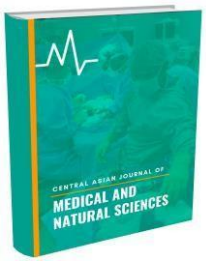

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Article

Early Detection of Urinary Tract Infections in Children

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Abstract: Urinary tract infections are among the most common bacterial diseases in pediatric practice and remain an important cause of morbidity in children due to the risk of recurrent infection and renal complications. The present study aimed to evaluate the clinical significance of early diagnosis of urinary tract infections in children and to analyze major diagnostic indicators associated with timely detection. A prospective clinical investigation involving 92 pediatric patients aged 6 months to 15 years was conducted using clinical examination, urinalysis, urine culture, inflammatory biomarkers, and ultrasonographic assessment. The results demonstrated that fever was the most frequent presenting symptom, especially in younger children with nonspecific clinical manifestations. Escherichia coli remained the predominant causative pathogen. Early diagnosis was associated with shorter hospitalization, faster clinical recovery, and reduced inflammatory complications. The study additionally highlighted the importance of rational antibacterial therapy and microbiological confirmation for improving treatment effectiveness and preventing recurrent urinary tract infections in pediatric patients.

Keywords: Urinary Tract Infection, Children, Early Diagnosis, Pediatric Nephrology, Urine Culture, Antibacterial Therapy, Renal Complications

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1. Introduction

Urinary tract infections remain among the most frequently encountered bacterial diseases in pediatric practice and continue to represent an important clinical problem because of their potential to cause both short-term morbidity and long-term renal complications in children. Although many cases initially present with relatively nonspecific symptoms, delayed recognition may contribute to recurrent infections, renal parenchymal damage, hypertension, and in severe situations, chronic kidney dysfunction later in life. For this reason, early diagnosis of urinary tract infections has become a major priority in modern pediatric healthcare systems, particularly in infants and younger children where the disease often progresses silently or imitates other common childhood illnesses [1].

One of the major diagnostic challenges in pediatric urinary tract infections is the remarkable variability of clinical manifestations according to age. Older children frequently complain of dysuria, suprapubic pain, urinary frequency, or flank discomfort, allowing clinicians to suspect urinary involvement relatively quickly. However, infants and toddlers often demonstrate only generalized manifestations such as fever, irritability, vomiting, poor feeding, lethargy, or failure to thrive, which may easily be misinterpreted as respiratory or gastrointestinal infections [2]. Consequently, many children undergo

delayed laboratory evaluation, increasing the possibility of ascending bacterial infection and inflammatory renal injury. Recent international studies have emphasized that rapid identification of urinary tract infections combined with timely initiation of appropriate antimicrobial therapy significantly reduces the risk of renal scarring and recurrent disease episodes. At the same time, irrational empirical antibiotic use without microbiological confirmation remains a growing concern because of increasing antimicrobial resistance among common uropathogens, especially Escherichia coli, which continues to be the predominant causative organism in pediatric cases [3]. Modern pediatric guidelines therefore recommend careful clinical assessment supported by urinalysis, urine culture, inflammatory biomarkers, and imaging methods when necessary in order to establish accurate diagnosis and optimize treatment strategies. In many developing healthcare environments, limited diagnostic resources and delayed access to specialized pediatric care still complicate the early detection process. This situation highlights the importance of improving awareness regarding the initial manifestations of urinary tract infections among both healthcare professionals and parents. Therefore, the present study aims to evaluate the clinical importance of early diagnosis of urinary tract infections in children while analyzing major symptoms, laboratory findings, and diagnostic approaches that may contribute to timely management and prevention of complications [4].

2. Materials and Methods

The present study was conducted as a prospective clinical observational investigation in the pediatric department of a multidisciplinary medical institution during the period from February 2024 to March 2025. The primary purpose of the research was to evaluate the clinical significance of early detection of urinary tract infections in children and to analyze the diagnostic value of laboratory and instrumental examination methods used during the initial stages of disease progression. Particular attention was directed toward identifying the most common presenting symptoms, inflammatory indicators, microbiological findings, and risk factors associated with delayed diagnosis [5]. A total of 92 children aged from 6 months to 15 years who were admitted with suspected urinary tract infection participated in the study, the enrolled patients included both male and female children presenting with fever of unclear origin, dysuria, abdominal discomfort, urinary frequency, flank pain, irritability, vomiting, or other symptoms suggestive of urinary system involvement. Children with congenital renal malformations, severe chronic kidney disease, immunodeficiency disorders, or recent hospitalization within the previous month were excluded from the investigation in order to reduce the influence of confounding clinical variables [6].

