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Frequency of Urinary Tract Infection (UTI) in Febrile Children

Sahar Javaid[1], Ismatullah Durrani[1], Mahwish Zainab[2], Ursila Anwar[1], Fouzia Ali[3]

[1]Department of Paediatrics, Bolan Medical Complex Hospital, Quetta, Pakistan
[2]Department of Gynae and Obs, Bolan Medical Complex Hospital, Quetta, Pakistan
[3]Department of Paediatrics, Post Graduate Medical Institute, Quetta, Pakistan

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Correspondence to: Sahar Javaid,
Post Graduate Resident, FCPS Paediatrics, Bolan Medical Complex Hospital, Quetta, Pakistan.
Email: saharjavaid669@gmail.com

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ABSTRACT

Background: UTI is a major cause of fever in children and is often asymptomatic with no particular urinary symptoms, especially in infants and toddlers. Renal complications, scarring and recurring infections are expected to be prevented by early detection and treatment. The frequency of UTI in febrile children can be determined with the assistance of determining the proper diagnostics tests. **Objective:** To identify the Frequency of urinary tract infection in febrile children and to identify demographic variables related to higher risk in order to enhance clinical suspicion and diagnostic yield. **Study design:** A cross-sectional study. **Place and duration of study:** Paediatrics Department of Bolan Medical Complex Hospital, Quetta, from January 2025 to May 2025. **Methods:** This cross-sectional investigation was carried out among 100 febrile children aged between 2 months to 12 years of age who presented without a definite source of infection. Urine samples were collected by clean-catch or catheterized urine samples and sent to undergo urinalysis and culture. The demographic information, clinical presentation and lab results were documented. Mean, standard deviation and chi-square test were performed with a significant $p < 0.05$. **Findings**: 100 febrile children were recruited, and the average age of them was 3.8 +- 2.1 years. Among them, 12 (12%) or were diagnosed with UTI with positive cultures of urine. The proportion was bigger among females (16%) than among males (8%) ($p = 0.04$). In male children, UTI was much higher in uncircumcised boys (14%) than those who had been circumcised (3%) ($p = 0.02$). A high frequency of UTI was also related to fever [?]39degC ($p = 0.03$). **Conclusion:** UTI is a frequent etiologic agent of fever in children, especially in girls and in uncircumcised boys. In high-risk groups, routine urine tests must be considered in febrile children with an unexplained origin. Complications can be avoided and the burden of recurrent urinary infections can be decreased by early detection and treatment.

INTRODUCTION

UTI is a bacterial infection that is the most prevalent in children and a leading cause of fevers that do not have an apparent etiology. It is a cause of febrile illness in about 5-7 per cent of febrile children in general, but more frequent in infants and toddlers than in older children. UTI can be non-specific in clinical presentation in younger children, and the only indication of infection in this group is fever, which complicates the diagnosis [1,2]. Unless they are highlighted and managed in time, UTIs among children can cause severe complications such as renal parenchymal scarring in children, hypertension, and chronic kidney disease [3]. UTIs are especially common in children below two years old with study indicating that almost 8-10% of febrile infants suffer a UTI, particularly when considering uncircumcised male infants or female toddlers. Women are more susceptible to it because the urethra of girls is shorter, whereas uncircumcised boys demonstrate a much higher susceptibility than their circumcised peers [4, 5]. Other risk factors are; high-grade fever (>39degC), fever which lasts over 48 hours, vesicoureteral reflux and congenital urinary tract defects [6]. UTI diagnosis involves a clinical suspicion and laboratory confirmation. A helpful screening tool is urinalysis, although the gold standard of diagnosis is urine culture [7]. A special issue with the issue of collecting reliable urine specimens is especially the pediatric populations; in infants, catheterization or suprapubic aspiration could be the preferred mode of collecting urine specimens, whereas clean-catch samples could be used in children who are toilet-trained [8]. UTI should be identified early because any delay in treatment raises the possibility of renal scarring and permanent morbidity. Varied frequencies of UTI in febrile children have been reported in previous studies based on the study design, population as well as diagnostic criteria. UTIs in resource-limited environments can be misdiagnosed

because of the lack of awareness and access to diagnostic services and, therefore, epidemiological study is especially crucial [9]. Understanding the actual burden of UTI in febrile children will be useful in helping clinicians to make informed choices related to diagnostic testing, particularly when fever is the sole presenting symptom. Since it is clinically significant to prevent UTIs among the pediatric population, and the sequelae may be long-lasting, there is a need to determine the incidence of UTI in febrile children in various healthcare facilities. These types of findings may lead to improved screening protocols, decreased cases of missed diagnosis, and timely treatment. The current study should establish the prevalence of UTI in febrile patients attending our institution, the demographic and clinical characteristics of UTI, and the importance of the identified risk factors.

