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CLINICAL PROFILE OF URINARY TRACT INFECTION IN FEBRILE CHILDREN AGED 1–5 YEARS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background

Urinary tract infection (UTI) is a common but often under-diagnosed cause of fever in young children due to its non-specific clinical presentation. Early diagnosis and treatment are essential to prevent long-term renal complications.

Objectives

To study the clinical profile, laboratory findings, and etiological agents of urinary tract infection in febrile children aged 1–5 years attending a tertiary care hospital.

Materials and Methods

This hospital-based observational study included 100 febrile children aged 1–5 years. Detailed clinical evaluation, urine routine examination, urine culture, and ultrasonography of the kidneys, ureters, and bladder were performed. UTI was confirmed based on urine culture positivity.

Results

Out of 100 febrile children, 24 (24%) were diagnosed with UTI. The majority of cases were in the 1–3 years age group (62.5%) with a female predominance (62.5%). Fever was present in all cases, with irritability and poor feeding being common associated symptoms. Pyuria was observed in 83.3% of cases. *Escherichia coli* was the most common organism isolated (62.5%). Abnormal ultrasonography findings were seen in 25% of UTI-positive children.

Conclusion

Urinary tract infection is a significant cause of fever in children aged 1–5 years. Prolonged fever with non-specific symptoms should prompt evaluation for UTI to ensure early diagnosis and prevent complications.

Keywords

Urinary tract infection; Febrile children; Pediatrics; Urine culture; *Escherichia coli*; Tertiary care hospital

INTRODUCTION

Fever is one of the most common presenting complaints in pediatric practice and accounts for a significant proportion of outpatient visits and hospital admissions among children aged 1–5 years. While most febrile episodes in this age group are attributed to self-limiting viral illnesses, a substantial number are caused by occult bacterial infections that may not be clinically apparent at initial presentation. Among these, urinary tract infection (UTI) is a frequent yet often under-

diagnosed cause of fever, particularly in young children who are unable to localize symptoms or verbalize urinary complaints [1].Alam S, Singh N, Afaq N, Putatunda C. (2024) – Natural phenolics against UTI pathogens
Natural phenolic compounds demonstrated strong antimicrobial activity against several clinical uropathogens. The study suggested their potential as alternative therapeutic agents to combat antimicrobial resistance [2].

Urinary tract infection in children represents a significant global health problem due to its high prevalence, risk of recurrence, and potential for long-term renal sequelae such as renal scarring, hypertension, and chronic kidney disease if not diagnosed and treated promptly [3,4]. The reported prevalence of UTI among febrile children varies widely, ranging from 5% to 30%, depending on age, sex, circumcision status, and study setting [5,6]. Children between 1 and 5 years of age represent a particularly vulnerable group, as classical urinary symptoms are often absent and fever may be the sole manifestation of infection [7].

The clinical presentation of UTI in young children is notoriously non-specific. Symptoms such as irritability, poor feeding, vomiting, abdominal pain, and excessive crying are frequently encountered but are not unique to UTI, often leading to delayed diagnosis or misdiagnosis [8,9]. As a result, UTI may remain unrecognized until complications arise. Several studies have emphasized that prolonged or high-grade fever without an identifiable focus should prompt evaluation for UTI, especially in younger children and females [10,11].

Sex-related differences in the epidemiology of pediatric UTI have been well documented. While UTIs are more common in male infants during the first year of life, females predominate beyond infancy due to anatomical factors such as a shorter urethra and closer proximity of the urethral opening to the anus [12,13]. Age-related susceptibility is also important, with higher incidence reported in toddlers and preschool-aged children, possibly related to toilet training, poor perineal hygiene, and immature immune responses [14].

Laboratory evaluation plays a pivotal role in the diagnosis of pediatric UTI. Urine routine examination findings such as pyuria, nitrite positivity, and microscopic hematuria provide useful screening clues; however, urine culture remains the gold standard for definitive diagnosis [15]. Identification of the causative organism is essential not only for confirmation of UTI but also for guiding appropriate antimicrobial therapy and addressing the growing concern of antimicrobial resistance [16].

