The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 3, 2025

PREVALENCE OF URINARY TRACT INFECTION IN CHILDREN PRESENTING WITH DIARRHEA

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DOI: https://doi.org/10.5281/zenodo.15016342

Keywords
Urinary tract infection, diarrhea, pediatric population, *Escherichia coli*, prevalence, clinical presentation, children, Lahore.

Article History
Received on 05 February 2025
Accepted on 05 March 2025
Published on 13 March 2025

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Abstract

Background: *Urinary tract infections (UTIs) are common in children and can lead to significant morbidity, particularly if not diagnosed and treated promptly. Diarrhea, a frequent pediatric condition, may complicate the clinical presentation of UTIs.* ***Objective:*** *This study aimed to investigate the prevalence of UTIs in children presenting with diarrhea at The Children's Hospital and UCHS, Lahore.* ***Methods:*** *A cross-sectional study was conducted on 86 children aged 6 months to 12 years who presented with diarrhea at the Emergency Department of The Children's Hospital and UCHS, Lahore. Data were collected through non-probability consecutive sampling. A clean-catch midstream urine sample was collected from each child and sent for culture analysis.* ***Results:*** *Of the 86 children, 30.2% tested positive for a UTI. The highest prevalence was observed in children under 5 years of age (37.5%), and moderate diarrhea was associated with the highest UTI prevalence (40%). The most common pathogen identified was* Escherichia coli *(61.5%), followed by* Klebsiella pneumoniae *(19.2%) and* Proteus mirabilis *(11.5%). Gender did not show a significant association with UTI prevalence, but age and diarrhea severity were significant factors.* ***Conclusion:*** *It is concluded that UTIs are prevalent in children with diarrhea, particularly in younger children and those with moderate to severe diarrhea. Clinicians should maintain a high index of suspicion for UTIs in such patients to ensure timely diagnosis and treatment, thereby preventing potential complications such as kidney damage.*

INTRODUCTION

Urinary tract infections (UTIs) are one of the most common bacterial infections in children, often leading to significant morbidity if not diagnosed and treated promptly. The clinical presentation of UTIs in children can vary widely, with symptoms ranging from fever and irritability to more severe manifestations such as sepsis [1]. Diarrhea, a frequent gastrointestinal issue in pediatric populations, has been shown to sometimes complicate the clinical course of children with UTIs [2]. While gastrointestinal illnesses are commonly the primary concern in such cases, it is crucial to consider the possibility of an underlying urinary tract infection, especially when symptoms such as fever

persist or when the child exhibits signs of dehydration or malaise [3]. Urinary tract infection (UTI) is a frequent cause of bacterial infection in infants and children presenting with diarrhea. It is the most common cause of febrile illness in pediatrics and the third most frequent bacterial illness among children in developing nations [4]. Risk factors for UTI in children include obstructive uropathy, urolithiasis, residual urine, non-circumcision in males, and constipation. Boys are more vulnerable to UTIs than girls early in childhood, with an incidence of 20% in uncircumcised males and 5% in girls. Girls are more likely to be affected later in life, with an 8.1% incidence between the ages of 2 and 4 years [5]. However, symptomatic UTIs are more frequent in females after the first year. Parenteral diarrhea, which originates outside the gastrointestinal system, can also cause diarrhea along with meningitis, otitis media, and UTIs [6].

A study conducted by Akbar et al. found that out of 120 children presenting with diarrhea, 40 (33.33%) had UTIs. The most common organism found in the urine culture was *E. coli*, present in 28 (70%) patients. *K. pneumoniae* was found in 12 (30%) patients. Another study by Singraiah et al. reported that 17% of children presenting with diarrhea also had UTIs. The most common organism isolated in the urine culture was *E. coli*, which was found in 15 cases. *Enterococcus* was also found in some cases [7]. These findings highlight the significant prevalence of UTI in children presenting with diarrhea and the importance of considering UTI as a potential cause of diarrhea in young children. The commonest organism found in both studies was *E. coli*, which is a leading cause of UTIs in children [8]. The objective of this study is to assess the prevalence of UTI in children presenting with diarrhea. The results of this study will have important implications for clinical practice, as early evaluation and treatment of UTIs are crucial in preventing renal parenchymal damage and scarring. The findings of this study can be utilized by healthcare providers to improve the diagnosis and treatment of UTIs in young children presenting with diarrhea.

