



ASSESSMENT OF CLINICO-ETIOLOGICAL PROFILE AND LABORATORY PARAMETERS OF UTI IN 1 MONTH TO 15 YEARS AGE GROUP

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ABSTRACT

Background: Worldwide in paediatric age group, urinary tract infection remains a silent yet very frequently faced infection. It produces significant mortality and morbidity among paediatric population due to inconspicuous clinical manifestations.

Objective: To assess Clinicoetiological profile and laboratory parameters of UTI in 1 month to 15 years age group.

Methods: This Hospital based cross sectional Observational study was conducted among Children between 1 month -15 year age group of presented in OPD and IPD patient in GIMS, District hospital, Gadag. Duration of study was 2 years from May 2023 to May 2025.

Result: The prevalence of UTI among febrile children in our study was 11.3 % (p value 0.000), with a significant proportion of children belonging to 5-10 years (37.5) with a female preponderance. Fever was the most common symptom (85.4%) noted in the study. The most common etiology of UTI in our study is E.Coli (18.3%) followed by citrobacter (4.2%) , Klebsiella (3.8%) and enterococcus (3.3%), sensitive to most of the first line and second line antibiotics suggested in literature. Ultrasound findings, and abnormal MCU findings were seen in a very low proportion of patients in our study.

Conclusion: This study provides a comprehensive analysis of the clinical profile, microbiological findings, and radiological features of pediatric urinary tract infections (UTIs) in a tertiary care setting.

Keywords: Urinary Tract Infection, Dysuria, Abdominal Pain, Clinico-Etiological Profile, Laboratory Parameters.

INTRODUCTION

Urinary tract infection can be defined as the infection present in any part of the urinary system that includes the kidneys, ureter, bladder, and urethra. It is the growth of a significant number of microorganisms within the urinary tract. In general, the lower urinary tract is more affected than the upper urinary tract. The upper urinary tract infection affects the kidneys and the lower tract infection involves the bladder, prostate and urethra.

UTIs are most common in children under age 1 year with the prevalence in febrile infants being around 7%.

During infancy the male: female ratio is 2.8: 5.4. Beyond infancy, there is a female preponderance, with a male : female ratio of 1:10. In males Urinary tract infection can be defined as the infection present in any part of the urinary system that includes the kidneys, ureter, bladder, and urethra. It is the growth of a significant number of microorganisms within the urinary tract. In general, the lower urinary tract is more affected than the upper urinary tract. The upper urinary tract infection affects the kidneys and the lower tract infection involves the bladder, prostate and urethra.

UTIs are most common in children under age 1 year with the prevalence in febrile infants being around 7%. During infancy the male: female ratio is 2.8: 5.4. Beyond infancy, there is a female preponderance, with a male: female ratio of 1:10.



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In males, most UTIs occur during the first year of life that too in infancy, where the rate is 20% in febrile uncircumcised males under age 1 year. In females, the first UTI usually occurs by the age of 5 years, with peaks during infancy, toilet training, and onset of sexual activity. Most UTIs occur during the first year of life that too in infancy, where the rate is 20% in febrile uncircumcised males under age 1 year. In females, the first UTI usually occurs by the age of 5 years, with peaks during infancy, toilet training, and onset of sexual activity.

Children with fever form a considerable proportion of patients. Due to the absence of specific symptoms and signs, pediatric UTI cases remain under diagnosed, especially in infants and young children. With a worldwide prevalence of 2–20%, UTI is the most common bacterial illness among febrile infants and young children [1]. Despite recent information that suggests a high prevalence of UTI and significant associated morbidity in these patients, this clinical entity is often neglected in actual practice.

Thus identification of specific clinical patterns is mandatory. Prompt diagnosis and treatment decrease the risks of renal scarring and complications like hypertension in children. UTI is defined as the growth of a significant number of organisms of a single species in the urine, in the presence of symptoms. While significant bacteriuria is defined as growth with a colony count of $>10^5$ /ml of a single species in a mid-stream clean catch urine sample [2]. *E. coli*, colonic bacteria, *Klebsiella* are the most common organisms found in most urinary tract infections. Newer pathogens including *Enterococcus* species, yeasts and *Staphylococcus aureus* are also prominent causative agents in pediatric UTIs in recent years [3,4]. Hence this study was conducted to assess Clinicoetiological profile and laboratory parameters of UTI in 1 month to 15 years age group.