Escherichia coli remains the most common uropathogen in pediatric UTIs worldwide, accounting for 60–80% of cases, followed by organisms such as Klebsiella species, Enterococcus species, and Proteus species [17,18]. The microbial profile may vary according to geographic location, healthcare setting, and prior antibiotic exposure, highlighting the importance of local epidemiological data [19].

Imaging studies, particularly ultrasonography of the kidneys, ureters, and bladder (USG KUB), are recommended in selected cases of pediatric UTI to identify underlying structural abnormalities such as hydronephrosis, vesicoureteral reflux, or bladder dysfunction that may

predispose to recurrent infections [20,21]. Early detection of such abnormalities allows timely intervention and prevention of long-term renal damage.

Despite the clinical importance of UTI as a cause of fever in young children, data from many developing regions remain limited. Understanding the clinical profile, laboratory findings, and etiological agents of UTI in febrile children is essential for improving diagnostic strategies and optimizing management protocols. Therefore, the present study was undertaken to evaluate the clinical characteristics, laboratory parameters, microbiological profile, and imaging findings of urinary tract infection in febrile children aged 1–5 years attending a tertiary care hospital.

MATERIALS AND METHODS

Study Design and Setting

This was a hospital-based observational study conducted in the Pediatric department of a tertiary care centre over a period of 12 months i.e, August 2025 to August 2025.

Study Population

A total of **100 febrile children aged 1–5 years** presenting to the outpatient department or admitted to the pediatric ward were enrolled after obtaining informed consent from parents or guardians.

Inclusion Criteria

1. Children aged **1–5 years**
2. Presence of **fever (≥38°C)** with or without an obvious focus
3. Children whose parents/guardians consented to participation
4. Availability of urine sample for routine examination and culture

Exclusion Criteria

1. Children below 1 year or above 5 years of age
2. Known cases of **chronic kidney disease or congenital renal anomalies**
3. Children already on **antibiotic therapy** prior to presentation
4. Febrile children with a clearly identifiable non-urinary source of infection (e.g., pneumonia, meningitis)
5. Inadequate or contaminated urine samples

Data Collection

A detailed clinical history and thorough physical examination were performed for all enrolled children. Information regarding age, sex, duration and pattern of fever, and associated symptoms such as irritability, poor feeding, vomiting, abdominal pain, and urinary complaints was recorded.

Laboratory Investigations

Urine samples were collected using age-appropriate sterile techniques. Urine routine examination was performed to assess pyuria, nitrite positivity, and hematuria. Urine culture was carried out, and UTI was confirmed based on significant bacterial growth.

Imaging

Ultrasonography of the kidneys, ureters, and bladder (USG KUB) was performed in children with confirmed UTI to detect any underlying abnormalities.

Statistical Analysis

Data were analyzed using descriptive statistics. Results were expressed as frequencies and percentages.

RESULTS

Out of 100 febrile children evaluated, **24% were diagnosed with UTI**, indicating that nearly one-fourth of febrile episodes in this age group were attributable to urinary tract infection. The majority of UTI cases occurred in children aged **1–3 years (62.5%)**, highlighting increased susceptibility in younger children. A clear **female predominance (62.5%)** was observed.

Fever was present in all UTI-positive children, with most cases exhibiting **prolonged (>3 days) and high-grade fever**. Non-specific symptoms such as irritability, poor feeding, and vomiting were commonly observed, reinforcing the diagnostic challenge of UTI in young children.

Pyuria was the most frequent laboratory finding, followed by nitrite positivity. **Escherichia coli** was the predominant organism isolated. USG KUB revealed abnormalities in **25%** of UTI-positive children, suggesting underlying urinary tract involvement in a subset of cases.

Table 1: Distribution of Febrile Children According to UTI Status (n = 100)

UTI Status	Number of Children	Percentage (%)
UTI Positive	24	24.0
UTI Negative	76	76.0
Total	**100**	**100**

Table 1 shows the distribution of febrile children according to UTI status. Out of 100 febrile children aged 1–5 years evaluated in the study, 24 children (24%) were confirmed to have urinary tract infection based on urine culture positivity, while the remaining 76 children (76%) were culture negative. This highlights that nearly one-fourth of febrile children in this age group had UTI as an underlying cause of fever.

