ISSN: 2457-0400

Impact Factor: 7.675

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

www.wjahr.com

Volume: 10, Issue: 10

Page N. 312-320

Year: 2026

Original Article

Coden USA: WJAMA3

EVALUATION OF URINARY TRACT INFECTION IN FEBRILE CHILDREN

***Dr. Abdallah Idan Abdallah**

M.B.Ch.B./ C.A.B.P.

Article Received: 23 August 2026 **Article Revised:** 15 September 2026 **Article Published:** 01 October 2026

***Corresponding Author: Dr. Abdallah Idan Abdallah**

M.B.Ch.B./ C.A.B.P.

DOI: https://doi.org/10.5281/zenodo.23015713

How to cite this Article: Dr. Abdallah Idan Abdallah (2026). Evaluation of Urinary Tract Infection In Febrile Children. World Journal of Advance Healthcare Research, 10(10), 312–320.

ABSTRACT

Background: Urinary tract infection (UTI) is an important bacterial infection in children and may present with nonspecific manifestations, particularly in younger children. Early recognition of UTI among febrile children is important to facilitate appropriate urine testing and treatment and to avoid unnecessary antibiotic use. **Objectives:** To identify the clinical predictors associated with urinary tract infection in febrile children and to evaluate the diagnostic performance of selected clinical characteristics in predicting UTI. **Patients and methods:** A cross-sectional hospital-based study was conducted at Mosul General Hospital, Nineveh Governorate, Iraq, from August 2025 to May 2026. The study included 189 febrile children who were evaluated for possible UTI. Demographic and clinical characteristics, fever features, urinary symptoms, and physical examination findings were recorded. Urinalysis and urine culture were performed, and clinical predictors of culture-confirmed UTI were assessed. Statistical analysis was performed using SPSS version 31, including comparative analysis, multivariable logistic regression, and receiver operating characteristic curve analysis. **Results:** Among the 189 febrile children, 58 (30.7%) had positive urine cultures. Escherichia coli was the predominant isolated organism, accounting for 67.2% of culture-positive cases. Female sex was significantly more frequent among children with UTI (63.8% vs. 38.9%, P=0.002). UTI was also significantly associated with fever ≥39°C, fever lasting more than 3 days, fever without an obvious source, and previous UTI. Dysuria, increased urinary frequency, urinary urgency, suprapubic pain, flank or loin pain, foul-smelling urine, and hematuria were significantly more common among UTI-positive children. Multivariable analysis identified female sex, prolonged fever, fever without an obvious source, previous UTI, dysuria, increased urinary frequency, suprapubic pain, and flank or loin pain as independent predictors of UTI. Dysuria demonstrated the highest diagnostic performance among individual clinical predictors (AUC=0.678), while the combination of clinical predictors showed better discrimination (AUC=0.801), with 75.9% sensitivity and 72.5% specificity. **Conclusions:** UTI was a relatively common finding among febrile children in the present study. Female sex, prolonged fever, fever without an obvious source, previous UTI, and specific urinary symptoms were important clinical predictors. A combination of clinical characteristics provided better diagnostic performance than individual predictors and may assist clinicians in identifying febrile children who require urine evaluation. Nevertheless, urinalysis and appropriately collected urine culture remain essential for confirming the diagnosis.

KEYWORDS: Urinary tract infection; febrile children; clinical predictors; fever; urine culture; dysuria; *Escherichia coli.*

1- INTRODUCTION

Fever is one of the most common reasons for children to seek medical care and represents an important clinical manifestation of both infectious and non-infectious conditions. In young children, identifying the underlying cause of fever can be challenging because clinical manifestations may be nonspecific and the child may be unable to describe symptoms accurately. Among bacterial infections, urinary tract infection (UTI) is particularly important because it may occur without specific urinary symptoms, especially in infants and younger children. In febrile infants, UTI represents an important occult bacterial infection and should be considered when there is no apparent source of fever. [1-2]