Material and Methods: This Hospital based cross sectional Observational study was conducted among Children between 1 month -15 year age group of presented in OPD and IPD patient in GIMS, District hospital, Gadag. Duration of study was 2 years from May 2023 to May 2025.

Sample size calculation:- Based on Kaina Bhonsle, Alka Vyas, Harish Vyas study.
 $P = 62.4$

$q = 37.6$

$d = 10\%$ of prevalence

$n = 4 \times pq \div D^2 = 4 \times 62.4 \times 37.6 \div (6.24)^2$

$n = 231$

Collection of urine for culture:

The specimen for urine will be obtained carefully to prevent contamination by commensal flora, especially in females. A clean-catch mid stream specimen collected in children. Urine specimen can also be collected by temporary transurethral catheterization or from a bag applied to the perineum. In children with indwelling catheters urine aspirated by supra pubic aspiration. For all children who are full filling inclusion criteria, a detailed history, general examination and system examination done. Urine analysis by dipstick test, microscopy and culture of the clean catch mid stream urine specimen done and the growth pattern of organisms and their susceptibility pattern to antibiotics determined. Radiological findings determined.

RESULTS

The age distribution of the study participants ($N=240$) shows that the highest proportion (37.5%) falls within the 5-10 years category, followed by 29.6% in the 1-5 years group and 22.5% in the 10-15 years group, while the lowest proportion (10.4%) consists of infants less than 1 year old. This distribution indicates that the study population is primarily composed of young children, particularly those aged 5-10 years, which may be a key factor in analyzing age-related health outcomes.

Sex Distribution of Study Participants

The sex distribution of the study participants ($N=240$) indicates that the majority are female (66.3%), while males constitute 33.8% of the sample. This imbalance suggests a higher representation of females in the study, which may have implications for analyzing sex-related differences in the study's outcomes.

Clinical features among study participants

Clinical features among study participants ($N=240$) indicates that fever is most common symptom (85%) followed by increased frequency of urine (65%), dysuria (45%), and other symptoms like abdominal pain, vomiting, constipation, dribbling, retention, urgency, pyuria, hematuria

