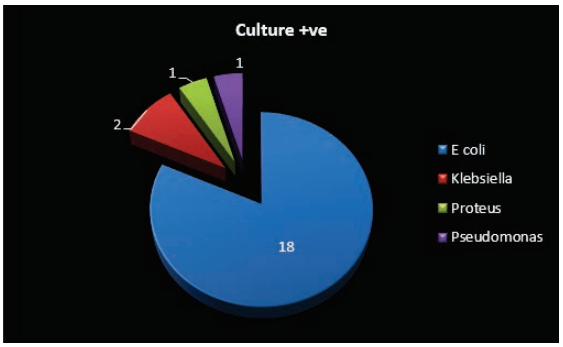

Fig 1: Prevalence of UTI in study population considering culture results is 6.3%

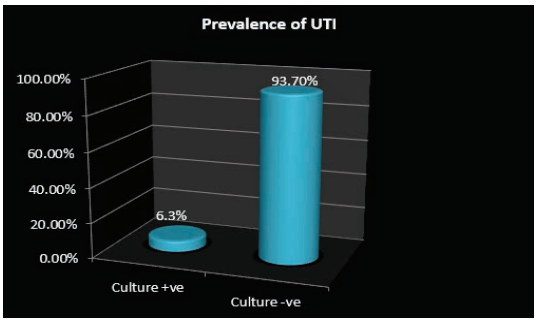

Fig 2: Distribution pattern of Organism isolated from UTI cases

August 2019 to July 2020. All preschool children suspected of urinary tract infection attending out patients department of this hospital during the study period were enrolled in this study.

Inclusion criteria:

- Febrile children between 2 to 6 years of age
- Fever (Axillary temperature = 37.2°C/ 99°F)
- Whose parent or guardian provided written informed consent for the study

Exclusion criteria:

- Children <2 or >6 years of age
- Any child who have already received antibiotic within 48 hrs
- Children with known congenital genitourinary anomalies
- Immunosuppressed children

There was no loss to follow up for the study. Institutional ethics committee approval was taken prior to starting the study. A predesigned proforma was used to collect the information. Detailed history was taken and clinical examination was done in all the cases to find out the cause of fever. Necessary investigations were carried out and relevant data were recorded.

Table 1: Comparison of culture positive and culture negative UTI cases in relation to socio-demographic variables

Socio-demographic variables		UTI (Culture positive) (N = 22)	No UTI (Culture negative) (N = 328)	p-value
Age group (yrs)	2-3 years	10 (45.5%)	78 (23.8%)	0.119 (NS)
	3-4 years	6 (27.3%)	126 (38.4%)	
	4-5 years	5 (22.7%)	69 (21%)	
	5-6 years	1 (4.5%)	55 (16.8%)	
Gender	Female	14 (63.6%)	132 (40.2%)	0.054 (NS)
	Male	8 (36.4%)	196 (59.8%)	
socioeconomic status	SES 1	0 (0%)	8 (2.4%)	0.087 (NS)
	SES 2	9 (41%)	96 (29.3%)	
	SES 3	11 (50%)	106 (32.3%)	
	SES 4	1 (4.5%)	97 (29.6%)	
	SES 5	1 (4.5%)	21 (6.4%)	
Nutritional status (IAP Grade)				
	Normal	10 (45.5%)	148 (45.1%)	0.391 (NS)
	Malnutrition grade 1	5 (22.7%)	91 (27.7%)	
	Malnutrition grade 2	3 (13.6%)	50 (15.3%)	
	Malnutrition grade 3	2 (9.1%)	32 (9.8%)	
	Malnutrition grade 4	2 (9.1%)	7 (2.1%)	

Table 3: Ultrasonography, DMSA and MCU Findings among the study participants

Parameters	Finding	No. of subjects (%)
USG	Not Required	328 (93.7)
	Normal	11 (3.2)
	Mild left Hydronephrosis	2 (0.57)
	B/L mild Hydronephrosis	3 (0.85)
	Bladder Calculi	2 (0.57)
	Thickened bladder with cystitis	1 (0.28)
	Renal cyst	1 (0.28)
	Double Collecting System	1 (0.28)
	Renal Abscess	1 (0.28)
DMSA	Not indicated	339 (96.8)
	Normal	5 (1.4)
	Scarring	4 (1.2)
	Pyelonephritis	2 (0.57)
MCU	Not indicated	339 (96.8)
	Normal	6 (17.2)
	Vesicoureteral reflux	2 (0.57)
	Pyelonephritis	2 (0.57)
	Posterior urethral valve	1 (0.28)

