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FREQUENCY OF URINARY TRACT INFECTION AMONG CHILDREN PRESENTING WITH ACUTE GASTROENTERITIS

Original Research

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ABSTRACT

Background: Urinary tract infection (UTI) is the second most common bacterial infection in children and often presents with non-specific symptoms. Acute gastroenteritis (AGE), one of the most frequent causes of pediatric emergency visits, may mask underlying UTIs due to overlapping clinical features, especially in young children. Early detection is critical to prevent renal complications.

Objective: To determine the frequency of urinary tract infection among children presenting with acute gastroenteritis.

Methods: A cross-sectional study was conducted in the Department of Pediatrics, NWGH&RC, over six months. A total of 101 children aged 6 months to 10 years presenting with AGE were enrolled using non-probability consecutive sampling. Midstream urine samples were collected and analyzed through microscopy and culture to diagnose UTI. Data were entered and analyzed using SPSS version 20. Frequencies, means, and post-stratification chi-square tests were applied to determine associations.

Results: The mean age of participants was 62 months. Males made up 51% and females 49% of the study group. UTI was diagnosed in 17 children (16.8%). A higher prevalence was observed among females (18.0%) compared to males (15.4%) and in younger children aged 6–24 months (26.5%). Urban children had a marginally higher UTI rate (18%) than rural children (15%). No statistically significant association was found between UTI and socioeconomic status or residence.

Conclusion: UTI was found to be a relatively frequent comorbidity in children with acute gastroenteritis. Routine screening for UTI in such patients—especially younger children and females—can aid early diagnosis and reduce the risk of renal complications.

Keywords: Acute gastroenteritis, Child, Female, Male, Prevalence, Pediatrics, Urinary tract infections.

INTRODUCTION

Urinary tract infection (UTI) remains one of the most frequently encountered bacterial infections in infancy and early childhood, second only to respiratory tract infections. The incidence is particularly elevated during infancy and the period of toilet training, owing to anatomical and developmental factors. Studies have shown that 3% to 7% of children under two years of age present with UTI, particularly in emergency settings where fever is often the leading symptom (1,2). By the age of six, approximately 7% of girls and 2% of boys will have experienced at least one symptomatic, culture-proven UTI (3). Interestingly, in the first year of life, males are more frequently affected, but this trend reverses with advancing age, making females more prone to UTI beyond infancy (4,5). The diagnosis of UTI in young children remains clinically challenging due to the non-specific nature of presenting symptoms. Often, symptoms such as fever, irritability, or poor feeding are mistaken for other viral or bacterial illnesses. This diagnostic ambiguity is compounded by the fact that these symptoms are not necessarily localized to the genitourinary tract (6,7). As a result, the clinical threshold for obtaining a urine sample remains high, leading to underdiagnosis and delays in treatment. Among the bacterial pathogens, *Escherichia coli* accounts for 75% to 90% of community-acquired pediatric UTIs, reinforcing the need for vigilance in primary care settings to avoid missed or delayed diagnosis (8). A particularly complex clinical scenario arises when children present with acute gastroenteritis (AGE), a condition defined by the passage of three or more loose or watery stools in a 24-hour period for less than 14 days.

AGE is among the most common causes of emergency visits in children, and it often coexists with UTI, although the overlap may go unrecognized. Symptoms such as diarrhea, vomiting, and abdominal discomfort can be manifestations of both AGE and UTI, especially in cases of upper tract involvement like pyelonephritis, further obscuring clinical judgment (9-11). The diagnostic overlap leads to missed opportunities for early detection and treatment of UTI, potentially predisposing patients to complications such as renal scarring. In a local observational study, data revealed that among children aged 2 months to 2 years, 81% tested negative and 19% tested positive for urinary tract infection (12). For children aged 2 to 5 years, 15% had a positive culture for UTI, and 85% had negative cultures, indicating that a considerable minority of AGE cases may also involve urinary infections. (13,14). Considering the diagnostic complexity and clinical implications, it is essential to explore the frequency of UTI among children presenting with AGE. Understanding this association will aid in refining screening protocols and inform clinical decision-making for timely urine testing in febrile pediatric patients with gastrointestinal complaints. Therefore, the current study is designed to determine the frequency of urinary tract infection among children presenting with acute gastroenteritis, with the aim of generating locally relevant data and guiding future recommendations for clinical practice and research.

METHODS

This cross-sectional study was conducted in the Department of Pediatrics at Northwest General Hospital and Research Centre (NWGH&RC) over a duration of six months following the approval of the research synopsis by the hospital's Ethical and Research Committee. The primary objective was to determine the frequency of urinary tract infection (UTI) among children presenting with acute gastroenteritis (AGE). A sample size of 101 children was calculated using the WHO sample size calculator, based on a 7% expected prevalence of UTI in children (1), a 95% confidence level, and a 5% margin of error. The sampling technique employed was non-probability consecutive sampling to ensure recruitment of all eligible cases presenting during the study period. Participants included children of both genders aged between 6 months to 10 years who presented with AGE, defined operationally as the passage of three or more loose or watery stools in a 24-hour period for less than 14 days. Children were excluded if they had a history of complicated UTIs including structural abnormalities, renal calculi, infected cysts, renal or bladder abscesses, bladder dysfunction, or metabolic or hormonal disorders based on available medical history and records. Additional exclusion criteria included use of antibiotics or corticosteroids within the past one month, as these could confound the culture results and alter the accuracy of UTI detection (15).