Table 2: Age Distribution of UTI-Positive Children (n = 24)

Age Group (years)	Number of Cases	Percentage (%)
1–3 years	15	62.5
3–5 years	9	37.5
Total	**24**	**100**

Table 2 depicts the age distribution of UTI-positive children. The majority of UTI cases were observed in the 1–3 years age group, accounting for 15 cases (62.5%), whereas 9 cases (37.5%) were seen in children aged 3–5 years. This indicates a higher vulnerability to UTI in younger children.

Table 3: Sex Distribution of UTI-Positive Children (n = 24)

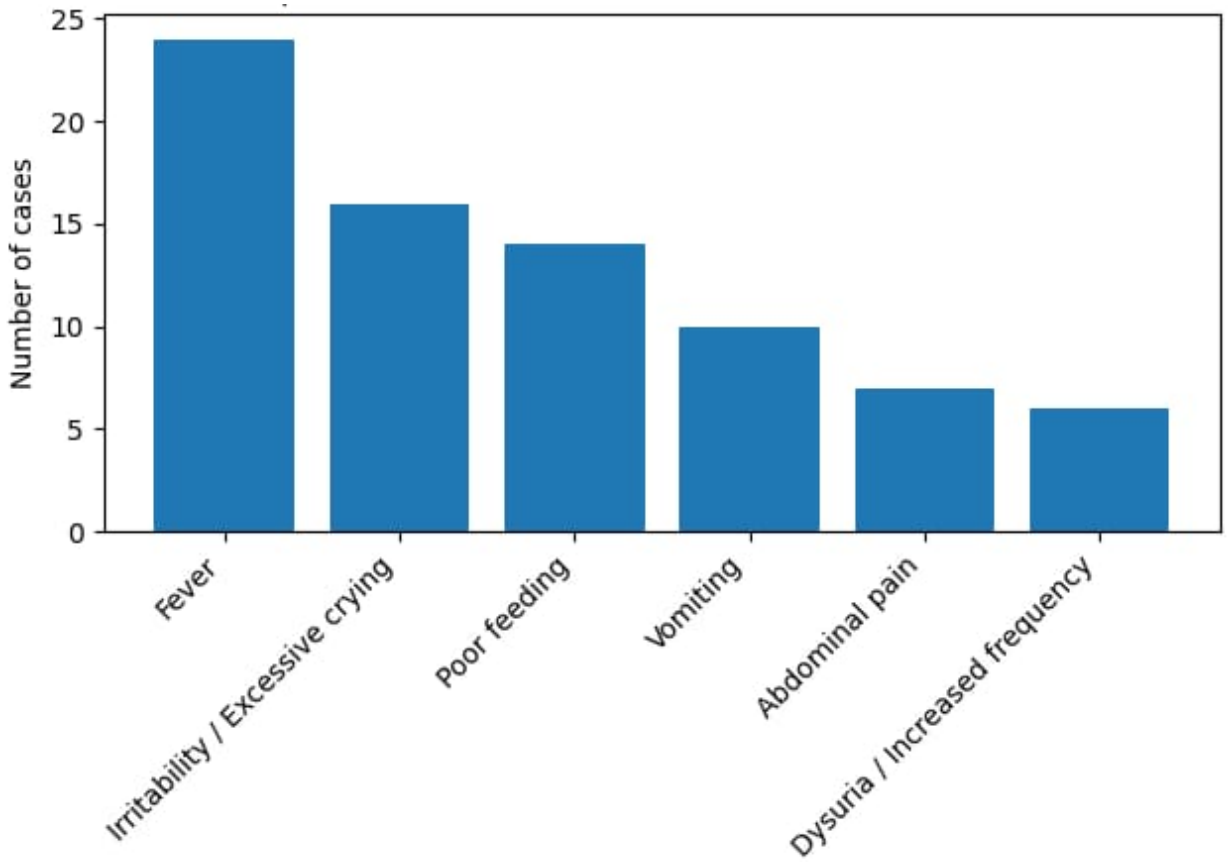
Sex	Number of Cases	Percentage (%)
Male	9	37.5
Female	15	62.5
Total	**24**	**100**

Table 3 illustrates the sex distribution among UTI-positive cases. Females constituted 15 cases (62.5%), while males accounted for 9 cases (37.5%), showing a clear female predominance with a female-to-male ratio of approximately 1.7:1.

