

A HOSPITAL BASED PROSPECTIVE STUDY TO ASSESS THE INCIDENCE OF URINARY TRACT INFECTION (UTI) AMONG THE CHILDREN IN TERTIARY CARE CENTER

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Abstract

Background: The present study was conducted for assessing the incidence of urinary tract infection (UTI) among the children in tertiary care center.

Materials and Methods: A total of 200 patients were enrolled in the present study. Complete demographic and clinical details of all the patients were obtained. The study was conducted on subjects of less than 15 years of age who reported with different spectrum of pathologies. Urine samples were obtained from all the subjects and were sent for urine culture. Subjects with leukocyturia ≥ 10 white blood cells per high power field (WBC/hpf) were considered as suffering from UTI. Patients with positive urine cultures and diagnosed with symptomatic UTIs were analyzed. Patients were analyzed by their clinical status and laboratory test results. The etiologies of UTIs in children were analyzed depending on the gender, age, type of UTI (acute pyelonephritis (APN) Vs cystitis (CYS)). **Result:** The incidence of UTI was observed to be 26 percent. Among these 52 subjects, 31 were boys while the remaining 21 were girls. Mean age of the subjects with UTI was 6.2 years. APN comprised of 32 cases of UTI while CYS comprised of 20 cases of UTI. Mean WBC count among subjects with UTI was 17.9×10^3 /microliter. **Conclusion:** We concluded that all medical personnels must be aware that the possibility of febrile children may have urinary tract infection and should consider obtaining a urine culture specimen as part of their diagnostic evaluation.

INTRODUCTION

Urinary Tract Infection (UTI) is one of the most common bacterial infections in childhood. The infection may affect the upper urinary tract (referred to as pyelonephritis) or the lower urinary tract (referred to as cystitis). Unfortunately, it may be difficult, if not impossible, to distinguish pyelonephritis from cystitis based on clinical symptoms and signs, especially in infants and young children. From a practical point of view, these two conditions are discussed together under the umbrella of UTI.^[1,2]

Childhood UTI has been associated with renal scarring and serious long-term complications, including hypertension, pre-eclampsia, and renal failure. A systematic review found renal scarring was present in approximately 15% of children following a first UTI. It remains unclear exactly what causes renal scarring to develop in some children, or which

groups of children are most at risk. There is some evidence that even children without fever or those with a self-limiting UTI may nevertheless be at risk of renal scarring.^[3-5]

Most paediatric UTIs are caused by Gram negative coliform bacteria arising from faecal flora colonising the perineum, which enter and ascend the urinary tract. Escherichia coli (E.coli) is the most common uropathogen, responsible for approximately 80% of paediatric UTIs. Uropathogenic E.coli strains possess specific properties, such as fimbriae to attach to the uroepithelial cell surface, to allow them to overcome host defenses. Other common uropathogens include Klebsiella, Proteus, Enterobacter and Enterococcus species.^[6-8] Hence; the present study was conducted for assessing the incidence of urinary tract infection (UTI) among the children in tertiary care center.

MATERIALS AND METHODS

The present study was conducted in the Department of Microbiology and Department of Pediatrics, NSCB Medical College, Jabalpur, M.P for assessing the incidence of urinary tract infection (UTI) among the children. A total of 200 patients were enrolled in the present study. Complete demographic and clinical details of all the patients was obtained. The study was conducted on subjects of less than 15 years of age who reported with different spectrum of pathologies.

Inclusion Criteria

1. Febrile children from 2 month to 15 years.
2. Fever (auxiliary temperature $\geq 37.8^{\circ}\text{C}$)

Exclusion Criteria

1. Children below 2 months and above 15 years.
2. Any child who has received antibiotics 48 hours prior were not be included in the study.
3. Children with known congenital genitourinary anomalies.

Methods: 200 children who were considered in our study and all information regarding their age, sex, socioeconomic class and various predisposing factors like instrumentation of the urethra, voiding difficulties were collected. A complete history related to the onset, duration of fever and associated symptoms such as nausea, vomiting, diarrhea, urinary disturbances, and other system involvement was obtained.

Collection of Urine sample: In children less than 2 years of age urine was collected by a bag collection method and in children above 2 yrs clean midstream sample was collected. Urine samples were obtained from all the subjects and were sent for urine culture. The urine was then examined under microscope for Hematuria, and Leukocyturia.

Subjects with leukocyturia ≥ 10 white blood cells per high power field (WBC/hpf) were considered as suffering from UTI. Patients with positive urine cultures and diagnosed with symptomatic UTIs were

analyzed. Patients were analyzed by their clinical status and laboratory test results. The etiologies of UTIs in children were analyzed depending on the gender, age, type of UTI (acute pyelonephritis (APN) Vs cystitis (CYS)).

A renal ultrasound examination is advised in all young children with first febrile UTI and in older children with recurrent UTI. UTI in children with abnormal renal and bladder ultrasound examination or a UTI caused by atypical pathogen, complex clinical course, or known renal scarring.

All the results were recorded in Microsoft excel sheet followed by statistical analysis using SPSS software. $P < 0.05$ was taken as the significance level in the analyses performed.

RESULTS

The study population had 200 subjects in the age group of 2 months- 15years. The mean age group of the total population was 6 years 7 months. Among the 200 children included in our study majority of the children were in the age group of 5-10 years (46%) [Table 1].