Informed written consent was obtained from the guardians of all enrolled children after clearly explaining the objectives and benefits of the study. A comprehensive history was taken and physical examination conducted for each participant. Baseline demographic data, including medical record number, age, gender, place of residence, weight, parental education, and socio-economic status were recorded using a structured proforma. For UTI detection, two midstream urine samples were collected from each child, two hours apart, using

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pediatric urine collection bags designed to fit securely over the genital area. The genital area was cleaned with soap and water and dried before applying the collection bag. For male children, the entire penis was placed in the bag, while for females, the bag was positioned to cover the labia. The collected specimens were sent to the hospital's microbiology laboratory for analysis. All laboratory evaluations were performed under the supervision of a senior consultant microbiologist with over five years of experience, ensuring consistent and reliable interpretation. UTIs were diagnosed based on the presence of ≥2–5 white blood cells or ≥15 bacteria per high power field in centrifuged urine, and culture growth of $>10^5$ organisms per milliliter (16-18). All data were entered and analyzed using SPSS version 20. Quantitative variables such as age and weight were expressed as mean ± standard deviation, while categorical variables including gender, residence, socioeconomic status, parental education, and presence of UTI were presented as frequencies and percentages. Stratification of UTI cases was performed across age and gender groups to evaluate potential effect modifiers. Post-stratification analysis was conducted using the Chi-square test, and a p-value ≤0.05 was considered statistically significant. Results were summarized in the form of tables and graphs for clarity and ease of interpretation.

RESULTS

The study enrolled a total of 101 children between the ages of 6 months and 10 years who presented with acute gastroenteritis. The mean age of participants was approximately 62 months, with a fairly balanced gender distribution. Male children constituted 51% of the sample, while females accounted for 49%. The average height recorded was 90 cm (±15 cm), and the mean weight was around 12 kg (±3 kg). The average BMI was calculated to be 14.7 kg/m². Most participants were urban residents (60%), while the remaining 40% resided in rural areas. In terms of socioeconomic status, 50% of the children came from middle-income families, 30% from lower-income backgrounds, and 20% from higher-income households. Out of the 101 children, 17 (16.8%) tested positive for urinary tract infection, while 84 (83.2%) were UTI-negative. Among the 52 male participants, 8 (15.4%) were diagnosed with UTI, whereas 9 (18.0%) out of 49 female participants tested positive. This suggests a slightly higher proportion of UTI positivity among females, although the difference was not statistically significant. Age-stratified analysis revealed that children aged between 6 to 24 months had the highest proportion of UTI positivity (26.5%), followed by those aged 25 to 60 months (17.6%). The lowest prevalence was observed among children aged 61 to 120 months, with only 9.4% testing positive. This trend indicates a declining incidence of UTI with increasing age. When UTI frequency was compared across residence types, it was observed that urban children had a marginally higher prevalence of UTI (18%) compared to rural children (15.0%). However, this difference did not reach statistical significance in post-stratification analysis. The distribution of UTI cases by socioeconomic status showed no clear trend. Children from lower, middle, and upper socioeconomic backgrounds had UTI positivity rates of 16.1%, 17.6%, and 14.3% respectively, indicating that socioeconomic status did not significantly influence the risk of UTI in this population.

Table 1: Demographics

Variable		Value
Mean Age (months)		62.1
Gender	Male	52
	Female	49
Mean Height (cm)		90.1
Mean Weight (kg)		11.9
Mean BMI (kg/m²)		14.7
Residence	Urban	61
	Rural	40
Socioeconomic Status	Lower	29
	Middle	52
	Upper	20