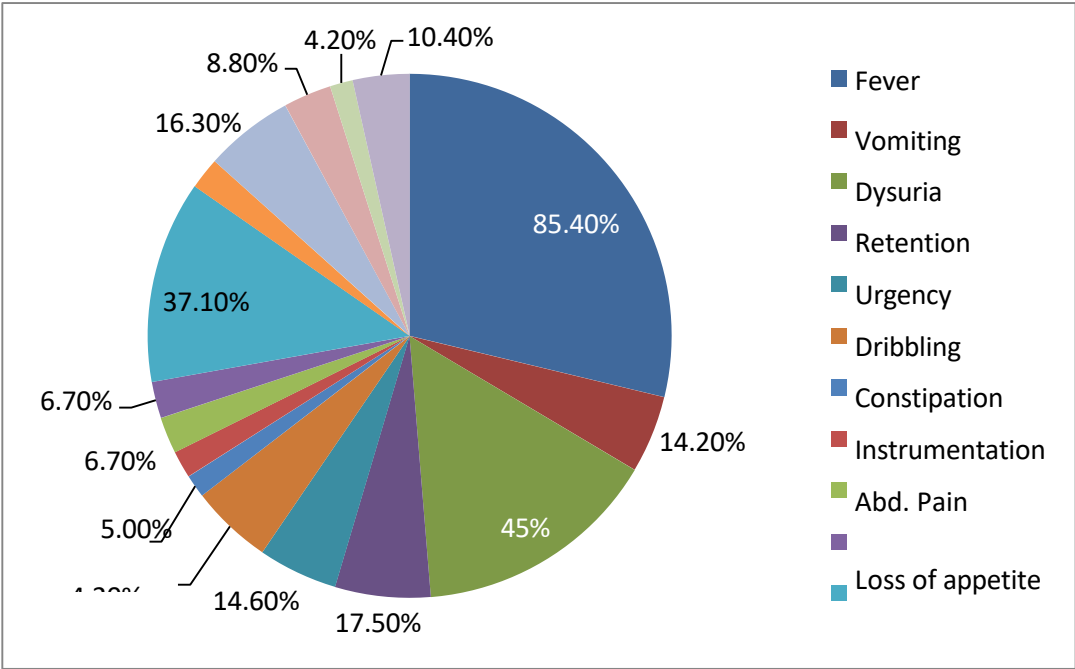


Fig 1: Clinical Features Distribution of Study Participants

Fever Prevalence among Study Participants

The data shows that out of 240 participants, the majority (85.4%) reported having a fever, while only 14.6% did not experience fever. This high prevalence suggests that fever is a common health concern among the study population and may be associated with underlying conditions that require further investigation.

Prevalence of Vomiting among Study Participants

The data indicates that out of 240 participants, 14.2% experienced vomiting, while the majority (85.8%) did not report this symptom. The relatively

low prevalence of vomiting compared to other symptoms suggests that it may not be a primary health concern in this study population but could still be relevant in specific cases or in relation to other conditions.

Prevalence of Dysuria among Study Participants

The data shows that out of 240 participants, 45.0% reported experiencing dysuria, while 55.0% did not. The relatively high prevalence of dysuria suggests that urinary discomfort is a common concern in the study population, potentially indicating underlying infections or other urinary tract issues that may require further evaluation.

Table 1: Prevalence of Dysuria among Study Participants

Dysuria			
		Frequency	Percent
	No	132	55.0
	Yes	108	45.0
	Total	240	100.0

Prevalence of Urinary Retention among Study Participants

The data indicates that out of 240 participants, 17.5% experienced urinary retention, while the majority (82.5%) did not. Although less common, the presence of urinary retention in a notable proportion of participants suggests a potential underlying health concern that may warrant further clinical investigation.

Prevalence of Urinary Urgency among Study Participants

The data reveals that 14.6% of the 240 participants experienced urinary urgency, while the majority (85.4%) did not report this symptom. Although not highly prevalent, the presence of urinary urgency in a subset of participants suggests the need for further evaluation of potential underlying urinary tract conditions.

Table 2: Prevalence of Urinary Urgency among Study Participants

URGENCY		
	Frequency	Percent

	No	205	85.4
	Yes	35	14.6
	Total	240	100.0

Prevalence of Urinary Dribbling among Study Participants

The data shows that 15.0% of the 240 participants experienced urinary dribbling, while the majority (85.0%) did not report this symptom. Although not highly prevalent, the presence of dribbling in a subset of participants may indicate underlying urinary tract issues that require further clinical assessment.

Prevalence of Constipation among Study Participants

The data indicates that out of 240 participants, only 4.2% experienced constipation, while the vast majority (95.8%) did not report this issue. The low prevalence suggests that constipation is not a significant concern in this study population, though it may still be relevant in specific cases or in relation to other health conditions.

Table 3: Prevalence of Constipation among Study Participants

Constipation			
		Frequency	Percent
	No	230	95.8
	Yes	10	4.2
	Total	240	100.0

Prevalence of Instrumentation among Study Participants

The data indicates that 5.0% of the 240 participants underwent instrumentation, while the majority (95.0%) did not. Although instrumentation is

relatively uncommon in this study population, its presence in a subset of participants may be associated with specific medical conditions or procedures, warranting further investigation into its potential impact on health outcomes.

Table 4: Prevalence of Instrumentation among Study Participants

Instrumentation			
		Frequency	Percent
	No	228	95.0
	Yes	12	5.0
	Total	240	100.0

Prevalence of Abdominal Pain among Study Participants

The data reveals that 40.4% of the 240 participants reported experiencing abdominal pain, while 59.6% did not. The relatively high prevalence of abdominal pain suggests that it is a common symptom in the study population, potentially indicating underlying gastrointestinal or other related health conditions that may require further evaluation.

Prevalence of Loss of Appetite among Study Participants

The data shows that 6.7% of the 240 participants experienced loss of appetite, while the majority (93.3%) did not report this symptom. The low

prevalence suggests that loss of appetite is not a widespread issue in this study population, though it may still be relevant in specific cases or as a symptom of underlying health conditions.