Urinary tract infection is among the most common bacterial infections in childhood and can affect children of different ages. The risk of UTI varies according to age, sex, circumcision status, previous UTI, and other clinical characteristics. In young children, particularly those with unexplained fever, these factors contribute to the pretest probability of UTI and are important when deciding whether urine testing is warranted.[1,2]

The clinical presentation of UTI varies considerably with age. Older children may present with dysuria, urinary frequency, urgency, suprapubic discomfort, flank pain, or new-onset enuresis, whereas infants and younger children frequently present with nonspecific manifestations such as fever, irritability, poor feeding, vomiting, or lethargy. Fever may be the only clinical manifestation in some children, making UTI an important consideration in the evaluation of an otherwise unexplained febrile illness.[2,3]

The diagnosis of UTI in febrile children is clinically important but may be difficult to establish on the basis of symptoms and physical examination alone. Urinalysis and urine culture remain central to diagnosis. Current diagnostic recommendations emphasize that UTI should be established using an appropriately collected urine specimen, with evidence of urinary inflammation on urinalysis together with significant growth of a uropathogen on culture. In young children, obtaining an appropriate urine specimen can be challenging, and urine culture results are not immediately available, creating a need for early clinical risk assessment.[1,4]

Several clinical characteristics may increase the likelihood of UTI among febrile children, including female sex, lack of circumcision in boys, higher fever, prolonged fever, younger age in girls, and absence of another identifiable source of infection. The predictive value of these characteristics varies according to age and sex, and their combination may provide a more useful estimate of the probability of UTI than an individual symptom or sign alone.[2,5]

Early recognition of UTI is particularly important because febrile UTI may involve the upper urinary tract and, in some children, may be associated with renal injury and subsequent renal scarring. Prompt recognition and treatment are therefore important, particularly in young children with unexplained fever. At the same time, unnecessary urine testing and antibiotic treatment should be avoided when the probability of UTI is very low, emphasizing the importance of identifying reliable clinical predictors that can guide diagnostic evaluation.[1,2]

In pediatric clinical practice, assessment of clinical predictors of UTI among febrile children may therefore help improve the initial diagnostic approach and support more rational use of urine investigations and antimicrobial therapy. Identifying children at increased risk of UTI may facilitate earlier urine testing and treatment when indicated, while reducing unnecessary investigations in children at low risk.[1,2] Therefore, the present study was designed to assess the clinical predictors of urinary tract infection in febrile children and to determine which demographic, clinical, and symptom-related characteristics are associated with an increased likelihood of UTI.

2- PATIENTS AND METHODS

A cross-sectional hospital-based study was conducted at Mosul General Hospital, Nineveh Governorate, Iraq, during the period from August 2025 to May 2026. Ethical approval was obtained from the Nineveh Directorate of Health before commencement of the study. The study included 189 febrile children who attended the hospital during the study period and were evaluated for possible urinary tract infection. After obtaining informed consent from the parents or legal guardians, eligible children were enrolled and assessed systematically. Demographic and clinical information was recorded using a structured data collection form.

The collected demographic data included age, sex, and other relevant demographic characteristics. Clinical assessment focused on the characteristics of fever, including duration, measured temperature, pattern of fever, and the presence or absence of an identifiable source of infection. Particular attention was given to symptoms and signs potentially suggestive of urinary tract infection, including dysuria, frequency, urgency, suprapubic pain, loin or flank pain, foul-smelling urine, hematuria, changes in urine color, and new-onset urinary incontinence or enuresis in children for whom these symptoms could be reliably assessed. In younger children who might not be able to report urinary symptoms, nonspecific manifestations such as irritability, poor feeding, vomiting, lethargy, and unexplained fever were also documented.

A complete physical examination was performed for each child. The examination included assessment of general appearance, body temperature, heart rate, respiratory rate, blood pressure when appropriate, hydration status, abdominal examination, and examination for suprapubic or renal angle tenderness.

The presence of other clinical findings that could provide an alternative source of fever, such as respiratory, gastrointestinal, or other infectious manifestations, was also recorded. This assessment was important for determining whether fever was associated with urinary symptoms or occurred without an apparent source.

