

Original Article

# Screening of Asymptomatic Urinary Tract Infection among School Childrens through Dipstick and Microscopic Examination

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## ABSTRACT

**Background:** Urinary tract infections (UTI) are among the most prevalent pediatric infectious diseases, leading to substantial healthcare utilization including hospitalization and antibiotic therapy. Despite the asymptomatic nature of many pediatric UTIs, these infections can contribute to significant morbidity if left undiagnosed and untreated, including the development of chronic kidney disease.

**Objective:** This study aimed to assess the prevalence of asymptomatic UTIs in school-going children and to evaluate the effectiveness of dipstick and microscopic urinalysis as diagnostic tools.

**Methods:** A cross-sectional study was conducted with 67 asymptomatic school-aged children in the district of Nowshera, KP. Urine samples were analyzed using urine dipstick tests followed by microscopic examination to detect the presence of pyuria, hematuria, and proteinuria. The study excluded children previously diagnosed with UTI or any other infectious disease. SPSS version 25 was utilized for data analysis, with results presented in descriptive statistics.

**Results:** Of the total children screened, 40 (59.7%) were male, and 27 (40.3%) were female. Age distribution was split between 3 to 7 years (25.4%) and 8 to 15 years (74.6%). The dipstick and microscopic examinations revealed UTI positivity in 46 children (68.7%). Specifically, pyuria was detected in 32.83%, hematuria in 32.83%, and proteinuria in 18% of the screened children.

**Conclusion:** The study highlights the high prevalence of asymptomatic UTIs among school children and emphasizes the necessity for routine urine examinations as an integral component of pediatric healthcare to prevent future complications. Furthermore, dipstick and microscopic analyses were validated as efficient diagnostic tools for early detection of UTIs.

**Keywords:** Pediatric Urinary Tract Infection, Asymptomatic UTI, Urine Dipstick Test, Microscopic Urinalysis, School-aged Children, Kidney Disease Prevention, Pediatric Nephrology, Early Diagnosis, Cross-Sectional Study.

## INTRODUCTION

Urinary tract infection (UTI) is recognized as a prevalent infectious disease among the pediatric population, accounting for significant rates of hospitalization and antibiotic use. Studies suggest that annually, up to 2.8% of children in high-income countries experience a UTI, with a recurrence rate ranging from 8% to 30% (1, 2). The incidence of UTI is notably higher during the first year of life and again during the toilet training years, between two and four years of age. Initially, males are more frequently affected, but this trend reverses after the first year, with females remaining at higher risk into adulthood (3). The predominant pathogens are typically Gram-negative organisms like Enterobacteriaceae (4).

Diagnosing UTIs in children is challenging due to their nonspecific clinical presentations. Infants may show signs such as feeding difficulties, jaundice, vomiting, and lethargy, sometimes without fever or with hypothermia, whereas older children may experience

symptoms related to the lower urinary tract, including increased urination frequency, pain, and abdominal discomfort, often accompanied by fever (5). Furthermore, UTIs in children are a concern due to their potential to cause renal scarring and contribute to chronic kidney disease (CKD), which affects between 15% and 74.7% of pediatric cases per million (6). Early detection of urinary abnormalities through prenatal ultrasonography of the kidney and urinary tract can be crucial, as congenital anomalies of the kidney and urinary tract (CAKUT) are found in approximately half of the pediatric CKD cases (7, 8).

Screening for CKD is a subject of global debate, given the uncertainty regarding its efficacy in preventing end-stage renal disease (ESRD) in children. However, screening programs in countries like Japan, Taiwan, and Korea have demonstrated benefits in terms of early intervention and management of renal disorders in children, thereby potentially reducing the incidence of CKD (1, 9, 10). As UTIs can manifest in various forms from fever and dysuria to more severe complications like renal scarring, prompt and accurate diagnosis is essential. Current diagnostic methods include urine culture, which is the gold standard despite its time-consuming nature. Alternative rapid methods like dipstick tests and microscopic examination of urine can detect leukocytes and pus cells, providing quicker diagnostic insights and allowing for the early initiation of treatment (11, 12).