Table 4: Clinical Presentation in UTI-Positive Children (n = 24)

Clinical Feature	Number of Cases	Percentage (%)
Fever	24	100
Irritability / Excessive crying	16	66.7
Poor feeding	14	58.3
Vomiting	10	41.7
Abdominal pain	7	29.2
Dysuria / Increased frequency	6	25.0

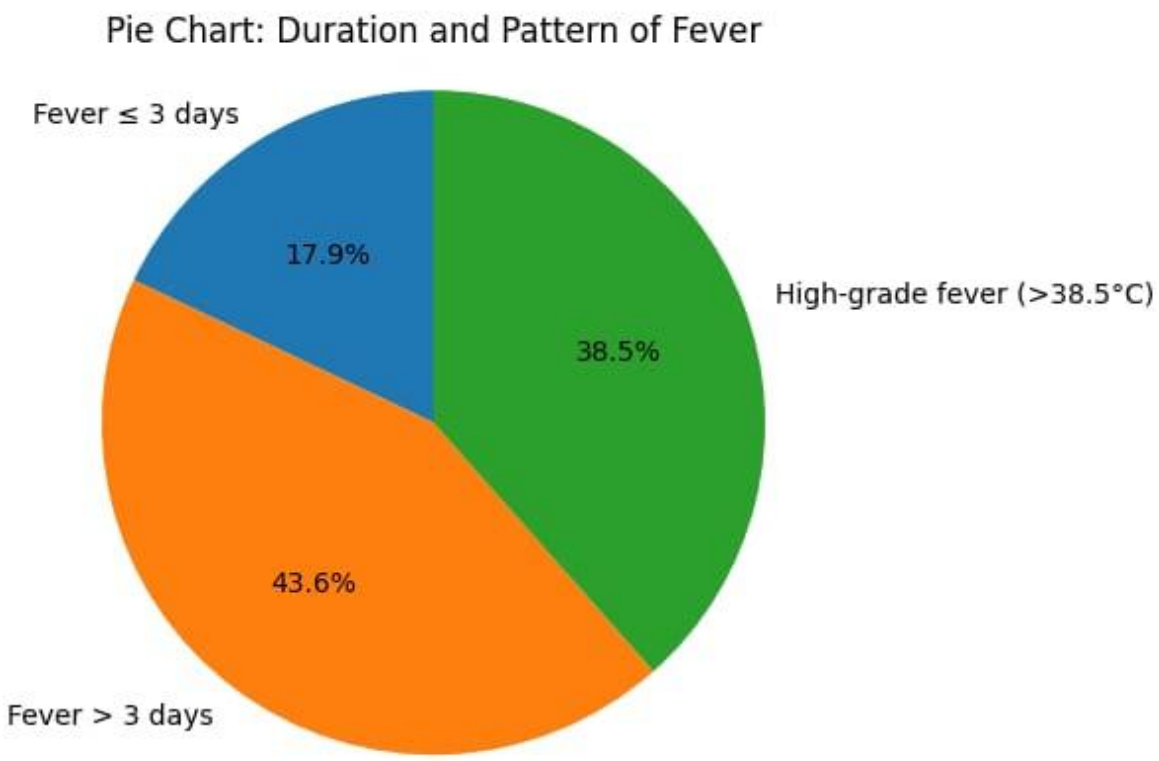
Table 4 summarizes the clinical features observed in UTI-positive children. Fever was present in all cases (100%). Other common symptoms included irritability or excessive crying in 66.7% of cases, poor feeding in 58.3%, vomiting in 41.7%, abdominal pain in 29.2%, and dysuria or increased frequency of micturition in 25% of cases. This reflects the non-specific nature of UTI presentation in young children.