Prevalence of Increased Urinary Frequency among Study Participants

The data indicates that 37.1% of the 240 participants reported experiencing increased urinary frequency, while 62.9% did not. The notable proportion of individuals affected suggests that urinary frequency is a common concern in this population and may be linked to underlying urinary tract or systemic health conditions that require further evaluation.

Table 5: Prevalence of Increased Urinary Frequency among Study Participants

Frequency			
		Frequency	Percent
	No	151	62.9
	Yes	89	37.1
	Total	240	100.0

Prevalence of Pyuria among Study Participants

The data shows that 5.8% of the 240 participants had

pyuria, while the majority (94.2%) did not. The low prevalence suggests that pyuria, an indicator of

possible urinary tract infections or inflammatory conditions, is not widespread in this study

population but may still be clinically significant for affected individuals.

Table 6: Prevalence of Pyuria among Study Participants

Pyuria			
		Frequency	Percent
	No	226	94.2
	Yes	14	5.8
	Total	240	100.0

Prevalence of Poor Urinary Stream among Study Participants

The data indicates that 16.3% of the 240 participants reported experiencing a poor urinary stream, while the majority (83.8%) did not. Although not highly prevalent, the presence of poor urinary stream in a subset of participants may indicate underlying urological conditions that require further clinical assessment.

Prevalence of Hematuria among Study Participants

The data indicates that 4.2% of the 240 participants experienced hematuria, while the majority (95.8%) did not. Although the prevalence is low, the presence of hematuria in some individuals may suggest underlying urinary tract issues, infections, or other medical conditions that require further investigation.

Prevalence of Diarrhea among Study Participants

The data shows that 10.4% of the 240 participants reported experiencing diarrhea, while the majority (89.6%) did not. Although not highly prevalent, the presence of diarrhea in a subset of participants may indicate underlying gastrointestinal infections or other health conditions that warrant further assessment.

History of Previous Episodes among Study Participants

The data indicates that 7.1% of the 237 participants reported a history of previous episodes, while 91.7% did not. Additionally, data for three participants (1.3%) was missing. The relatively low prevalence of prior episodes suggests that recurrent cases are uncommon in this study population, though further investigation may be needed to assess potential risk factors for recurrence.

Number of Previous Episodes among Study Participants

The data shows that 91.7% of the 240 participants reported no previous episodes, while 5.8% had at least one prior episode. Additionally, 2.1% experienced two previous episodes, and 0.4% reported three episodes. The low recurrence rate suggests that repeated occurrences are uncommon in this study population, though those with multiple episodes may require further evaluation to identify underlying risk factors.

Genitalia Examination Findings among Male

Study Participants

The data indicates that among 240 participants, 67.5% were female, among males 24.6% had normal penis examination, while 5.0% were circumcised. 2.1% had phimosis, and 0.8% had epispadias. The presence of anatomical conditions such as phimosis and epispadias, though relatively low, may have clinical significance and require further medical attention.

Prevalence of Vulval Synechiae among Study Participants

The data indicates that 65.8% of the 240 participants were female and had no vulval synechiae. The absence of vulval synechiae in the majority suggests that it is not a widespread concern in this study population, though its presence in a notable proportion may warrant further clinical evaluation.

Prevalence of Anorectal Anomalies among Study Participants

The data shows that none of the 240 participants had anorectal anomalies. This indicates that anorectal anomalies were not observed in the study population, suggesting that such conditions were not a contributing factor to the health concerns being investigated.

Method of Urine Sample Collection among Study Participants

The data indicates that the majority of participants (87.1%) provided a clean-voided urine sample, while 12.9% required catheterization for urine collection. The higher proportion of clean-voided samples suggests that non-invasive methods were preferred and sufficient for most participants, while catheterization was used in cases where it was necessary for accurate sample collection.

Urine Culture Results among Study Participants

The data shows that 34.6% of the 240 participants had a positive urine culture, indicating the presence of bacterial growth, while 65.4% had negative culture results. The relatively high prevalence of positive cultures suggests a significant occurrence of urinary tract infections (UTIs) or other bacterial infections in the study population, warranting further clinical attention and appropriate treatment.