A freshly voided clean catch midstream urine sample was collected in an autoclaved container after perineum and genitalia with soap and water. Urine microscopic analysis and urine culture were done in all children. On culture of urine, a colony count of more than >105 mL organisms of a single species were considered significant. Urine Culture positive cases were further evaluated with USG-KUB examination. DMSA renal scan and MCU study were performed in children who had abnormal USG finding.

Statistical analysis: All statistical analysis was done using Epi info version 7.2.1.0. Categorical variables were expressed as frequency and percentage, analyzed using Chi square test Fischer, Exact test as applicable. Continuous variables were summarized as mean and standard deviation and analyzed using student t test. A $p<0.05$ was taken as statistically significant.

RESULTS

A total of 350 suspected UTI patients were enrolled and analysed in this study. Prevalence of UTI in study population was 6.3% (22/350), according to the results of urine culture positive. Majority of the culture positive UTI cases (45.5%) were 2-3 years of age group, predominantly (63.6%) females. Mean temperature of the culture positive subjects were 99.98 degree F. out of total UTI cases, half of them were from Socio Economic Status 3 (SES-3), followed by 41% from SES 2, according to modified Kuppuswamy scale 2020. 45.5% of the total UTI cases had normal nutritional status and 22.7% had grade 1 malnutrition, according to IAP Classification. Details of socio-demographic variables was shown in table: 1

Escherichia coli were the most common (81.8%) organism isolated from positive urine culture patients (Fig. 2). UTI culture positive cases were subjected to USG KUB examination, 11 were found to have normal USG finding while remaining 11 had abnormal USG. Cases with abnormal USG findings (11 out of 22) were further investigated with DMSA scan and MCU (table 3).

DISCUSSIONS

UTIs remain the commonest bacterial infection in childhood. Although urine culture remains a gold standard for diagnosis of UTI but it takes time at least 48 hrs, requires well equipped laboratory and trained staff. Whereas dipstick tests have the advantage of being rapid and easy to carry out and can be performed in small laboratories by laboratory technicians[11]. The prevalence of UTI among preschool children in present study was 6.3%, similar results were also reported by many other researchers: Brien *et al*.[12], Kumar *et al*.[13] and Singh *et al*.[14], reported prevalence of UTI was 5.9, 6 and 6.36%

respectively, whereas in contrast to our study. Rabasa *et al*.[15] and Masika *et al*.[16], reported higher prevalence of UTI 13.7 and 11.9% respectively. Lower prevalence of UTI (1.7%) was reported by Bauchner *et al*.[17]. Current study showed decreasing trends of UTI with advancing age, most common among 3-4 years of age group, our finding comparable with the Ibeneme *et al*.[18] and Alcoba *et al*.[19].

Females were predominantly affected with UTI as compared to males in the present study, in agreement with the Jack Elder *et al*.[20], Prasad *et al*.[21]. This could be due to a woman's urethra (the tube from the bladder to where the urine comes out of the body) is shorter than a man's. This makes it easier for bacteria to get into the bladder. During first year of life, UTI most commonly occur in boys than girl[22]. This variation in the results in different studies may be due to data collected from developed countries with good hygiene practices and circumcision in male children in comparison to poor hygiene and illiteracy in the developing countries.

In our study the most common isolated organism was E coil, concordance with the Page *et al*.[23], Caksen *et al*.[24] and Shetty *et al*.[25]. Other common Gram negative organisms responsible for UTI include Klebsiella, Proteus and occasionally Pseudomonas. In the present study, when culture positive cases were subjected to USG KUB examination, 50% had abnormal USG finding, they were further investigated with DMSA scan and MCU.

CONCLUSION

We have concluded that prevalence of UTI in preschool febrile children of ages between 2-6 years was 6.3% with females being more predisposed. E. coli was the most common organism isolated from the UTI cases. An untreated UTI can lead to subsequent damage and impairment of renal structure and function, it is very important to diagnose and treat UTI in preschool children.

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