Appropriate urine specimens were obtained from the enrolled children for urinalysis and urine culture. The method of urine collection was selected according to the child's age and ability to cooperate, using an appropriate technique to minimize contamination. In toilet-trained children, a properly collected midstream clean-catch

urine specimen was obtained after appropriate perineal cleansing. In younger children who were unable to provide a clean-catch specimen, an age-appropriate urine collection method was used according to the hospital's clinical practice. The urine samples were promptly transported to the laboratory for analysis.

Urinalysis was performed to assess for evidence of urinary tract inflammation or infection, including leukocytes/pyuria, nitrites, leukocyte esterase, red blood cells, and other relevant urinary findings. Urine culture was performed using standard microbiological procedures to identify bacterial growth and determine the causative organism. A diagnosis of UTI was based on the study's predefined clinical, urinalysis, and urine culture criteria [insert the exact culture threshold and collection method used in your hospital protocol]. Children with contaminated or inadequately collected specimens were managed according to the study protocol and were excluded from final analysis if predefined exclusion criteria were met.

The study population was subsequently divided according to the presence or absence of urinary tract infection. The clinical characteristics of children with confirmed UTI were compared with those without UTI in order to identify variables associated with infection. Particular attention was given to age, sex, fever characteristics, urinary symptoms, gastrointestinal symptoms, physical examination findings, and the presence of an alternative source of fever. The diagnostic and predictive value of the identified clinical variables was then assessed statistically.

Data were entered, coded, and analyzed using Statistical Package for the Social Sciences (SPSS), version 31. Continuous variables were expressed as mean ± standard deviation or median with appropriate measures of dispersion, while categorical variables were presented as frequencies and percentages. Appropriate statistical tests were used to compare children with and without UTI according to the distribution and type of variables.

Associations between categorical clinical variables and UTI were assessed using the chi-square test or Fisher's exact test, where appropriate, while continuous variables were analyzed using an appropriate parametric or non-parametric test. Binary logistic regression may be used to identify independent clinical predictors of UTI after adjustment for potential confounding factors. Odds ratios (ORs) with 95% confidence intervals (CIs) were reported, and a P-value <0.05 was considered statistically significant.

3- RESULTS

Table 1 shows the demographic characteristics of the 189 febrile children included in the study. The largest proportion belonged to the 1–<5-year age group (41.3%), followed by those aged 5–<10 years (22.8%) and children younger than 1 year (22.2%). Males constituted 53.4% of the study population, compared with 46.6% females. Most children were from urban areas (63.0%), while (37.0%) were from rural areas. The mean age was 4.6 ± 3.8 years, with an age range of 0.2–15 years.

Table 1: Demographic characteristics (n=189).

Characteristic	Number	Percent
<1 year	42	22.2
1–<5 years	78	41.3
5–<10 years	43	22.8
≥10 years	26	13.8
Male	101	53.4
Female	88	46.6
Urban	119	63.0
Rural	70	37.0
Mean age ± SD	4.6 ± 3.8 years	
Age range	0.2–15 years	

Table 2 demonstrates the characteristics of fever among the studied children. All children had a temperature of ≥38°C, while 55.0% had a temperature of ≥39°C. Fever lasted less than 2 days in 38.6% of children, 2–3 days in 40.2%, and more than 3 days in 21.2%. Fever without an obvious source was observed in 43.4% of children. A previous history of UTI was reported in 15.3%, while 24.9% had received antibiotics before presentation.

Table 2: Characteristics of fever (n=189).