Bacterial Organisms Identified in Urine Cultures among Study Participants

The data shows that out of 240 participants, 65.4% had no bacterial growth in their urine cultures. Among those with positive cultures, *Escherichia coli*

(18.3%) was the most frequently identified organism, followed by Citrobacter (4.2%), Klebsiella (3.8%), Enterococcus (3.3%), Proteus (1.7%), Pseudomonas (1.7%), Staphylococcus aureus (1.3%), and Acinetobacter (0.4%). The

predominance of E. coli aligns with its known role as a leading cause of urinary tract infections (UTIs), while the presence of other organisms suggests variability in infection sources and potential antibiotic resistance concerns.

Table 7: Bacterial Organisms Identified in Urine Cultures among Study Participants

Organism			
		Frequency	Percent
	No Growth	157	65.4
	E.Coli.	44	18.3
	Citrobacter	10	4.2
	Klebsiella	9	3.8
	Enterococcus	8	3.3
	Proteus	4	1.7
	Staphylococcus Aureus	3	1.3
	Pseudomonas	1	1.7
	Acintobacter	1	0.4
	Total	240	100.0

Antibiotic Sensitivity Patterns among Study Participants

The data shows that 65.4% of participants had no bacterial growth in their urine cultures, leaving 34.6% with positive cultures that were tested for antibiotic sensitivity. Among those with positive cultures, bacterial isolates displayed a wide range of sensitivities to various antibiotics. The most commonly effective antibiotics included **amikacin, ciprofloxacin, ceftriaxone, ceftazidime, meropenem, and nitrofurantoin**, either alone or in combination with other drugs. The diversity of antibiotic sensitivity patterns suggests the presence of multiple bacterial strains with varying resistance profiles, highlighting the importance of targeted antibiotic therapy based on culture and sensitivity testing.

Ultrasound Findings of Abdomen and Pelvis among Study Participants

The ultrasound results show that 39.2% of participants had normal findings, while 48.8% were not recommended for USG, among abnormal findings, cystitis was the most common (6.7%), followed by cases of bilateral mild or gross hydronephrosis (HUN) and hydronephrosis with cystitis in smaller proportions. Additionally, a few cases of renal pelviectasis (0.4%) and hydronephroureterosis were noted. These findings suggest that urinary tract abnormalities, particularly cystitis and hydronephrosis, were present in a significant subset of the study population, emphasizing the need for further evaluation and management of underlying urinary conditions.

Micturating Cystourethrogram (MCU) Findings among Study Participants

The data indicates that 86.3% of participants did not undergo an MCU examination, while 10% had normal findings. Among the abnormal findings, bilateral vesicoureteral reflux (VUR) of varying severity was detected in a small percentage of cases (Grade 2: 0.8%, Grade 4: 0.4%). Other notable abnormalities included bilateral moderate to large hydronephrosis (0.8%), bilateral moderate hydronephrosis with renal parenchymal changes (0.4%), and left mild hydronephrosis (0.8%). These findings suggest that a subset of participants had structural or functional urinary abnormalities, which may contribute to recurrent urinary tract infections (UTIs) or renal complications.

DMSA/DTPA Scan Findings among Study Participants

The data indicates that 97.5% of participants did not undergo a DMSA/DTPA scan. Among the 2.5% who had the scan, the majority (1.3%) exhibited adequate bilateral cortical function, while a small proportion had bilateral gross hydronephrosis with decreased cortical function (0.8%) or left mild to moderate hydroureteronephrosis with adequate cortical function (0.4%). These findings highlight that while most patients were not evaluated with nuclear imaging, those with structural kidney abnormalities showed varying degrees of functional impairment, reinforcing the importance of advanced imaging in assessing renal health in patients with urinary tract conditions.

Table 8: DMSA/DTPA Scan Findings among Study Participants

Dmsa/Dtpa			
		Frequency	Percent
	Dmsa/Dtpa Not Recommended	213	88.75

	Dmsa/Dtpa Recommended But Lost For	21	8.75
	Follow Up		
	Adequate Cortical Function Of B/L	3	1.25
	Kidney		
	B/L Gross Hun With Decreased	2	0.8
	Cortical Function.		
	Left Mild To Moderate	1	0.4
	Hydroureteronephrosis With		
	Adequate B/L Cortical Function.		
	Total	240	100.0

Diagnosis Distribution among Study Participants

The majority of the participants (65.8%) were diagnosed with simple urinary tract infection (UTI), while 29.2% had complicated UTI. A smaller percentage (2.5%) had recurrent UTI, highlighting persistent or unresolved infections. Additionally, a few cases were associated with bilateral hydronephrosis (0.8%), nephritic syndrome with UTI (0.8%), and nephrotic syndrome with UTI (0.4%). These findings suggest that while simple UTI remains the most common diagnosis, a notable percentage of cases require further evaluation for complications or associated renal conditions.