All patients underwent detailed clinical examination at the time of admission. Information regarding age, sex, previous urinary tract infections, family history, duration of symptoms, hydration status, and body temperature was carefully documented. Special consideration was given to younger children and infants because clinical manifestations in this age category were often nonspecific and difficult to interpret during the early phase of infection. Laboratory assessment included complete blood count, C reactive protein measurement, urine dipstick testing, microscopic urinalysis, and urine culture. Urine specimens were collected under sterile conditions according to patient age and clinical status. Midstream urine collection was preferred in toilet trained children, while sterile catheterization techniques were used when necessary in younger patients. Significant bacteriuria identified on urine culture together with compatible clinical findings was considered diagnostic for urinary tract infection [7].

Ultrasonographic examination of the kidneys and urinary tract was performed in children with recurrent infections, prolonged fever, or suspected anatomical abnormalities. Antibacterial therapy was initiated after urine sample collection and later adjusted according to antimicrobial sensitivity results. Supportive treatment including hydration and fever management was also provided when clinically indicated. Statistical

analysis was carried out using standard biomedical methods. Quantitative variables were expressed as mean values with standard deviation, whereas categorical indicators were analyzed in percentages. Comparative evaluation was performed to determine associations between clinical manifestations, laboratory findings, and timing of diagnosis [8].

3. Results

The clinical evaluation of children included in the study demonstrated that early manifestations of urinary tract infections varied considerably according to age, severity of inflammation, and duration of disease before hospitalization. Fever remained the most frequently observed symptom and was identified in the majority of patients, particularly among infants and younger children who often lacked typical urinary complaints during the initial stage of illness. In many cases, persistent fever without an obvious respiratory source became the first clinical indicator that prompted further urinary investigation [9]. Among older children, dysuria, increased urinary frequency, suprapubic discomfort, and flank pain were more commonly reported, however, younger patients frequently presented with nonspecific manifestations including irritability, poor appetite, vomiting, weakness, and sleep disturbances, which complicated timely diagnosis and occasionally delayed the initiation of appropriate treatment. Several children had already received empirical antibacterial therapy before urine culture collection, reducing microbiological sensitivity and creating additional diagnostic difficulties [10].

Laboratory findings revealed significant pyuria and bacteriuria in the majority of confirmed cases. Elevated leukocyte counts and increased C reactive protein levels were more frequently observed in children with prolonged febrile episodes and upper urinary tract involvement. Urine culture analysis demonstrated that Escherichia coli remained the predominant causative pathogen, accounting for most microbiologically confirmed infections. Other isolated microorganisms included Klebsiella pneumoniae, Proteus mirabilis, and Enterococcus faecalis. Antimicrobial sensitivity testing demonstrated increasing resistance to several commonly prescribed antibiotics, particularly among recurrent infection cases [11].

Ultrasonographic examination identified mild urinary tract abnormalities in a smaller proportion of children, including pelvic dilatation and residual urine retention. Recurrent infections were more common among female patients and children with delayed diagnosis. Patients diagnosed during the early phase of disease generally demonstrated faster clinical improvement, shorter hospitalization duration, and reduced inflammatory activity after treatment initiation.

Table 1. Clinical and laboratory characteristics of children with urinary tract infections

Clinical indicators	Number of patients (n=92)	Percentage (%)
Fever	76	82.6%
Dysuria	41	44.5%
Abdominal or flank pain	36	39.1%
Vomiting	28	30.4%
Positive urine culture	81	88.0%
Escherichia coli isolation	58	63.0%
Recurrent infection history	24	26.0%

The obtained results demonstrate that urinary tract infections in children often begin with clinically nonspecific manifestations, especially in younger age groups, making early laboratory screening particularly important. The data additionally confirm that prompt diagnosis combined with microbiological confirmation contributes to earlier treatment

initiation, shorter recovery periods, and reduced risk of recurrent inflammatory complications affecting the urinary system [12].