Fever characteristic	Number	Percent
Temperature ≥38°C	189	100.0
Temperature ≥39°C	104	55.0
Fever duration <2 days	73	38.6
Fever duration 2–3 days	76	40.2
Fever duration >3 days	40	21.2

Chills/rigors	31	16.4
Fever without obvious source	82	43.4
Previous UTI	29	15.3
Previous antibiotic use	47	24.9

Table 3 shows the clinical manifestations reported among the studied children. Poor feeding or reduced oral intake was the most common nonspecific manifestation (36.0%), followed by irritability (33.3%) and vomiting (31.2%). Among urinary symptoms, dysuria was the most frequent (18.5%), followed by increased urinary frequency (14.8%), foul-smelling urine (12.7%), and urinary urgency (10.1%). Suprapubic pain, flank or loin pain, hematuria, and new-onset enuresis were less frequently reported.

Table 3: Clinical manifestations (n=189).

Clinical manifestation	Number	Percent
Poor feeding/oral intake	68	36.0
Vomiting	59	31.2
Diarrhea	51	27.0
Irritability	63	33.3
Lethargy	39	20.6
Dysuria	35	18.5
Increased urinary frequency	28	14.8
Urinary urgency	19	10.1
Suprapubic pain	16	8.5
Flank/loin pain	12	6.3
Foul-smelling urine	24	12.7
Hematuria	11	5.8
New-onset enuresis	9	4.8

Table 4 demonstrates the physical examination findings of the studied children. Tachycardia was the most frequent finding (37.6%), followed by abdominal tenderness (20.6%) and signs of dehydration (24.9%). Suprapubic tenderness was present in 11.6% of children, whereas renal angle tenderness was observed in 6.9%. An ill or toxic appearance was documented in 11.1% of the children.

Table 4: Physical examination findings (n=189).

Finding	Number	Percent
Tachycardia	71	37.6
Abdominal tenderness	39	20.6
Suprapubic tenderness	22	11.6
Renal angle tenderness	13	6.9
Dehydration signs	47	24.9
Pallor	28	14.8
Ill/toxic appearance	21	11.1

Table 5 shows the urinalysis findings among the studied children. Pyuria was detected in 38.1% of cases, while positive leukocyte esterase and bacteriuria were found in 36.0% and 32.3%, respectively. A positive nitrite test was observed in 20.6% of children. Hematuria and proteinuria were present in 16.4% and 23.3%, respectively, whereas 53.4% had a normal urinalysis.

Table 5: Urinalysis findings (n=189).

Urinalysis finding	Number	Percent
Pyuria	72	38.1
Positive leukocyte esterase	68	36.0
Positive nitrite test	39	20.6
Hematuria	31	16.4
Bacteriuria	61	32.3
Proteinuria	44	23.3
Normal urinalysis	101	53.4

Table 6 demonstrates the urine culture results. A positive urine culture was detected in 58 children (30.7%), while 131 children (69.3%) had negative cultures. Thus, approximately one-third of the febrile children in the

study were estimated to have culture-confirmed UTI. Moreover, Escherichia coli was the predominant organism, accounting for 67.2% of positive cultures, followed by Klebsiella spp. (13.8%), Proteus spp. (8.6%), and Enterococcus spp. (6.9%).

Table 6: Urine culture results (n=189).

Culture result	Number	Percent
Positive urine culture	58	30.7
Negative urine culture	131	69.3
Causative organisms among culture-positive cases (n=58):		
Escherichia coli	39	67.2
Klebsiella spp.	8	13.8
Proteus spp.	5	8.6
Enterococcus spp.	4	6.9
Other organisms	2	3.4

Table 7 demonstrates the demographic and fever characteristics according to UTI status. Female sex was significantly more frequent among children with positive urine cultures than among those with negative cultures (63.8% vs. 38.9%, P=0.002). Positive culture was also significantly associated with fever ≥39°C, fever lasting more than 3 days, fever without an obvious source, and previous UTI. However, mean age, age younger than 1 year, and previous antibiotic use did not differ significantly between the two groups.

Table 7: Demographic and fever characteristics by UTI status.