Follow-Up Status among Study Participants

The data shows that the vast majority of participants (99.2%) were scheduled for a follow-up after one week, indicating a standard post-treatment monitoring plan for urinary tract infections and related conditions. 19.2% of participants were lost to follow up. A small proportion (0.8%) underwent surgical intervention, suggesting that a few cases required more invasive management, likely due to bacterial colonization.

Fever

Fever was the most common symptom in our study, observed in 85.4% of cases. This finding is consistent with Alsaywid et al. (2023) [7], who reported fever as the primary presenting symptom in 80% of pediatric UTI cases.

Bacterial Pathogens

In our study about 34.6% of cases with significant bacteriuria showed organism isolation on urine culture, and 65.4% of cases showed no growth.

Our study identified *Escherichia coli* (*E. coli*) as the most common pathogen (18.3%), followed by *Citrobacter* (4.2%), *Klebsiella* (3.8%), and *Enterococcus* (3.3%). These findings are in agreement with Patel et al. (2021) [9], who reported *E. coli* in 75% of pediatric UTI cases.

Antibiotic Sensitivity Patterns

In our study majority of organisms were highly sensitive around 45% to amikacin, ciprofloxacin, and nitrofurantoin, consistent with Hsu et al. (2021) [10], who found that aminoglycosides and fluoroquinolones were the most effective treatments for UTIs. These antibiotics remain key choices for treating complicated and resistant cases,

structural abnormalities or severe complications. This follow-up approach ensures timely assessment of treatment efficacy and early detection of any recurrent or unresolved issues.

DISCUSSION

In our study, the highest prevalence of UTI cases was in the 5–10 years age group (37.5). These findings are consistent with those of Kumar et al. (2023) [5], who also reported a peak incidence of UTIs in children older than 5 years, suggesting that increased mobility and hygiene factors may play a role in the susceptibility to infection.

Gender Distribution of Study Participants

Our study observed a female predominance (66.3%), which aligns with previous research indicating that girls are more susceptible to UTIs due to anatomical differences. Sangeda et al. (2021) [6] reported similar findings, with 70% of pediatric UTI cases occurring in females. This increased susceptibility is attributed to the shorter urethra in females, facilitat

Dysuria and Urinary Symptoms

Dysuria was present in 45% of our study population, consistent with Nakalema et al. (2022) [8], who reported a 48% prevalence of dysuria in febrile children with UTIs.

particularly in hospitalized patients.

Radiological and Imaging Findings Ultrasound Abnormalities

In our study, 38.8% of children had normal ultrasound findings, while simple cystitis (6.7%) and chronic cystitis with pyelonephritis (1.2%) , hydronephrosis (0.8%) were among the notable abnormalities. Kumar et al. (2023) [11] similarly found that 35% of children with recurrent UTIs had abnormal ultrasound findings, particularly renal scarring. The detection of cystitis and hydronephrosis in our study indicates that early radiological evaluation plays a critical role in diagnosing complicated UTIs and preventing long-term sequelae.

CONCLUSION

This study provides a comprehensive analysis of the

clinical profile, microbiological findings, and radiological features of pediatric urinary tract infections (UTIs) in a tertiary care setting. The increasing resistance to ciprofloxacin and ceftriaxone underscores the urgent need for antimicrobial stewardship programs to prevent the overuse of broad-spectrum antibiotics. Additionally, the study highlights the role of early ultrasound screening in identifying anatomical abnormalities such as vesicoureteral reflux (VUR), which predispose children to recurrent infections and potential long-term renal damage.

The study underscores the critical need for early diagnosis, appropriate antibiotic selection, and radiological evaluation to prevent complications and improve pediatric UTI management. By integrating these findings into clinical practice and public health policies, healthcare professionals can contribute to better patient outcomes, reduced antimicrobial resistance, and improved pediatric health.

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