A prospective evaluation of urinary tract infection among children: An institutional-based study

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ABSTRACT

Background: One of the common health problems affecting significant pediatric population is urinary tract infection (UTI). Due to the presence of non-specific signs and symptoms, it is very difficult to diagnose UTI in children. **Objective:** The objective of this study was to assess the clinical profile and risk factors of UTI among pediatric patients. **Materials and Methods:** It was a prospective study where a total of 50 children with UTI were included in the study. A self-framed questionnaire was given to all the pediatric subjects and their parents/guardians for recording the clinical profile and medical history. Various risk factors for the occurrence of UTIs were recorded and assessed. All the results were analyzed by SPSS software. **Results:** A total of 52% of the subjects were having rural residence. Hospitalization in the past 2 months was present in 10% of the patients. Constipation was a risk factor in 16% of patients. Reduced water and neglected cleaning habit were found to be a risk factor in 24% and 40% of patients. Common toilet was a risk factor in 18% of the patients. **Conclusion:** UTI represents a significant health problem among pediatric population. The use of common toilet, improper cleaning, and prolonged hospitalization is among the prominent risk factors associated with it.

Key words: *Pediatric, Risk, Urinary tract infection*

One of the common health problems affecting significant pediatric population is urinary tract infection (UTI). Due to the presence of non-specific signs and symptoms, it is very difficult to diagnose UTI in children. This is true, especially in young adults. Collection of urine followed by its interpretation is a tedious process and, hence, might not be always possible to identify the pathology. In the previously published studies, UTI was diagnosed in 7% of the pediatric subjects who were <2 years of age and 8% of the pediatric subjects <19 years of age [1-3]. UTI should be inspected in the pediatric population, mostly in infants and children <2 years of age. A thorough clinical history should be obtained along with clinical examination, especially in pediatric patients for confirming the diagnosis of UTI [4-6]. Hence, under the light of above-mentioned data, the present study was planned to assess the profile and risk factors of UTI among pediatric patients reporting to the department of pediatrics.

MATERIALS AND METHODS

The present study was conducted in the department of pediatrics of a tertiary care institute of Uttar Pradesh (India) and it included assessment of the pediatric patients reporting with UTIs. Written consent was obtained from parents/guardians after explaining in detail the entire research protocol. A total of 50 children with UTI were included in the present study. A self-framed questionnaire was given to all the pediatric subjects and their parents/guardians for recording the clinical profile and medical history of the patients. The present questionnaire was prepared for exploring the risk factors related to UTI.

For confirming its diagnosis, the standard chosen was two positive urine cultures with $>10^5$ cfu/ml. The second sample was collected 48 h after the first sample. If white blood cells were $>10/mm^3$ in uncentrifuged urine, it would be considered pyuria and more than one microorganism in 10 oil immersion fields as bacteriuria [4-6]. Various risk factors (socioeconomic status, residence, hospitalization, constipation, etc.) for the occurrence of UTIs were recorded and assessed. Patients <18 years of age and whose parents/guardians were willing to give informed consent were included in the study. Patients with a history of any other systemic illnesses and a history of any known drug allergy were excluded from the study.

All the results were analyzed by SPSS software. Chi-square test was used for the assessment of level of significance. $p<0.05$ was taken as statistically significant.

RESULTS

In the present study, a total of 50 children with UTI were enrolled. Mean age of the subjects of the present study was 12.8 years. The patients in the age group of 10–14 years were 42%, 38% belonged

to the age group of 14–18 years, and 20% of patients belonged to the age group of <10 years. In the present study, 56% of patients were male while the remaining 44% of patients were female. No significant results were obtained while comparing the age-wise and gender-wise distribution of subjects (Table 1). A total of 46% of subjects with UTI belonged to the lower class while about 52% of subjects were residing in rural areas. Hospitalization in the past 2 months was found in 10% of the patients. Constipation was found to be a risk factor in 16% of the patients. Reduced water and neglected cleaning habit were risk factor in 24% and 40% of patients. Common toilet was found to be a risk factor in 18% of the patients (Table 2).