Objective

To determine the prevalence of urinary tract infection (UTI) in children presenting with diarrhea.

Methodology

This Cross-sectional study was conducted at Children presenting to the emergency department of The Children's Hospital and UCHS, Lahore during October 2024 to December 2024. Data were collected through Non-probability consecutive sampling technique.

Sample Size:

A sample size of 86 has been calculated using the WHO sample size calculator, assuming a 33.33% expected prevalence of UTIs in children with diarrhea, a 95% confidence interval, and a 10% margin of error.

Inclusion Criteria:

- Children aged 6 months to 12 years
- Both genders
- Admitted to the ward with diarrhea (mild to severe)

Exclusion Criteria:

- Children with congenital anomalies of the genitourinary tract and spine
- Children who have received antibiotics within 48 hours before admission

Data Collection:

The study was initiated after obtaining approval from the institutional review board (IRB) of the hospital. Informed written consent was obtained from the parents or legal guardians of all participating children. Basic demographic information, including the child's name, age, gender, the duration of the illness, and the severity of diarrhea (mild, moderate, or severe), was recorded. A clean-catch midstream urine sample was collected from each child to avoid contamination and ensure accurate urine culture results. The urine samples were then sent to the laboratory for culture analysis to identify the presence of any causative organisms. The laboratory team analyzed the samples to detect the presence of common pathogens responsible for UTIs.

Statistical analysis

The data collected were entered into a computer-based database and analyzed using SPSS (Statistical Package for Social Sciences) version 26.0. Descriptive statistics were used to summarize the data, with numerical variables, such as age and disease duration, presented using mean and standard deviation. Categorical variables, such as gender, severity of diarrhea, culture positivity, and the presence of causative organisms, were presented as frequencies and percentages. The data were stratified based on gender and disease duration to examine any potential associations between these variables and UTI culture positivity. To assess the relationship between gender, severity of diarrhea, and culture positivity, a chi-square test was applied. The significance level for all statistical tests was set at a p-value of < 0.05.

Results

Data were collected from 86 patients, with a mean age of 4.8 ± 3.1 years, with 55.8% being male and 44.2% female. The severity of diarrhea was classified as mild (32.6%), moderate (46.5%), and severe (20.9%). The mean disease duration was 3.6 ± 2.4 days.

Table 1: Demographic and Baseline Characteristics of Study Participants

Characteristic	Value
Age (years)	4.8 ± 3.1
Gender	
- Male	48 (55.8%)
- Female	38 (44.2%)
Severity of Diarrhea	
- Mild	28 (32.6%)
- Moderate	40 (46.5%)
- Severe	18 (20.9%)
Disease Duration (days)	Mean: 3.6 ± 2.4
Pathogens	
Escherichia coli	61.5
Klebsiella pneumoniae	19.2
Proteus mirabilis	11.5
No Growth	7.7

Among children with mild diarrhea, 14.3% tested positive for a UTI, while 40.0% of children with moderate diarrhea and 33.3% with severe diarrhea had a positive urine culture. Regarding gender, 29.2% of male children and 31.6% of female children tested positive for UTIs, indicating no significant difference between genders.

Table 2: Severity of Diarrhea and UTI Prevalence

Severity of Diarrhea	Total Children (n)	UTI Positive (n)	UTI Prevalence (%)
Mild	28	4	14.3
Moderate	40	16	40.0
Severe	18	6	33.3
Gender			
Male	48	14	29.2
Female	38	12	31.6

Children aged 6 months to 2 years had the highest UTI prevalence at 41.7%, followed by those in the 3 to 5 years and 6 to 8 years groups, both with a

prevalence of 33.3%. The lowest UTI prevalence was observed in the 9 to 12 years age group at 10.0%.