Graph 1: Clinical Presentation in UTI-Positive Children

Table 5: Duration and Pattern of Fever in UTI-Positive Children (n = 24)

Fever Characteristics	Number of Cases	Percentage (%)
Fever ≤ 3 days	7	29.2
Fever > 3 days	17	70.8
High-grade fever (>38.5°C)	15	62.5

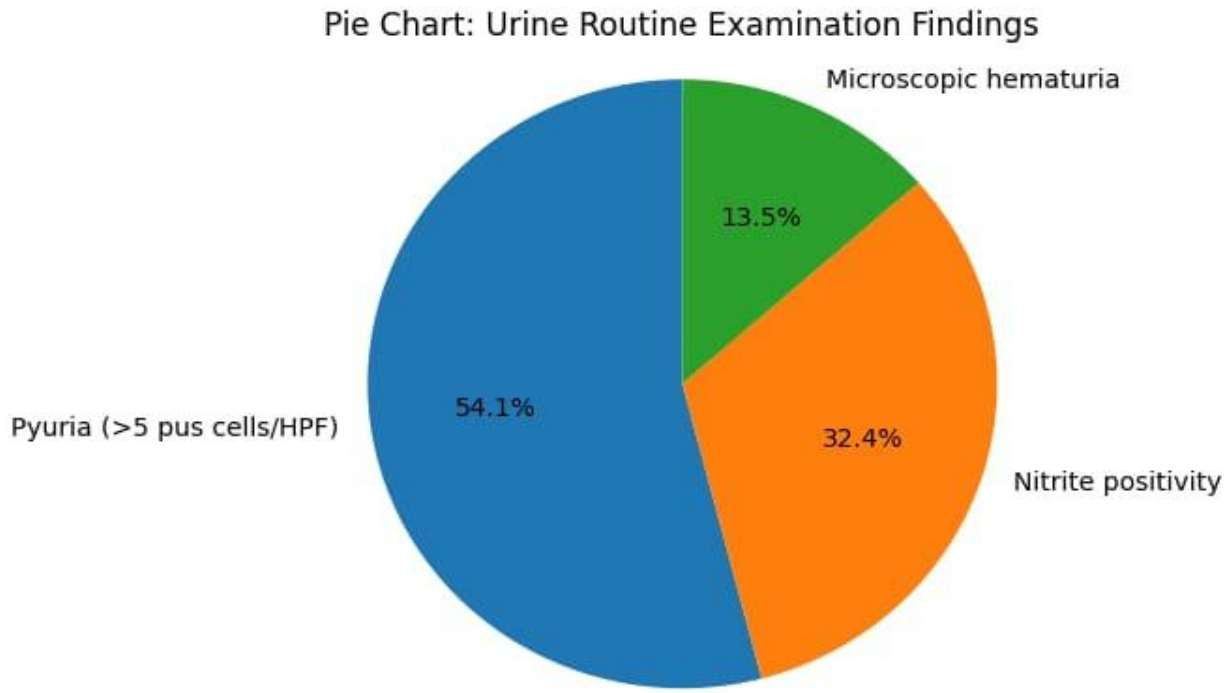


Graph 2: Duration and Pattern of Fever

Table 5 describes the duration and pattern of fever among UTI-positive cases. Fever lasting more than three days was noted in 70.8% of children, while 29.2% presented within three days of fever onset. High-grade fever (>38.5°C) was observed in 62.5% of cases, emphasizing the importance of suspecting UTI in children with prolonged and high-grade fever.

