Al-Mukhtar Journal of Sciences 40 (1): 52-56, 2025
Doi: https://doi.org/10.54172/

Research Article **Open Access**

Epidemiological and Clinical Characteristics of Pediatric Urinary Tract Infections in Benghazi, Libya: A Two-Year Retrospective Study

Jebrile S. Elabidi [1]*, Asmaa F. Salih [2] and Monia faraj [3]

***Corresponding author:** Jebril.elabidi@uob.edu.ly, Department of Pediatrics, Faculty of Medicine, University of Benghazi, Libya.

[2, 3] Department of Pediatrics, Faculty of Medicine, University of Benghazi, Libya

Received:
27 May 2025

Accepted:
27 June 2025

Publish online:
30 June 2025

Abstract

Urinary tract infections (UTIs) are among the most prevalent bacterial infections in children and represent a significant cause of pediatric morbidity worldwide. This study examines the epidemiological and clinical characteristics of UTIs among children admitted to Benghazi pediatric hospitals for two years A retrospective analysis of 176 pediatric patients (January 2021-December 2022) was conducted at Benghazi Children's Hospital. Data included demographics, clinical presentation, laboratory findings, and imaging results. UTI prevalence among nephrology admissions was 17.6 %, with a female predominance of (62.5 %). E. coli was the predominant pathogen (71.4 %). Common symptoms included abdominal pain (35.8 %), discolored urine (31.3 %), and vomiting (26.7 %). Ultrasound revealed abnormalities in 31.8 % of cases. Pediatric UTIs in Benghazi show similar patterns to global trends, with E. coli as the primary pathogen. These findings emphasize a need for prompt diagnosis and tailored antibiotic therapy in our region.

Keywords: Pediatric UTI, Escherichia Coli, Vesicoureteral Reflux, UTI Epidemiology, Retrospective Study, Libya.

INTRODUCTION

Urinary tract infections (UTIs) represent a significant cause of morbidity among the pediatric population worldwide (Ali, 2022) .They can affect both the lower (cystitis) and upper (pyelonephritis) urinary tracts (AL-Mendalawi, 2020). The clinical presentation of UTIs in children varies significantly by age, with indistinct symptoms in infants making early diagnosis challenging (Al-Qurashi, 2020). Undiagnosed or inadequately treated UTIs can lead to long-term complications, such as renal scarring, hypertension, and chronic kidney disease (American Academy of Pediatrics, 2021). Recurrent UTIs are also common and may be linked to underlying anatomical abnormalities such as vesicoureteral reflux (VUR), bladder dysfunction, or immune deficiencies (Chua, 2023). In newborns, particularly males, the incidence is higher during the first few months of life, especially in uncircumcised boys (downs, 2024). As children age, females become more commonly affected due to their shorter urethra and proximity to the perineal region (Freedman, 2024).

Geographic, socioeconomic, and cultural factors could influence UTI prevalence and microbial resistance patterns, particularly in developing regions (Johnson, 2021). Thus, a region-specific understanding of UTI characteristics is crucial for implementing effective diagnostic, preventive, and therapeutic strategies (Mohamed, 2021). This study aims to fill this gap by analyzing the

epidemiological and clinical patterns of pediatric UTIs in Benghazi, Libya, providing insights into local trends in symptom presentation, microbial etiology, and outcomes (Roberts, 2021).

MATERIALS AND METHODS

This retrospective cohort study analyzed medical records of children (0-15 years) admitted with UTI to Benghazi Children's Hospital from January 2021 to December 2022. The sample size (n=176) was determined by all eligible cases during the study period. Diagnosis required: 1) Clinical symptoms. 2) Positive urine culture (>10^5 CFU/ml) or 3) Pyuria (>5 WBCs/hpf) + positive dipstick. Urine samples were obtained via clean-catch (73.3 %), catheterization (10.2 %), or suprapubic aspiration (16.5 %). Ethical approval was obtained from the University of Benghazi Ethics Committee (Ref: UB/Ped/2023-045), with a waiver of informed consent due to the study's retrospective nature.

RESULTS

Table (1). Distribution of patients according to age and sex

Age/year	Male n=66	Female (n=110)	Total %
<1	29 (43.9 %)	16 (14.5 %)	45 (25.6 %)
1 - 5	19 (28.8 %)	46 (41.8 %)	65 (36.9 %)
6-10	12 (18.2 %)	38 (34.5 %)	50 (28.4 %)
11-15	6 (9.1 %)	10 (9.2 %)	16 (9.1 %)
Total	66	110	176

Children aged 1-5 years represented the largest group (36.9 %), with significant female predominance (62.5 %, p=0.04). The male-to-female ratio shifted from 3:1 in infants to 1:2.5 in children > 5 years, reflecting known epidemiological patterns.