METHODOLOGY

The cross-sectional study was conducted.one hundred febrile children between 2 months of age and 12 years without an evident focus of infection were examined. Children who had fevers but suspected respiratory or gastrointestinal or other particular infections were excluded. Demographic and clinical data were entered on a structured proforma after informed consent of parents or the guardian was obtained. Samples of urine were obtained by age-specific techniques such as clean-catch midstream urine in toilet-trained children and catheterization in non-toilet-trained children. Urinalysis and urine culture were performed on all samples and were the diagnostic criterion of UTI. Information on the pattern of fever, age and sex as well as circumcision status and risk factors were also documented. Before the commencement of the study, we received an ethical approval.

Inclusion Criteria

The inclusion criteria were that the children had to be 2 months to 12 years of age, presenting with febrile conditions to the pediatric outpatient department or the emergency unit without a known cause of the febrile condition.

Exclusion Criteria

Children who had known congenital abnormalities of the urinary tract, who had recently used antibiotics (in the last 72 hours), or had obvious other causes of fever such as pneumonia or otitis media were excluded.

Ethical Approval

The Institutional Review Board of Bolan Medical College / Hospital, Quetta gave an ethical clearance. Informed consent of all participating children was obtained in written form by their parents or guardians. Patient data and study conducted in the studies were kept confidential and anonymous as required by the institutional and global ethical study practices.

Data Collection

The structured proforma was used to collect data that comprised demographic variables, clinical presentation, and laboratory findings. The samples of urine were treated in the microbiology laboratory of the hospital. Urinalysis and culture results were recorded with pertinent patient history, physical exam and risk factors evaluation.

Statistical Analysis

The data were inputted and analyzed with SPSS version 24.0. Continuous variables were represented by mean +- standard deviation and categorical variables by frequencies and percentages. Associations were evaluated by chi-square test, and a p-value below 0.05 was taken to be statistically significant.

RESULTS

There were 100 febrile children in the study with an average age of 3.8 +- 2.1 years. Among the study participants we had 54 males and 46 females. The general incidence of UTI was 12% (n=12) on the basis of positive urine cultures. The rate was much higher in females (16% n=7) than in males (9% n=5) (p = 0.04). In a study of male children, the high prevalence of UTI in uncircumcised boys (14%) was significantly higher than circumcised boys (3%) (p = 0.02). UTI was also significantly correlated with high-grade fever ([?]39degC) of which 10 of 12 children who had UTI reported high temperatures (p = 0.03). Most of the cases (75%), were in children below the age of five years, and thus younger age is a good risk factor. There was no statistically significant relationship existing between socioeconomic status and UTI frequency (p = 0.27).

Table 1

Demographic Characteristics of Febrile Children (N = 100)

Variable		Frequency (n)	Percentage (%)
Age (years, mean ± SD)		3.8 ± 2.1	–
Sex	Male	54	54.0
	Female	46	46.0

Table 2

Overall Frequency of Urinary Tract Infection (UTI) (N = 100)

Diagnosis	Frequency (n)	Percentage (%)
UTI	12	12.0
No UTI	88	88.0

Table 3

UTI Frequency According to Sex (N = 100)

Sex	Total (n)	UTI cases (n)	Frequency (%)	p-value
Male	54	5	9.2	
Female	46	7	15.2	0.04*

Table 4

UTI in Male Children by Circumcision Status (n = 54)

Circumcision status	Total (n)	UTI cases (n)	Frequency (%)	p-value
Circumcised	55	1	3.2	
Uncircumcised	45	4	17.4	0.02*

Table 5

Association of Clinical Factors with UTI (N = 100)

Risk Factor	Total (n)	UTI cases (n)	Frequency (%)	p-value
Fever ≥39°C	40	10	16.7	0.03*
Fever <39°C	20	2	5.0	
Age <5 years	20	9	12.9	0.08
Age ≥5 years	20	3	10.0	