DISCUSSION

UTIs are a common event occurring in children and are often accompanied by moderate-to-severe adverse events. The significance of UTIs is imitated not only by their incidence and prevalence but also by the spectrum of clinical severity that might be present, varying from asymptomatic to symptomatic lower UTI and further extending bacteremia and septic shock. Along with this, it is proven fact UTIs with fever in adolescents increase the chances of renal involvement and is often accompanied with an elevated risk of underlying nephrourological anomalies and consequent renal scarring [7-9].

In the present study, a total of 50 children with UTI were enrolled. Mean age of the subjects was 12.8 years. For the confirmed diagnosis of UTIs, rapid urine tests are useful tools. The nitrite test assessed the translation of dietary nitrate into nitrite by the action of Gram-negative bacteria. The presence of UTI is further assured by positive nitrite test. At the same time, there are chances of the occurrence of false-negative results. This can occur in cases where the bladder is emptied more often or if any bacterium that does not metabolize nitrate is the causative organism [10,11].

Table 1: Age-wise and gender-wise distribution of urinary tract infection subjects

Parameter	Number	Percentage	p value
Age group (years)			
<10	10	20	0.58
10–14	21	42	
14–18	19	38	
Gender			
Males	28	56	0.48
Females	22	44	

Table 2: Risk factors for urinary tract infection in children

Risk factors	Number of patients	Percentage
Socioeconomic status		
Upper class	5	10
Middle class	22	44
Lower class	23	46
Locality		
Rural	26	52
Urban	24	48
Hospitalization	5	10
Constipation	8	16
Reduced water	12	24
Neglected cleaning habit	20	40
Common toilet	9	18

No significant results were obtained while comparing the age-wise and gender-wise distribution of subjects in the present study. Leung *et al.* provided an update on the evaluation, diagnosis, and treatment of UTI in children. A PubMed search was completed in clinical queries using the key terms "UTI," "pyelonephritis," and "cystitis." The choice of antibiotics should take into consideration local data on antibiotic resistance patterns. At present, the second- or third-generation cephalosporin and amoxicillin-clavulanate are drugs of choice in the treatment of acute uncomplicated UTI [11]. In the present study, socioeconomic status, hospitalization in the past 2 months, and constipation were found to be a risk factor in significant proportion of the patient population.

UTIs among patients with diarrhea were assessed by Soleimani *et al*. They examined a total of 200 subjects. Among these 200 subjects, 100 subjects were suffering from acute gastroenteritis, while the remaining 100 were healthy age-matched controls. Non-significant correlation was observed while assessing the age-wise and gender-wise distribution. They also observed that in urine culture, 27 subjects were positive while seven subjects were healthy. From the results, they concluded that considerable percentage of UTI existed in the gastroenteritis diseases.

Early treatment of UTI in patients would reduce its complications [12]. In a previous meta-analysis conducted by Shaikh *et al.*, authors assessed the incidence of UTI among pediatric subjects. They conducted an extensive search of MEDLINE and EMBASE databases for evaluating articles about pediatric UTI. The overall incidence of UTI in their study was found to be 7%. Slightly higher prevalence was recorded in their study among subjects within the age group of 6–12 years. From the results, they concluded that significant variation in the prevalence rate of UTIs occurs among subjects divided on the basis of demographic data and circumcision status [3].

A meta-analysis in 2008 showed that uncircumcised males <3 months and females <12 months of age had the highest baseline prevalence of UTI [3]. Most male patients in this study were circumcised. However, UTI seems higher in the younger age group, even in circumcised males. Studies from the UK [13], Iran [14], and Nigeria also revealed a higher prevalence among children <2 years of age [13]. An observation from Sudan showed that 74% of affected children with UTI were <5 years and 35% were infants [15]. In Saudi Arabia, Al-Ibrahim *et al.* [16] from the central province described UTI and vesicoureteral reflux in Saudi children; wherein 71% were between the age group of 1 and 5 years, 18% were between the age group of 0 and 1 year, and 11% were more than 5 years of age. Our study had certain

limitations as the microbiological profile of the urine was not assessed in detail and there was small sample size.

CONCLUSION

UTI represents a significant health problem among pediatric population. The use of common toilet, improper cleaning, and prolonged hospitalization is among the prominent risk factors associated with it.

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