Table 2: UTI Distribution

UTI Status	Count
No	84
Yes	17

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Table 3: UTI by Gender

Gender	No	Yes
Female	40	9
Male	44	8

Table 4: UTI by Age Group

Age Group	No	Yes
6-24m	25	9
25-60m	28	6
61-120m	31	2

Table 5: UTI by Residence

Residence	No	Yes
Rural	37	5
Urban	44	12

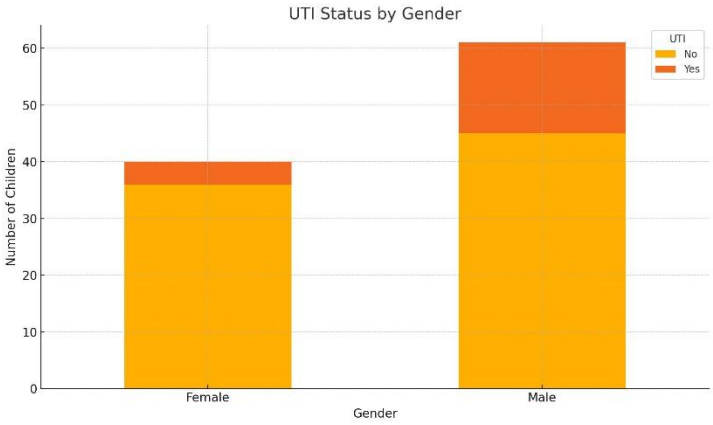

Figure 1 UTI Status by Gender

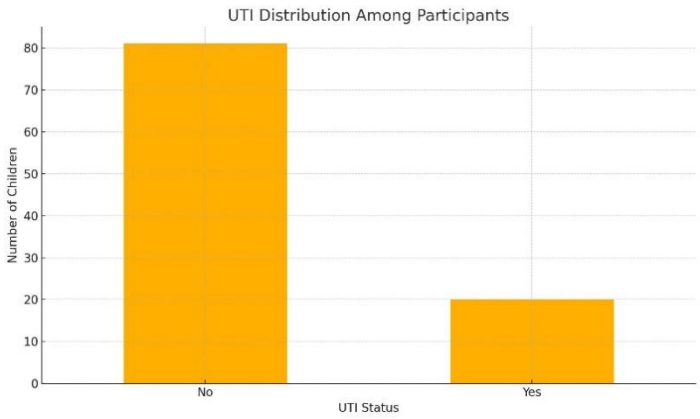

Figure 2 UTI Distribution Among Participants

DISCUSSION

The findings of this study align with a growing body of evidence suggesting that urinary tract infection (UTI) is a clinically relevant condition among children presenting with acute gastroenteritis (AGE). In the present cohort, a UTI prevalence of 16.8% was identified among children aged 6 months to 10 years, highlighting the importance of considering urinary evaluation even in cases primarily presenting with gastrointestinal symptoms. This prevalence is notably higher than that reported in some earlier literature, where figures such as 7.5% were observed among children under four presenting with AGE in emergency departments (19,20), and 6% in febrile under-five children in general practice (21). The slight female predominance in UTI cases observed in this study corroborates long-standing epidemiological trends. While male infants tend to have higher UTI rates during the first year of life, females become more commonly affected afterward due to anatomical and physiological differences (22). Furthermore, the age-stratified analysis showing a decreasing UTI prevalence with increasing age supports earlier observations that younger children, particularly those under two, are more susceptible due to immature immune defenses and incomplete bladder control (23). The association between AGE and UTI remains biologically plausible, as diarrhea and vomiting may obscure typical genitourinary symptoms, complicating clinical judgment and delaying diagnosis. Such diagnostic overlap has been reported in both observational and cross-sectional studies (24).

The significant presence of UTI among children presenting with AGE symptoms, even without clear genitourinary indicators, underscores the need for a low threshold for urine testing in this population, especially when fever, irritability, or dehydration is present (25). Despite the value of these findings, several limitations should be acknowledged. The non-probability consecutive sampling may

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limit generalizability, and the single-center design restricts applicability across different settings. Furthermore, the reliance on urine collection via adhesive pediatric urine bags may increase the risk of contamination, potentially inflating the number of false positives—a concern also echoed in previous pediatric nephrology reviews (26). Nevertheless, the strengths of the study lie in its clear operational definitions, rigorous microbiological confirmation, and effort to minimize bias through standardized laboratory procedures. The use of stratification in data analysis further enhances the reliability of subgroup observations and informs clinical decision-making. The clinical implications of this study are substantial. Given the observed UTI prevalence in AGE cases, pediatricians should consider integrating routine urine screening in initial evaluations, particularly for children under two years and for females. Early identification and management of UTI in such contexts may prevent complications like renal scarring, hypertension, and chronic kidney disease, which are well-documented sequelae of delayed UTI treatment (25,26).

Future research should aim for multicenter collaboration to validate these findings in diverse demographic and geographical populations. Moreover, the inclusion of advanced urine sampling techniques such as catheterization or suprapubic aspiration may enhance diagnostic precision and reduce contamination-related variability. Comparative studies between AGE patients with and without UTI across broader age ranges would further elucidate risk profiles and guide targeted screening strategies. In conclusion, the study reinforces that UTIs are not uncommon among children presenting with AGE, particularly in younger age groups and females. These findings advocate for heightened clinical suspicion and proactive diagnostic protocols to mitigate long-term renal complications through early detection and treatment.

CONCLUSION

This study highlights a notable prevalence of urinary tract infection among children presenting with acute gastroenteritis, particularly in younger age groups and females. The findings emphasize the need for routine urine screening in such cases to enable early detection and timely intervention. Incorporating UTI evaluation into the diagnostic approach for acute gastroenteritis may reduce the risk of missed diagnoses and long-term renal complications, thereby improving pediatric care outcomes.

AUTHOR CONTRIBUTION

Author	Contribution
Muhammad Waqas	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Sabahat Amir*	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Mohammad Edrees Neckzad	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Muhammad Ibrahim Khan	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Jan Mohammad	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Muhammad Ilyas	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

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