Table (2). Clinical findings, laboratory results, and urine sampling method

Category	finding	No.	%
Symptoms	Abdominal pain	63	35.8
	Change in urine colour	55	31.3
	Vomiting	47	26.7
	Dysuria	37	21
	Foul-smelling urine	26	14.8
	Poor feeding	15	8.5
	Decreased urine output	14	8
	Urinary incontinence	13	7.4
Laboratory Results	Pyuria	125	(71.0 %)
	Leukocytosis (WBC >12,000/µL)	72	(40.9 %)
	Normal WBC count	98	(55.7 %)
Urine Collection Method	Clean-catch	129	(73.3 %)
	Suprapubic aspiration	29	(16.5 %)
	Catheterization	18	10.2 %)

This integrated analysis reveals critical diagnostic patterns: while non-specific symptoms (vomiting, 26.7 %) were common, their combination with pyuria (71 %) and/or leukocytosis (40.9 %) strengthened UTI suspicion. Notably, 29 % of cases lacked pyuria, emphasizing that its absence cannot exclude infection, particularly in neonates. The high clean-catch sample success rate (73.3 %) supports its preferential use, though suprapubic aspiration (16.5 %) remains essential for non-toilet-trained infants.

Table (3). Type of bacteria

Type of bacteria	No.	%*
E-coli	66	71.4
Klebsiella	24	26.1
Proteus	2	2.2
Staph	6	6.5
Pseudomonas areuginosa	7	7.6
Streptococcus	3	3.3
Enterococcus	3	3.3
Candida	1	1.1

E. coli predominance (71.4 %) aligns with global pediatric UTI patterns, while the elevated Klebsiella frequency (26.1 % vs. typical 5-15 %) may reflect regional antimicrobial resistance trends or healthcare-associated exposures. Notably, non-E. coli Gram-negative bacteria (including Klebsiella, Pseudomonas, and Proteus) collectively accounted for 36.9 % of isolates, suggesting empirical antibiotic coverage in this region should extend beyond first-line E. coli-targeted treatments. The 7.6 % Pseudomonas aeruginosa rate—unusually high for community-acquired UTIs—warrants investigation of local risk factors (e.g., catheter use, congenital anomalies).

Table (4). Abnormal finding of USS abdomen

Abnormal finding of USS abdomen	No.	%*
Kidney PCS Dilation	20	35.7
Poor differentiation of corticomedullary kidney & small-size kidney	18	32.1
Cystitis (Thick wall)	17	30.4
Dilation of ureter	7	12.7
Hydronephrosis	5	8.9
Vesicoureteral reflux	3	5.4

Renal ultrasound abnormalities were detected in 31.8 % of patients (56/176). Pelvicalyceal system dilation was the most common finding (35.7 %). This high detection rate supports current guidelines recommending renal ultrasound in all pediatric UTI cases, particularly given the 8.9 % prevalence of hydronephrosis and the 5.4 % incidence of vesicoureteral reflux. The spectrum of abnormalities—ranging from transient inflammation (cystitis, 30.4 %) to structural changes (poor corticomedullary differentiation, 32.1 %)—highlights the importance of imaging for identifying both acute complications and chronic renal damage risks. These findings justify routine ultrasound screening, especially in young children with febrile UTIs.

DISCUSSION

This study analyzed the epidemiological and clinical characteristics of pediatric UTIs in Benghazi, revealing both global similarities and local distinctions. UTIs accounted for 17.6 % of nephrology admissions, with a female predominance of (62.5 %), aligning with global trends (Shaikh, 2021), while the higher incidence in male infants (43.9 %) may reflect local factors such as non-circumcision (Tallus, 2023). Non-specific symptoms such as abdominal pain (35.8 %) and vomiting (26.7 %) posed diagnostic challenges, underscoring the need for routine lab testing even without classic symptoms. Microbiological findings reported expected E. coli predominance (71.4 %) but unusually high Klebsiella rates (26.1 %), suggesting local antibiotic resistance patterns (Williams G. , 2023). While consistent with Egyptian (Mohamed et al., 2021) and Saudi (Al-Sayyed et al., 2020) studies, the elevated Klebsiella incidence diverged significantly from European data ($P < 0.05$) (Williams, 2022). As the first comprehensive Benghazi study combining clinical, laboratory, and imaging data, its clear methodology is a strength, though its retrospective design (n=176) may affect data completeness and the lack of long-term follow-up limits outcome assessment.

Study Strengths and Limitations:

Strengths:

- First comprehensive Benghazi study combining clinical, lab, and imaging data
- Clear methodology

Limitations:

- Retrospective design may affect data completeness
- Lack of long-term follow-up
- Moderate sample size (176 cases)

Clinical and Research Recommendations

A. Clinical:

- Implement routine urine cultures
- Adapt empirical therapy to local resistance patterns

B. Research:

- Antibiotic resistance surveillance studies.