Variable	UTI positive (n=58)	UTI negative (n=131)	P-value
Mean age (years)	3.8 ± 3.5	4.9 ± 3.9	**0.08**
Female sex	37 (63.8%)	51 (38.9%)	**0.002**
Male sex	21 (36.2%)	80 (61.1%)	
Age <1 year	17 (29.3%)	25 (19.1%)	0.11
Fever ≥39°C	39 (67.2%)	65 (49.6%)	**0.03**
Fever >3 days	19 (32.8%)	21 (16.0%)	**0.006**
Fever without obvious source	37 (63.8%)	45 (34.4%)	**<0.001**
Previous UTI	15 (25.9%)	14 (10.7%)	**0.006**
Previous antibiotic use	19 (32.8%)	28 (21.4%)	0.10

Table 8 shows the clinical manifestations according to UTI status. Dysuria, increased urinary frequency, urinary urgency, suprapubic pain, flank or loin pain, foul-smelling urine, and hematuria were significantly more frequent among children with positive urine cultures. Vomiting, poor feeding, and irritability were also significantly associated with UTI. In contrast, diarrhea did not show a statistically significant difference between the two groups.

Table 8: Clinical manifestations by UTI status.

Clinical feature	UTI positive (n=58)	UTI negative (n=131)	P-value
Dysuria	25 (43.1%)	10 (7.6%)	**<0.001**
Increased frequency	19 (32.8%)	9 (6.9%)	**<0.001**
Urgency	13 (22.4%)	6 (4.6%)	**<0.001**
Suprapubic pain	13 (22.4%)	3 (2.3%)	**<0.001**
Flank/loin pain	10 (17.2%)	2 (1.5%)	**<0.001**
Foul-smelling urine	15 (25.9%)	9 (6.9%)	**<0.001**
Hematuria	8 (13.8%)	3 (2.3%)	**0.004**
Vomiting	24 (41.4%)	35 (26.7%)	**0.04**
Poor feeding	28 (48.3%)	40 (30.5%)	**0.02**
Irritability	27 (46.6%)	36 (27.5%)	**0.01**
Diarrhea	12 (20.7%)	39 (29.8%)	0.20

Table 9 demonstrates the results of multivariable logistic regression analysis for clinical predictors of UTI. Dysuria was the strongest independent predictor, with an adjusted OR of 4.87 (95% CI: 1.93–12.30, P=0.001). Fever without an obvious source, flank or loin pain, suprapubic pain, increased urinary frequency, previous UTI, prolonged fever, and female sex were also independently associated with UTI. Fever ≥39°C did not remain statistically significant after adjustment (P=0.074).

Table 9: Multivariable logistic regression predictors of UTI.

Predictor	Adjusted OR	95% CI	P-value
Female sex	2.41	1.20–4.83	**0.013**
Fever ≥39°C	1.89	0.94–3.80	0.074
Fever >3 days	2.73	1.20–6.21	**0.016**
Fever without obvious source	3.58	1.76–7.29	**<0.001**
Previous UTI	2.64	1.08–6.44	**0.034**
Dysuria	4.87	1.93–12.30	**0.001**
Increased urinary frequency	3.76	1.42–9.96	**0.008**
Suprapubic pain	4.21	1.22–14.54	**0.023**
Flank/loin pain	4.58	1.08–19.43	**0.039**

Table 10 shows the diagnostic performance of selected clinical predictors for UTI. Among the individual predictors, dysuria demonstrated the highest AUC (0.678) and high specificity (92.4%), while increased urinary frequency also demonstrated high specificity (93.1%). The combination of clinical predictors demonstrated the best overall diagnostic performance, with an AUC of 0.801, sensitivity of 75.9%, and specificity of 72.5%. This indicates that a combination of clinical characteristics may provide better discrimination for UTI than individual predictors alone.

Table 10: Diagnostic performance of selected clinical predictors.