In light of this, the objective of our study is to determine the prevalence of asymptomatic UTIs in seemingly healthy school-aged children using both dipstick and microscopic analysis. By identifying these cases, we aim to understand the distribution of UTIs among male and female students, thereby contributing to targeted prevention strategies and interventions to mitigate the long-term health impacts of these infections.

## MATERIAL AND METHODS

A cross-sectional study was conducted to assess the prevalence of asymptomatic urinary tract infections (UTIs) among school-aged children in various schools within the district of Nowshera, KP. A total of 67 asymptomatic children aged between 5 to 12 years were included in the study. These children were deemed healthy and not previously diagnosed with UTIs or other infectious diseases. Inclusion criteria were based on apparent health status and school enrollment, while those with known UTI or other infectious conditions were excluded from the study (13).

Ethical approval for the study was obtained from the relevant institutional review boards, adhering to the principles of the Declaration of Helsinki. Informed consent was secured from school administrations before collecting urine samples from the children. The urine collection process involved initial testing using a dipstick, followed by the centrifugation of 10 ml of urine at 2500 rpm for 20-30 minutes. After discarding the supernatant, the sediment was resuspended in 0.2 ml of the original volume. A drop of this suspension was then placed on a glass slide, covered with a coverslip, and examined microscopically to confirm the results.

Data regarding the presence of UTI indicators such as pyuria, hematuria, and proteinuria were collected and analyzed using SPSS version 25 for Windows (14). Descriptive statistics were employed to illustrate the distribution of these indicators across different variables, including gender. The results were compiled into tables and graphs, detailing the frequency and percentage of positive cases among male and female participants.

The findings, along with the test results, were communicated to the heads of the participating schools. They, in turn, were advised to distribute these results to the parents, and children diagnosed with positive cases were recommended to seek further medical evaluation and treatment if necessary. This methodological approach ensured a systematic collection and analysis of data, providing reliable insights into the asymptomatic prevalence of UTIs among the studied cohort.

## RESULTS

The comprehensive analysis of the study's outcomes, as detailed in the summarized data (Table 1), presents a nuanced picture of UTI prevalence among school children. Notably, males comprised the majority of the cohort, representing 59.7% (40 cases) compared to females who constituted 40.3% (27 cases) of the study population. In terms of age distribution, there was a clear predilection towards the older age group, with children aged 8 to 15 years accounting for 74.6% (50 cases) of the participants, whereas the younger demographic of 3 to 7 years made up 25.4% (17 cases).

Table 1: Summary of Demographics and UTI Detection in Children

Description	Gender	Age Range	Frequency	Percent
Gender Distribution	Female	-	27	40.3%
	Male	-	40	59.7%
Age Distribution	-	3 to 7 Years	17	25.4%
	-	8 to 15 Years	50	74.6%

Description	Gender	Age Range	Frequency	Percent
UTI Detection	-	-		
	Positive	-	46	68.7%
	Negative	-	21	31.3%
Total Participants	-	-	67	100%

Delving deeper into the findings related to UTI detection, a significant 68.7% (46 cases) of the children tested positive for UTIs as

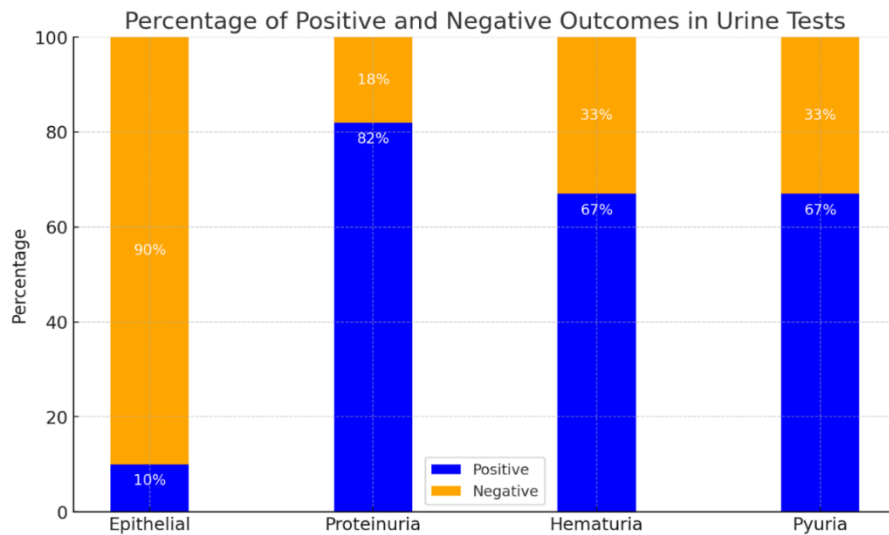


Figure 1 Urine Tests Outcomes

suggesting these conditions as common findings among the children tested.