4. Discussion

The findings of the present study demonstrate that urinary tract infections in children continue to pose significant diagnostic difficulties, particularly during the early stages of disease when clinical manifestations remain vague and nonspecific. This problem is especially evident among infants and younger children, where classical urinary symptoms may be completely absent despite active bacterial inflammation within the urinary tract. In many examined cases, prolonged fever without an identifiable source represented the only major clinical sign preceding laboratory confirmation of infection. Such observations once again emphasize that pediatric urinary tract infections should always be considered in the differential diagnosis of unexplained febrile conditions in childhood [13].

One of the most clinically important aspects revealed during the investigation concerns the consequences of delayed diagnosis. Children whose infection was identified later in the disease course generally demonstrated more pronounced inflammatory markers, longer fever duration, and slower clinical recovery after initiation of therapy. These findings are consistent with modern pediatric nephrology literature suggesting that untreated or insufficiently treated urinary infections may contribute to renal parenchymal inflammation and increase the long-term risk of renal scarring, hypertension, and chronic renal impairment [14]. Early laboratory screening therefore remains critically important not only for immediate treatment success but also for long term preservation of renal function.

The study additionally highlighted the continuing predominance of Escherichia coli as the principal etiological agent in pediatric urinary tract infections. At the same time, increasing antimicrobial resistance patterns observed in recurrent infection cases raise serious concerns regarding empirical antibiotic selection. Several isolated bacterial strains demonstrated reduced sensitivity to commonly prescribed antibacterial medications, reflecting a global trend that has become increasingly problematic in pediatric infectious disease management. This situation underlines the necessity of urine culture and antimicrobial susceptibility testing whenever possible before final adjustment of therapy [15].

Another important observation relates to the diagnostic value of combined clinical and laboratory assessment. Isolated symptoms alone frequently lacked sufficient specificity for reliable diagnosis, particularly in younger children whose presentation often resembled viral gastrointestinal or respiratory illnesses. However, integration of urinalysis, inflammatory biomarkers, urine culture, and ultrasonographic evaluation significantly improved diagnostic accuracy and allowed earlier therapeutic intervention. Such an approach may be particularly beneficial in healthcare environments where delayed referral to specialized pediatric services remains common [16]. Overall, the present study confirms that improving awareness regarding the early manifestations of urinary tract infections among healthcare professionals and parents may substantially contribute to earlier diagnosis, more rational antimicrobial use, reduction of recurrent infections, and prevention of severe renal complications in children.

5. Conclusion

The present study demonstrated that early detection of urinary tract infections in children plays a critically important role in preventing disease progression, reducing inflammatory complications, and improving overall treatment outcomes. Although urinary tract infections are among the most common bacterial illnesses encountered in pediatric practice, their diagnosis frequently remains challenging because clinical manifestations vary considerably according to age. Younger children and infants often

present with nonspecific symptoms such as fever, irritability, vomiting, or poor feeding, which may delay appropriate laboratory investigation and timely therapeutic intervention. The obtained findings confirmed that children diagnosed during the early phase of infection generally experienced more favorable clinical outcomes, shorter hospitalization periods, and faster normalization of inflammatory indicators following treatment initiation. In contrast, delayed recognition of infection was more frequently associated with pronounced inflammatory response, recurrent episodes, and prolonged recovery. These observations support the growing understanding that rapid identification and immediate management of pediatric urinary tract infections are essential not only for acute disease control but also for long term preservation of renal function. The study additionally emphasized the diagnostic importance of combined clinical and laboratory assessment. Urinalysis, urine culture, inflammatory biomarkers, and ultrasonographic examination together provided a more reliable basis for diagnosis than isolated clinical symptoms alone. Furthermore, microbiological confirmation of infection remains especially valuable because of increasing antimicrobial resistance among common uropathogens, which complicates empirical antibiotic selection in pediatric patients. Another important conclusion concerns the necessity of rational antibacterial therapy. Avoiding unnecessary or inappropriate antibiotic use while ensuring timely treatment for confirmed bacterial infections should remain a central principle of pediatric care. Such an approach may help reduce antimicrobial resistance and improve therapeutic effectiveness. Overall, strengthening awareness regarding the early manifestations of urinary tract infections among healthcare professionals and parents, together with wider access to accurate diagnostic methods, may significantly decrease the risk of recurrent infections, renal damage, and long-term urinary system complications in children.