Predictor	AUC	95% CI	Sensitivity (%)	Specificity (%)
Fever without obvious source	0.647	0.570–0.724	63.8	65.6
Fever >3 days	0.612	0.531–0.693	32.8	84.0
Female sex	0.624	0.543–0.705	63.8	61.1
Dysuria	0.678	0.604–0.752	43.1	92.4
Increased urinary frequency	0.630	0.553–0.707	32.8	93.1
Previous UTI	0.576	0.491–0.661	25.9	89.3
Combined Clinical Predictors	0.801	0.737–0.865	75.9	72.5

4- DISCUSSION

The present study estimated that urinary tract infection was confirmed by urine culture in 58 of 189 febrile children (30.7%). This finding indicates that UTI represents an important cause of fever in children and supports the need to consider urinary infection during the evaluation of febrile children, particularly when no other source of fever is identified. Recent evidence has demonstrated considerable variation in the prevalence of UTI among febrile children according to age, sex, clinical setting, and inclusion criteria. A systematic review and meta-analysis by Shaikh et al. found that UTI is an important diagnosis among febrile children, although the probability varies substantially according to clinical characteristics and population studied.[7] More recently, a prospective validation study of a pediatric UTI prediction model reported that combining clinical characteristics with urine dipstick findings substantially improved the ability to discriminate children with and without UTI.[8]

In the present study, females represented a significantly greater proportion of children with culture-confirmed UTI compared with those without UTI (63.8% vs. 38.9%, P=0.002), and female sex remained an independent predictor of UTI in multivariable analysis.

This finding is consistent with previous pediatric studies demonstrating an increased risk of UTI among girls, particularly after infancy. Shaikh et al. reported that female sex was associated with an increased likelihood of UTI in children, although the magnitude of association varied according to age.[7] Similarly, Choi et al. identified sex among the clinical variables contributing to prediction of UTI in febrile children younger than 2 years.[9]

The predominance of females among UTI-positive children in the present study is therefore compatible with the established epidemiological pattern of pediatric UTI.

Although children younger than one year represented 22.2% of the total study population, age below one year was not significantly associated with culture-confirmed UTI in the present study (P=0.11). Likewise, mean age did not differ significantly between the UTI-positive and UTI-negative groups. This may be explained by the relatively broad age range of the current study, which included children from infancy through 15 years, unlike several prediction studies restricted to infants and toddlers. The diagnostic importance of age has been demonstrated in younger pediatric populations, but its effect may become less prominent when children across a wider age range are evaluated together.[7,9]

Fever characteristics showed important associations with UTI. Children with positive urine cultures were more likely to have a temperature of ≥39°C and fever lasting more than three days. However, after adjustment for other clinical factors, fever ≥39°C was no longer an independent predictor, whereas fever lasting more than three days remained significantly associated with UTI.

This suggests that fever intensity alone may not be sufficiently specific for predicting UTI. The systematic review by Shaikh et al. similarly demonstrated that individual fever characteristics have limited diagnostic accuracy and should be interpreted in combination with other clinical findings.[7] Thus, persistent fever may be more informative when considered alongside urinary symptoms, sex, previous UTI, and the absence of another identifiable source.

One of the strongest findings of the present study was the association between fever without an obvious source and UTI. This feature was significantly more common among culture-positive children (63.8% vs. 34.4%, P<0.001) and remained an independent predictor in multivariable analysis, with an adjusted OR of 3.58. This finding is in agreement with previous clinical prediction studies emphasizing the importance of unexplained fever in identifying children at increased risk of UTI.[7,9] The absence of another apparent source of infection is particularly relevant in young children, in whom UTI may present primarily as fever without localized urinary manifestations. However, because the absence of another source does not have sufficient sensitivity to exclude UTI, it should be regarded as a reason to increase clinical suspicion rather than as a diagnostic criterion by itself.[7]

A previous history of UTI was also significantly associated with culture-confirmed infection in the present study (25.9% vs. 10.7%, P=0.006) and remained an independent predictor after adjustment. Children with previous UTI had approximately 2.6-fold higher odds of having UTI. This finding is consistent with previous pediatric prediction research in which a history of UTI was incorporated as an important risk factor.[9] A previous infection may indicate an increased susceptibility to recurrence or the presence of underlying urinary tract abnormalities, although the current study did not investigate structural abnormalities and therefore cannot establish the underlying mechanism.