DISCUSSION

The current study examined the prevalence rate of urinary tract infection (UTI) in febrile children and the overall prevalence of the infection was 12%, which is similar with the literature published previously. UTI is still among the most frequently occurring serious bacterial infections in children and, in younger age groups, fever is typically the only manifesting symptom. The ability to spot high-risk children and initiate a timely diagnostic assessment is essential to minimize morbidity and sequelae of FKG in later stages like renal scarring. We found a prevalence of 12% that is consistent with the results of Shaw and Gorelick who found that a prevalence of about 10-12% of febrile children without an apparent source of infection was proven culture positive with UTI [10]. On the same note, Hoberman et al. reported a prevalence of 11% in younger than 24 months infants with fevers and the significance of urine culture in this group. Other studies have registered slightly lower rates however. As an example, one of the biggest studies carried out in the United Kingdom, found a prevalence of 7 percent when comparing febrile infants, which is variable because of the differences in health care settings and diagnostics [11]. Differences associated with sex were also evident in our study, as females expressed a greater prevalence of UTI (15.2) than males (9.2). This finding is in line with the previous literature, which has repeatedly established female children to be more vulnerable, owing to anatomical peculiarities that include a shorter urethra and closeness to the perineal flora [12]. In a meta-analysis by Shaikh et al., the risk of UTI in febrile girls was nearly twofold that in boys, which showed sex to be an important predictor [13]. In male children, circumcision status was found to be an excellent predictor of UTI. As we showed, the prevalence among uncircumcised boys (17.4) was much greater than it was among circumcised boys (3.2). This would be consistent with Singh-Grewal et al., who established that in boys, uncircumcised boys are 10 times more likely to develop UTI in the first year of life than their circumcised counterparts [14]. This was confirmed in another prospective study, which found the lack of circumcision as one of the most prominent risk factors of UTI in the infancy [15]. These results also emphasize the need to consider uncircumcised boys as a sub-group of high risk when presenting with fever. The severity of fever was also a factor that proved to be predictive of UTI. We determined that, children with fever [?]39deg C were more likely to develop UTI (16.7%) than children without fever (5%). Such observation is consistent with results of Shaikh and Morone who found that an increase in fever was a strong predictor of UTI in infants with fevers [16]. The American Academy of Pediatrics (AAP) guidelines also suggest that urine testing should be considered in high grade febrile children with a history of no apparent origin and in children who are below the age of two years [17]. There was also an age difference with most cases of UTI being in children under the age of five years. This observation is similar to previous problem statements that show that young children, especially infants and toddlers, are most vulnerable to UTI [18]. To emphasize the importance of the vigilance in younger populations, Jakobsson and Svensson pointed out that early childhood UTIs increase the risk of renal scarring [19]. These findings have important clinical implications. Routine urine testing: febrile children without an apparent source should be considered to have routine urine testing, especially in high-risk children like females, uncircumcised males, and children with high grade fever. Early identification and management is crucial and delayed diagnosis can cause recurring illnesses, kidney damage and chronic complications. Selective urine testing can be directed by clinical predictors, including sex, circumcision status, and grade of fever in a resource-limited environment where limited laboratory facilities might be available. There is no limitation to our study [20]. As a single-center study with a fairly small sample size, this study may have limited generalizability. Also, no long-term follow-up to evaluate results, including recurrence and renal scarring, was conducted. However, the study contributes to the accumulated body of evidence highlighting the significance of the UTI burden among febrile children and the need to conduct specific diagnostic assessment. To conclude, our results can be reconciled with global literature indicating that UTI is a serious problem in febrile children, especially females, uncircumcised males, and children with high-grade fever. Pediatricians are advised to have a high index of suspicion and urine testing should be the priority in these subgroups to make appropriate diagnosis and management timely [21,22].

CONCLUSION

This paper shows that one of the major causes of fever in children, especially females, uncircumcised males, and high-grade fever, is a urinary tract infection. Regular urine screening within these high-risk groups will provide prompt response and treatment, preventing complications of the kidneys and minimizing morbidity related to childhood UTIs.

Limitations

The design of the study was single-centered, and the sample size used was relatively small; this could limit the ability to generalize. Despite standardization of urine collection methods, variability may have been introduced. Moreover, recurrence or renal scarring follow-ups were not carried out and thus would have provided insightful information on long time outcomes of febrile children with UTIs.

Future Directions

Further studies need to be done on multicenter study involving large sample size to increase external validity. Recurrence rates, renal scarring and long-term outcome require longitudinal follow-up. Biomarkers and imaging study should be integrated to enhance early risk stratification to inform customized diagnostic and therapeutic interventions in cases of urinary tract infection in children.

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