A total of 200 pediatric subjects were enrolled. Out of these 200 subjects, UTI was present in 52 subjects. Hence; the incidence of UTI was observed to be 26 percent [Table 2]. The most common organism isolated was Escherichia coli (n=42, 80.7%) followed by Klebsiella pneumoniae (n=7,13.5%), Pseudomonas aeruginosa (n=2,3.8%) & Enterococcus Species (n=1, 1.9%). Among these 52 subjects, 31 were boys while the remaining 21 were girls. Mean age of the subjects with UTI was 6.2 years. APN comprised of 32 cases of UTI while CYS comprised of 20 cases of UTI. Mean WBC count among subjects with UTI was 17.9×10^3 /microliter. Mean C-reactive protein levels among subjects with UTI was 3.93 mg/dL [Table 3].

Table 1: Distribution of patients according to age groups

Age Group (years)	Number of patients	Percentage
<1-5 years	80	40%
5-10 years	92	46%
>10- <15 years	28	14%
Total	200	100%

Table 2: Incidence of UTI

UTI	Number	Percentage
Present	52	26%
Absent	148	74%
Total	200	100%

Table 3: Variables of patients with UTI

Variable	Number
Mean age (years)	6.2 years
Gender	31 boys and 21 girls
Type	APN: 32 subjects CYS: 20 subjects
Socioeconomic status	Lower- 33, Middle- 19
Mean WBC count	17.9×10^3 /microliter
Mean C Reactive proteins	3.93 mg/dL

DISCUSSION

Urinary tract infection (UTI) remains one of the most common causes of febrile illness in pediatric practice. In developing countries, it ranks next to gastrointestinal and respiratory tract infections as the third most common bacterial infection in children. A number of host factors predispose children to UTI; these include obstructive uropathy, urolithiasis, incomplete emptying of the bladder with residual urine, non-circumcision in boys, female sex after infancy, and constipation. Nevertheless, there are some host defense mechanisms, namely, the intrinsic defense of the bladder epithelial cells, secretory immunoglobulin A (IgA) in urine, and blood group antigens in secretions, which block bacterial adhesion to the lining of the urinary tract. UTI is more common in malnourished children than in their well-nourished counterparts, and the risk of UTI increases with the severity of malnutrition.^[7-9] Hence; the present study was conducted for assessing the incidence of urinary tract infection (UTI) among the children in tertiary care center.

A total of 200 pediatric subjects were enrolled. Out of these 200 subjects, UTI was present in 52 subjects. Hence; the incidence of UTI was observed to be 26 percent. Among these 52 subjects, 31 were boys while the remaining 21 were girls. Mean age of the subjects with UTI was 6.2 years. APN comprised 32 cases of UTI while CYS comprised of 20 cases of UTI based on renal ultrasonography.

Age wise distribution of UTI shows that the most common age group presenting with UTI was 5-10 years (46%) and the least affected was older age group (>10 years). Also, another study done by Nair and Rai et al, showed infant age group were the least affected by UTI and children above 2 years had a higher percentage of UTI.^[9] In contrast to our study, a study done by Mathivanan et al, showed that there is a higher UTI incidence in the infant age group and least in the 2-3 years age group.^[10]

Nader Shaikh et al conducted a meta-analysis to determine the pooled prevalence of urinary tract infection (UTI) in children by age, gender, race, and circumcision status. MEDLINE and EMBASE databases were searched for articles about pediatric urinary tract infection. Search terms included urinary tract infection, cystitis, pyelonephritis, prevalence and incidence. Among infants presenting with fever, the overall prevalence of UTI was 7.0%. The pooled prevalence rates of febrile UTIs in females aged 0–3 months, 3–6 months, 6–12 months, and 12 months was 7.5%, 5.7%, 8.3%, and 2.1% respectively. Among febrile male infants less than 3 months of age, 2.4% of circumcised males and 20.1% of uncircumcised males had a UTI. For the 4 studies that reported UTI prevalence by race, UTI rates were higher among white infants 8.0% than among black infants 4.7%. Among older children (19 years) with urinary symptoms, the pooled prevalence of UTI (both febrile and afebrile) was 7.8%. Prevalence rates

of UTI varied by age, gender, race, and circumcision status.^[11]

Mean WBC count among subjects with UTI was 17.9×10^3 /microliter. Mean C-reactive protein levels among subjects with UTI was 3.93 mg/dL. Samuel N. Uwaezuoke et al conducted a systematic review and meta-analysis to provide estimates of pooled prevalence of UTI among these children and combined UTI risk in comparison with their well-nourished counterparts. They systematically searched electronic databases for studies reporting either the prevalence of UTI in malnourished children or parallel healthy controls. Eligible primary studies were observational studies of children in English Language reporting UTI prevalence with background malnutrition or with enough data to compute these estimates, as well as studies which reported at the same time UTI prevalence in healthy controls. They included 26 cross-sectional and 8 case-control studies reporting on UTI prevalence in malnourished children, and in malnourished children vs. healthy controls, respectively. The pooled prevalence of UTI in 3294 malnourished children was 17%. Heterogeneity was high as studies varied in their sample size, degree of malnutrition, and study period. Multivariate meta-regression model, including these factors, explained 34.6% of the between-study variance. Pooled OR of UTI in association with malnutrition in 2051 children was 2.34, with lower between-study heterogeneity.^[12]

CONCLUSION

We concluded that all medical personnels must be aware that the possibility of febrile children may have urinary tract infection and should consider obtaining a urine culture specimen as part of their diagnostic evaluation.

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