CONCLUSION

The prevalence of UTI in children was 17.6 %. Gram-negative bacteria are responsible for most UTIs and *Escherichia coli* (E. coli) is the most predominant uropathogen in this study, followed by *Klebsiella*. Abdominal pain, change in the colour of urine, and vomiting were the most frequent symptoms in the children. UTIs in children are common and require prompt diagnosis using urine culture and appropriate imaging.

ACKNOWLEDGEMENT

The authors would like to thank the Medical Records Department of Benghazi Children's Hospital for their assistance in data retrieval and the staff of the Pediatric Nephrology Department for their cooperation during the study.

ETHICS

Ethical approval for this retrospective study was obtained from the Ethics Committee of the Faculty of Medicine, University of Benghazi. As this was a retrospective chart review, patient consent was waived.

Duality of interest: The authors declare that they have no duality of interest associated with this manuscript.

Author contributions: Jebrile Saad Elabidi designed the study and supervised data collection. Asmaa Faraj Salih contributed to data analysis and interpretation. Monia Faraj drafted and revised the manuscript. All authors read and approved the final manuscript.

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

REFERENCES

Ali, S. S., Khan, M. A., & Ibrahim, R. (2022). Emerging Klebsiella resistance in North African pediatric UTIs. *Journal of Global Antimicrobial Resistance*, 28,45–51. https://doi.org/10.1016/j.jgar.2022.02.017

Al-Mendalawi, M. D. (2020). Patterns of UTI pathogens in Middle Eastern children. *Journal of Pediatric Infectious Diseases*, 15(3), 112–118.https://doi.org/10.1055/s-0040-1714705

Al-Qurashi, T. M., Al-Harbi, K. M., & Al-Sayyed, B. F. (2020). Diagnostic challenges in Saudi pediatric UTIs. *Saudi Medical Journal*, 41(8), 825–831. https://doi.org/10.15537/smj.2020.8.25198

American Academy of Pediatrics. (2021). Clinical practice guideline: UTI diagnosis and management in febrile infants 2–24 months. *Pediatrics*, 148(3), e2021053110. https://doi.org/10.1542/peds.2021-053110

Chua, A. N., Schlomer, B. J., & Kennedy, W. A. (2023). Vesicoureteral reflux and urinary tract infection in children: Contemporary management strategies. *Current Opinion in Pediatrics*, 35(2), 255–260. https://doi.org/10.1097/MOP.0000000000001223

Downs, S. M., Finnell, S. M. E., & Roberts, K. B. (2024). Point-of-care testing and biomarkers for pediatric urinary tract infection: Moving beyond culture. *Pediatric Emergency Care*, 40(2), 142–148.https://doi.org/10.1097/PEC.0000000000003125

Freedman, A. L., & Copp, H. L(2024). Antibiotic stewardship in pediatric urology: Focus on urinary tract infection. *Journal of Pediatric Urology*, 20 (1), 12–19. https://doi.org/10.1016/j.jpurol.2023.09.021

Johnson, A. B., Smith, C. D., & Williams, E. F. (2021). Global epidemiology of pediatric UTIs. *Pediatric Nephrology*, 36(5), 1293–1301. https://doi.org/10.1007/s00467-020-04852-5

Mohamed, I. A., Mahmoud, O. A., & Salem, T. M. (2021). Egyptian UTI patterns in children under five. *African Journal of Urology*, 27, 45. https://doi.org/10.1186/s12301-021-00154-y

Roberts, K. B., Downs, S. M., & Finnell, S. M. E. (2021). Urinalysis and urine culture in febrile infants with suspected UTI: Evidence-based approach. *Pediatrics*, 147(2), e2020014068. https://doi.org/10.1542/peds.2020-014068

Shaikh, N., Hoberman, A., & Hum, S. W. (2021). Antimicrobial resistance patterns in pediatric UTIs. *Journal of the Pediatric Infectious Diseases Society*, 10(3), 306–311. https://doi.org/10.1093/jpids/piaa168

Tullus, K., & Shaikh, N. (2023). Urinary tract infections in children. *The Lancet*, 401(10376), 786–798. https://doi.org/10.1016/S0140-6736(22)02593-4

Williams, G., Hodson, E. M., Craig, J. C., & Isaacs, D.(2023). Long-term outcomes of childhood urinary tract infection: A systematic review and meta-analysis. *Pediatric Nephrology*, 38(7), 2165–2176. https://doi.org/10.1007/s00467-022-05848-z

Williams, G. J., Craig, J. C., & Isaacs, D.(2022). Contemporary management of pediatric UTIs. *The Lancet Child & Adolescent Health*, 6(4), 276–285. https://doi.org/10.1016/S2352-4642(21)00384-0.