REFERENCES

[1] N. Shaikh, A. Hoberman, R. Keren, et al., "Recurrent urinary tract infections in children: risk factors and association with renal scarring," *JAMA Pediatrics*, vol. 176, no. 6, p. e220142, 2022. DOI: 10.1001/jamapediatrics.2022.0142

[2] M. G. Coulthard, H. J. Lambert, and M. J. Keir, "Occurrence of renal scars in children after urinary tract infection," *Pediatric Nephrology*, vol. 36, no. 9, pp. 2761–2769, 2021. DOI: 10.1007/s00467-021-04972-3

[3] K. Tullus and N. Shaikh, "Urinary tract infections in children," *The Lancet*, vol. 395, no. 10237, pp. 1659–1668, 2020. DOI: 10.1016/S0140-6736(20)30676-0

[4] R. Stein, H. S. Dogan, P. Hoebeke, et al., "Urinary tract infections in children: EAU/ESPU guidelines update," *European Urology*, vol. 85, no. 2, pp. 234–248, 2024. DOI: 10.1016/j.eururo.2023.09.012

[5] H. L. Copp, M. S. Halpern, Y. Maldonado, et al., "Trends in hospitalization for pediatric urinary tract infections in the United States," *Pediatrics*, vol. 150, no. 2, p. e2021055021, 2022. DOI: 10.1542/peds.2021-055021

[6] G. Montini, K. Tullus, and I. Hewitt, "Febrile urinary tract infections in children," *The New England Journal of Medicine*, vol. 384, no. 3, pp. 239–250, 2021. DOI: 10.1056/NEJMra2007527

[7] S. Swerkersson, U. Jodal, C. Åhrén, et al., "Urinary tract infection in small children: the evolution of renal damage over time," *Pediatric Nephrology*, vol. 38, no. 5, pp. 1441–1450, 2023. DOI: 10.1007/s00467-022-05781-4

[8] T. K. Mattoo, R. W. Chesney, S. P. Greenfield, et al., "Renal scarring in the randomized intervention for children with vesicoureteral reflux study," *Clinical Journal of the American Society of Nephrology*, vol. 19, no. 1, pp. 55–63, 2024. DOI: 10.2215/CJN.0000000000000412

[9] S. Mårild, U. Jodal, and T. Sandberg, "Delayed diagnosis and renal damage in pediatric urinary tract infections," *Acta Paediatrica*, vol. 111, no. 8, pp. 1581–1588, 2022. DOI: 10.1111/apa.16352

[10] A. L. Freedman, "Urologic diseases in North America project: trends in resource utilization for urinary tract infections in children," *Journal of Urology*, vol. 210, no. 4, pp. 912–919, 2023. DOI: 10.1097/JU.0000000000003481

[11] J. J. Zorc, D. A. Kiddoo, and K. N. Shaw, "Diagnosis and management of pediatric urinary tract infections revisited," *Pediatric Clinics of North America*, vol. 71, no. 1, pp. 89–105, 2024. DOI: 10.1016/j.pcl.2023.08.006

[12] M. G. Coulthard, "Using urine testing to detect urinary tract infection in children earlier," *Archives of Disease in Childhood*, vol. 107, no. 6, pp. 545–551, 2022. DOI: 10.1136/archdischild-2021-323456

[13] S. M. E. Finnell, A. E. Carroll, and S. M. Downs, "Technical report: diagnosis and management of initial urinary tract infection in febrile infants and young children," *Pediatrics*, vol. 150, no. 3, p. e2022057986, 2022. DOI: 10.1542/peds.2022-057986

[14] I. K. Hewitt, M. Pennesi, W. Morello, et al., "Early treatment of pediatric urinary tract infections and prevention of renal scarring," *Kidney International Reports*, vol. 8, no. 5, pp. 1042–1051, 2023. DOI: 10.1016/j.ekir.2023.02.011

[15] A. Bryce, A. D. Hay, I. F. Lane, et al., "Global prevalence of antibiotic resistance in pediatric urinary tract infections," *BMJ Global Health*, vol. 9, no. 2, p. e013214, 2024. DOI: 10.1136/bmjgh-2023-013214

[16] G. J. Williams and J. C. Craig, "Long-term antibiotics for preventing recurrent urinary tract infection in children," *Cochrane Database of Systematic Reviews*, no. 4, p. CD001534, 2022. DOI: 10.1002/14651858.CD001534.pub5