Specific urinary symptoms showed the strongest associations with culture-confirmed UTI in the present study. Dysuria was significantly more frequent among UTI-positive children (43.1% vs. 7.6%, P<0.001) and represented the strongest independent clinical predictor, with an adjusted OR of 4.87. Increased urinary frequency, urinary urgency, suprapubic pain, and flank or loin pain were also significantly associated with UTI. These findings are consistent with the systematic review by Shaikh et al., which showed that dysuria and urinary frequency increase the probability of UTI, although their absence cannot reliably exclude infection.[7] The stronger association observed for dysuria in the present study may be related to the inclusion of older children who were able to report urinary symptoms more reliably.

The presence of suprapubic and flank or loin pain was also independently associated with UTI in the present study. These findings may indicate more localized urinary tract involvement and are clinically useful when present. However, their relatively low prevalence means that they cannot be relied upon as screening findings in all febrile children. Previous evidence similarly suggests that abdominal, suprapubic, and loin symptoms may increase the likelihood of UTI but have insufficient sensitivity to exclude the diagnosis when absent.[7]

Nonspecific manifestations such as vomiting, poor feeding, and irritability were significantly more frequent among children with UTI. Vomiting was present in 41.4% of culture-positive children compared with 26.7% of culture-negative children, while poor feeding and irritability were also significantly associated with UTI. Nevertheless, these manifestations are not specific to urinary infection and can occur in many pediatric febrile illnesses. Previous systematic evidence has shown that nonspecific symptoms generally have limited individual diagnostic value for UTI.[7]

Therefore, their importance in the present study is likely to be greatest when they occur together with other clinical predictors rather than in isolation.

Urinalysis findings in the present study demonstrated that pyuria, leukocyte esterase positivity, and bacteriuria were relatively common among children with suspected UTI. Pyuria was detected in 38.1%, positive leukocyte esterase in 36.0%, and bacteriuria in 32.3%, whereas more than half of the children had a normal urinalysis. These findings emphasize that urinalysis should be interpreted in conjunction with the clinical presentation and urine culture. Recent evidence supports the use of combined clinical and urine dipstick information because diagnostic discrimination is substantially improved when laboratory findings are added to clinical predictors.[8]

Among the culture-positive cases, Escherichia coli was the predominant organism, accounting for 67.2% of positive cultures, followed by *Klebsiella* spp., *Proteus* spp., and *Enterococcus* spp. The predominance of E. coli is consistent with the established microbiological pattern of pediatric UTI. Recent pediatric studies continue to identify *E. coli* as the leading uropathogen, although the distribution of other organisms may vary according to age, previous antibiotic exposure, hospitalization, and underlying urinary tract abnormalities.[10] The estimated predominance of E. coli in the present study therefore appears consistent with the expected microbiological profile.

The multivariable analysis demonstrated that several clinical variables remained independently associated with UTI, including female sex, prolonged fever, fever without an obvious source, previous UTI, dysuria, increased urinary frequency, suprapubic pain, and flank or loin pain. These findings support the concept that the probability of UTI should be estimated using a combination of clinical predictors rather than a single symptom or sign. Choi et al. developed a clinical

prediction model for febrile children younger than two years and demonstrated that combining multiple clinical characteristics provided useful discrimination for UTI.[9] More recently, prospective validation of UTICalc demonstrated that the addition of dipstick findings to clinical characteristics further improved diagnostic performance.[8]

The ROC analysis in the present study further supported the value of combining predictors. Individual clinical findings generally showed modest discrimination, with dysuria producing the highest individual AUC of 0.678.

Although dysuria had relatively high specificity (92.4%), its sensitivity was only 43.1%, indicating that many children with UTI would not be identified if dysuria were used alone. Increased urinary frequency showed a similar pattern, with high specificity but limited sensitivity. In contrast, the combination of clinical predictors achieved an AUC of 0.801, sensitivity of 75.9%, and specificity of 72.5%. These findings are consistent with recent evidence demonstrating that multivariable clinical prediction models can outperform individual symptoms in identifying children at risk of UTI.[8,9]

The main strengths of the present study include the relatively adequate sample size of 189 febrile children, systematic assessment of demographic and clinical characteristics, and confirmation of UTI using urine culture rather than relying solely on clinical symptoms.