Table 6: Urine Routine Examination Findings in UTI-Positive Children (n = 24)

Urine Finding	Number of Cases	Percentage (%)
Pyuria (>5 pus cells/HPF)	20	83.3
Nitrite positivity	12	50.0
Microscopic hematuria	5	20.8



Graph 3: Urine Examination

Table 7: Distribution of Urine Culture Isolates (n = 24)

Organism Isolated	Number of Cases	Percentage (%)
Escherichia coli	15	62.5
Klebsiella species	5	20.8
Enterococcus species	3	12.5
Proteus species	1	4.2
Total	**24**	**100**

Table 8: Ultrasonography (USG KUB) Findings in UTI-Positive Children (n = 24)

USG Finding	Number of Cases	Percentage (%)
Normal	18	75.0
Abnormal	6	25.0
Total	**24**	**100**

Table 8 outlines ultrasonography findings in UTI-positive children. Normal USG KUB findings were observed in 75% of cases, while abnormal findings such as hydronephrosis or bladder wall thickening were present in 25% of children, indicating the presence of underlying urinary tract abnormalities in a subset of patients.

Table 6 presents urine routine examination findings. Pyuria (>5 pus cells per high-power field) was observed in 83.3% of UTI-positive cases, making it the most common laboratory finding. Nitrite positivity was seen in 50% of cases, while microscopic hematuria was detected in 20.8% of cases.

Table 7 shows the distribution of organisms isolated on urine culture. *Escherichia coli* was the most common pathogen, isolated in 62.5% of cases, followed by *Klebsiella* species (20.8%), *Enterococcus* species (12.5%), and *Proteus* species (4.2%). This confirms *E. coli* as the predominant uropathogen in pediatric UTIs.

DISCUSSION

The present study highlights the significant contribution of urinary tract infection as a cause of fever in children aged 1–5 years, with a prevalence of 24%. This finding is consistent with previous studies reporting UTI prevalence ranging from 10% to 30% among febrile pediatric populations [22,23]. The high prevalence underscores the importance of considering UTI in the differential diagnosis of fever without focus in young children.

Age distribution analysis revealed a higher incidence of UTI in children aged 1–3 years. Similar observations have been reported by Shaikh et al. and Zorc et al., who attributed this increased susceptibility to immature immune defenses, toilet training practices, and poor perineal hygiene in toddlers [24,25]. Early childhood thus represents a critical period for UTI surveillance.

Female predominance observed in this study aligns with established epidemiological trends beyond infancy [26]. Anatomical and behavioral factors are believed to contribute to this disparity. The findings emphasize the need for heightened clinical suspicion of UTI in febrile female children.

Clinically, fever was universal among UTI-positive cases, with a majority experiencing prolonged and high-grade fever. The predominance of non-specific symptoms such as irritability and poor feeding is in agreement with previous studies and highlights the diagnostic challenge faced by clinicians [27]. These findings reinforce recommendations that any child with unexplained fever should be evaluated for UTI.

Laboratory evaluation demonstrated pyuria as the most consistent finding, supporting its role as a useful screening marker [28]. However, the presence of culture-positive UTI in some children without classic urine findings reiterates that urine culture remains indispensable.

Microbiological analysis revealed *Escherichia coli* as the leading pathogen, consistent with global data [29]. The persistence of E. coli dominance emphasizes the need for empirical antibiotic regimens targeting Gram-negative bacilli while awaiting culture results.

Abnormal USG findings in 25% of cases indicate a substantial burden of underlying urinary tract abnormalities. Similar rates have been reported in earlier studies, supporting the role of imaging in selected pediatric UTI cases [30].

Overall, the findings of this study contribute valuable local data and reinforce existing evidence that UTI is a common, often hidden cause of fever in young children. Early recognition and appropriate management are crucial to prevent recurrent infections and long-term renal damage.

CONCLUSION

Urinary tract infection is a significant and often under-recognized cause of fever in children aged 1–5 years. Prolonged or high-grade fever with non-specific symptoms should prompt evaluation for UTI. Early diagnosis through urine culture and appropriate management can prevent long-term renal complications.

LIMITATIONS

- Single-center study with limited sample size
- Lack of long-term follow-up for renal outcomes
- Antibiotic susceptibility patterns were not analyzed
- Findings may not be generalizable to all populations

DECLARATIONS:

Conflicts of interest: There is no any conflict of interest associated with this study

Consent to participate: There is consent to participate.

Consent for publication: There is consent for the publication of this paper.

Authors' contributions: Author equally contributed the work.

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