Table 3: Age Group and UTI Prevalence

Age Group	Total Children (n)	UTI Positive (n)	UTI Prevalence (%)
6 months - 2 years	24	10	41.7
3 - 5 years	24	8	33.3
6 - 8 years	18	6	33.3
9 - 12 years	20	2	10.0

Among children with mild diarrhea, 14.3% tested positive for a UTI, while the prevalence increased to 40.0% in those with moderate diarrhea and 33.3% in those with severe diarrhea. The p-value for the association between severity of diarrhea and UTI prevalence was 0.04, indicating a statistically significant relationship.

Table 4: Association Between Severity of Diarrhea and UTI Prevalence

Severity of Diarrhea	UTI Positive (n)	UTI Prevalence (%)	p-value
Mild	4	14.3	0.04
Moderate	16	40.0	
Severe	6	33.3	

Discussion

This study aimed to investigate the prevalence of urinary tract infections (UTIs) among children presenting with diarrhea at The Children's Hospital and UCHS, Lahore. Our findings indicated that 30.2% of children with diarrhea had a UTI, which highlights the significant overlap between these two common pediatric conditions. The study also explored the relationship between various demographic factors such as age, gender, and diarrhea severity with the prevalence of UTIs. One of the most notable findings was the higher prevalence of UTIs in children under the age of 5 years (37.5%), compared to those older than 5 years (21.1%) [8]. This is consistent with existing literature, which suggests that younger children, particularly those under the age of 2, are more susceptible to UTIs due to anatomical and physiological factors such as shorter urethras, immature immune systems, and a higher incidence of vesicoureteral reflux (VUR) [9]. The fact that younger children were more likely to experience a UTI emphasizes the need for heightened clinical suspicion in this age group, particularly when they present with fever and gastrointestinal symptoms like diarrhea. The severity of diarrhea was also a significant factor in the prevalence of UTIs [10]. Children with moderate diarrhea exhibited the highest UTI prevalence at 40%, followed by those with severe diarrhea (33.3%) and mild diarrhea (14.3%). This finding supports the hypothesis that diarrhea may increase the risk of UTIs by facilitating urinary stasis and dehydration, which in turn predisposes the urinary tract to bacterial colonization. Moreover, dehydration can lead to a more concentrated urine, which allows bacteria to proliferate more easily [11]. The association between diarrhea severity and UTI prevalence warrants further investigation to understand the underlying mechanisms more clearly. Interestingly, the gender distribution in our study showed no significant difference in UTI prevalence between males and females, with 29.2% of males and 31.6% of females testing positive for a UTI [12]. This result differs from some previous studies, which have reported a higher incidence of UTIs in females due to anatomical differences such as a shorter urethra [13]. However, the lack of a gender-based difference in our study may be attributed to factors such as the relatively small sample size or the specific population under study [14]. Nonetheless, the findings suggest

that clinicians should maintain a high index of suspicion for UTIs in both male and female children presenting with diarrhea. While this study provides valuable insights into the prevalence of UTIs in children with diarrhea, there are some limitations to consider. First, the study employed a non-probability consecutive sampling technique, which may limit the generalizability of the results [15]. Additionally, the cross-sectional design of the study prevents us from making causal inferences about the relationship between diarrhea and UTIs. Further longitudinal studies with larger sample sizes would be needed to better understand the causal mechanisms behind the co-occurrence of these conditions.

Conclusion

It is concluded that urinary tract infections (UTIs) are a significant concern in children presenting with diarrhea, with a prevalence of 30.2% in this study. The findings emphasize the higher susceptibility of younger children (under 5 years) and those with moderate to severe diarrhea to develop UTIs. The most common pathogen identified was *Escherichia coli*, followed by *Klebsiella pneumoniae* and *Proteus mirabilis*. This study underscores the importance of considering UTIs in the differential diagnosis when children present with diarrhea, particularly in the presence of fever or dehydration.

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