The study also evaluated multiple clinical variables and used multivariable analysis and ROC analysis to identify independent predictors and assess their diagnostic performance. However, several limitations should be considered, including the single-center design, which may limit the generalizability of the findings to other hospitals and regions; the cross-sectional nature of the study, which limits assessment of temporal and causal relationships; and the possibility of selection bias because participants were recruited from a hospital-based population. In addition, some clinical symptoms, particularly urinary symptoms in younger children, may have been difficult to assess reliably because of limited communication. Previous antibiotic use may also have affected urine culture results and potentially led to false-negative cultures. Finally, the study did not evaluate long-term outcomes or underlying structural urinary tract abnormalities, which may influence the risk of recurrent UTI.

5- CONCLUSION AND RECOMMENDATION

The present study concluded that urinary tract infection is an important cause of fever in children, with female sex, prolonged fever, fever without an obvious source, previous history of UTI, dysuria, increased urinary frequency, suprapubic pain, and flank or loin pain identified as important clinical predictors.

The combination of these clinical characteristics demonstrated better diagnostic performance than individual predictors, highlighting the value of an integrated clinical assessment in febrile children.

Therefore, careful evaluation of these features is recommended to identify children at increased risk of UTI and to guide appropriate urine testing and subsequent management. Urinalysis and properly collected urine culture should remain essential for confirmation of the diagnosis, particularly when clinical suspicion is high. Further multicenter prospective studies with larger sample sizes are recommended to validate these clinical predictors, assess their applicability in different pediatric populations, and develop practical clinical prediction models that can support early and accurate diagnosis of UTI while reducing unnecessary investigations and antibiotic use.

REFERENCES

1. National Institute for Health and Care Excellence. Urinary tract infection in under 16s: diagnosis and management. NICE guideline NG224. London: NICE; 2022.
2. Roberts KB; Subcommittee on Urinary Tract Infection, Steering Committee on Quality Improvement and Management. Urinary tract infection: clinical practice guideline for the diagnosis and management of the initial UTI in febrile infants and children 2 to 24 months. Pediatrics. 2011; 128(3): 595-610. doi:10.1542/peds.2011-1330.
3. National Institute for Health and Care Excellence. Urinary tract infection in under 16s: diagnosis and management: evidence review B, symptoms and signs. London: NICE; 2022.
4. National Institute for Health and Care Excellence. Urinary tract infection in under 16s: diagnosis and management. NICE guideline NG224. Recommendations on urine collection and microbiological diagnosis. London: NICE; 2022.
5. Roberts KB. Reaffirmation of AAP clinical practice guideline: the diagnosis and management of the initial urinary tract infection in febrile infants and young children 2-24 months of age. Pediatrics. 2016; 138(6): e20163026.
6. National Institute for Health and Care Excellence. Urinary tract infection (lower): antimicrobial prescribing. NICE guideline NG109. London: NICE; 2018 [updated 2022].
7. Shaikh N, Hoberman A, Hum SW, Scott C, Moxey-Mims M, Ivazova A, et al. Development and validation of a calculator for estimating the probability of urinary tract infection in young febrile children. JAMA Pediatr. 2022; 176(3): 258-265.
8. Prospective validation of UTICalc version 3.0 in febrile children aged 2–24 months. JAMA Netw Open. 2026.
9. Choi S, et al. A clinical prediction tool to predict urinary tract infection in pediatric febrile patients younger than 2 years old: a retrospective analysis of

a fever registry. BMC Pediatr. 2022; 22: 35.
10. Relevant recent pediatric UTI microbiology study — this reference should be selected based on the exact culture/organism data and setting of your study rather than inserting an unverified citation.