per the dipstick and microscopy analysis, underscoring a substantial incidence rate within the apparently healthy demographic. The remaining 31.3% (21 cases) were found to be negative, reflecting a lesser but still critical proportion of the sample size. The graphical representation of these outcomes, as depicted in the corresponding figure, elucidates the distribution of positive and negative results across different test parameters. For instance, the prevalence of proteinuria was markedly high, with 82% positive cases, a stark contrast to epithelial presence, which showed only 10% positivity. Similarly, both hematuria and pyuria were present in 67% of the positive cases,

## DISCUSSION

The present study, through meticulous analysis of 67 asymptomatic urine samples from school-going children, identified a striking prevalence of urinary tract infections (UTIs) at 68.6% (46 cases), with the remaining 31.4% (21 cases) yielding negative results. This high incidence of UTIs discovered through routine urine examination underscores the critical importance of such screening processes for the early detection and prevention of asymptomatic disorders, and by extension, potentially serious kidney diseases.

The gender distribution of the sample, as shown in the summarized data (Table 1), and the methodical application of dipstick analysis followed by microscopic verification (as visualized in the corresponding figure), align with the findings of Memişoğullari et al. (2010) (15), where urine culture remains the gold standard for UTI detection. However, the current study bolsters the notion that for uncomplicated UTIs, rapid urinalysis by dipstick and microscopic methods may serve as sufficient preliminary diagnostics, providing a time-efficient alternative to culture. The potential to expedite patient care through these methods could significantly reduce the time to treatment initiation, especially in settings where immediate culture is not feasible.

Memişoğullari et al. (2010) further explicate the trade-offs between dipstick and microscopic analysis. While microscopy can reveal the presence of white blood cells and bacteria indicative of a UTI, it is not without logistical challenges, including the need for specialized equipment and expertise (15, 16). Conversely, the dipstick method, as shown by both Memişoğullari et al. (2010) and in the current study, provides a prompt indication of infection that can be critical in the decision to commence antibiotics, particularly in young children presenting with non-specific symptoms (15).

Despite these advantages, the dipstick's sensitivity and specificity are a concern. Lunn et al. (2020) highlighted comparable effectiveness between urine dipstick and automated microscopy in excluding UTIs, though the dipstick was found to be less specific. This concurs with our findings and supports the continued use of these methods as rapid diagnostic tools. However, as Nagalo et al. (2008) emphasized, the potential for false positives with dipstick analysis suggests that it should not be the sole diagnostic measure, particularly given the potential for pyuria from non-UTI causes (17, 18).

The study's strengths lie in its pragmatic approach to screening, offering insight into the practical application of dipstick and microscopic analysis in detecting asymptomatic UTIs. Nonetheless, there are inherent limitations. The study's relatively small sample size and focus on a single geographic region may restrict the generalizability of the findings. Additionally, while the dipstick method offers promptness and simplicity, the lack of a confirmatory urine culture for all samples may impact the accuracy of the findings (1, 2, 18).

Considering the considerations, it is recommended that future research encompasses a broader population sample and incorporates confirmatory urine cultures to validate the dipstick and microscopy results. Moreover, it would be beneficial for subsequent studies to investigate the long-term outcomes of children diagnosed with asymptomatic UTIs, to better understand the progression and potential implications of the disease (6, 16, 19-21).

## CONCLUSION

In conclusion, the implications of this study are manifold, reinforcing the value of routine urine examinations in seemingly healthy children, not only as a tool for early detection but also as a prophylactic measure against the progression of UTI-related disorders.

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