

ORIGINAL RESEARCH

Evaluation of urinary tract infection in 0-5 year old north Indian pediatric population by urine culture, sensitivity and ultrasound

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ABSTRACT

Background and aim: Fever is one of the most frequent conditions that prompt patients under the age of five to attend the OPD. In comparison to other illnesses that receive greater attention, urinary tract infections (UTIs) as the cause of fever receive very less attention. Antibiotics are frequently administered to children empirically without a proper UTI evaluation. Identification of UTI in children with fever is crucial in order to reduce lifetime morbidity and give timely treatment. The purpose of the current study was to evaluate the prevalence of urinary tract infections (UTIs) in children under the age of five and the reliability of urine culture and analysis in the diagnosis of UTIs. **Methods:** 120 participants between the ages of 2 months and 5 years who were hospitalized for fever were evaluated in the current prospective clinical investigation. Demographics and predisposing variables were recorded for each individual. Participants older than 2 years old had clean midstream pee collected, whereas younger participants had urine samples taken in bags. Urine culture and analysis were performed on all participants, and an ultrasonogram was performed on those whose cultures were positive. **Results:** In the present study, Klebsiella, Proteus, pseudomonas, and E. coli were isolated and observed for culture growth. Sensitivity to Cefoperazone, Amikacin, Cefotaxin, Nitrofurantoin, and Gentamycin was observed. In the subjects of the current study who tested positive for culture, the ultrasound revealed hepatomegaly in 2 males, bilateral hydronephrosis with obstruction of the PUJ in 1 female, bilateral hydronephrosis with thickening of the bladder wall in 1 female but not in any male subjects, and cystitis in 2 female and 1 male subjects. **Conclusion:** In order to reduce long-term complications, sequelae, and morbidity, the current study's findings suggest that subjects with significant pyuria—defined as >5pus cells/HPF in the urine sample—should be assessed further and promptly begin receiving antibiotic therapy for UTIs.

Keywords: Febrile illness, Prevalence, Pyuria, Significant growth, Urinary tract infection

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INTRODUCTION

Fever is among the most frequent conditions that cause patients under the age of five to attend the emergency room or the pediatrics department's outpatient clinic. The most frequent principal complaint of patients or their parents at the Pediatrics Outpatient Department is that their child has a febrile illness or fever. Despite current literature data demonstrating that urinary tract infections contribute to the major morbidity in the kid subjects, urinary tract infections (UTIs) are given very less attention as the cause of fever compared to other illnesses garnering greater attention.¹ Pediatric patients frequently receive antibiotics without having their urinary tract infections properly evaluated. Fever is

the most typical presenting symptom in pediatric UTI patients.

a considerable fever When pyuria and bacteriuria occur in young patients without a known infection source, pyelonephritis, an invasive infection of the renal parenchyma, must be presumed and treated very away. Nearly 80% of kid subjects under 5 years old with fever/febrile UTI have a diagnosis of pyelonephritis, according to recent literature research that analyzed renal parenchyma utilizing nuclear scans for the detection of UTIs. Even when there is no urinary tract abnormalities present, renal scarring often occurs in about 30-65% of pediatric UTI individuals.²

The majority of UTIs that result in kidney development slowing down or scarring are observed

in children under the age of four, and they are most frequent in newborn subjects under the age of one year, particularly in infants whose UTI treatment is postponed and in subjects who have a severe obstruction or reflux. Recurrent UTIs in children under the age of two increase the risk of kidney scarring, yet over one-third of these children show no symptoms. To reduce the danger and likelihood of morbidity in young patients, it is crucial to diagnose and treat children's urinary tract infections as away.³ When children with pyelonephritis reach adulthood, they may develop renal failure and hypertension due to gradual renal damage that is caused by an unknown source. Pyelonephritis causes the development of renal scarring in children, which poses a 15% greater risk for pregnant toxemia, a 10% increased risk for renal failure, and a 25% increased risk for hypertension when these patients reach adulthood, according to prior research data.⁴ The purpose of the current study was to evaluate the prevalence of UTIs in participants under the age of five and the reliability of urine culture and urine analysis in the diagnosis of urinary tract infections.

MATERIALS AND METHODS

The individuals who visited the Institute's Outpatient Department of Pediatrics were the focus of the investigation. In this prospective clinical experiment, the prevalence of urinary tract infections (UTIs) in participants under the age of five years was evaluated, as well as the reliability of urine culture and urine analysis in the diagnosis of UTIs.

120 young participants of both sexes were totaled for the study. Children under the age of five (2 months to 5 years) who presented to the Institute's Department of Pediatrics with a fever and an axillary temperature of less than 37.80C met the inclusion criteria for the research.

Subjects who had taken antibiotics within 48 hours of the trial, those who were less than 2 months or older than 5 years, those who were unwilling to provide their permission, and those who had genitourinary congenital malformations were all excluded from the study.

After the final inclusion of 120 research participants, a thorough history including demographics, voiding issues, and predisposing variables such urethra instrumentation was documented for each individual. An exhaustive febrile history was kept, including the length and time of the fever as well as any other system involvement, urinary issues, diarrhea, vomiting, and nausea. All of the participants then had comprehensive physical examinations and pertinent investigations.

All individuals had blood tests as well as urine analyses, including urine sensitivity and culture. An

ultrasonogram was performed on children who were culture-positive. In 4 research participants, micturating cystourethrograms (MCU) were performed.

A urine sample was taken from each one of the 120 participants. Children older than 2 years old had clean midstream pee collected, whereas younger individuals had urine collected using the bag method, which gathered roughly 10 ml of urine. The laboratory was then supplied the obtained urine sample for sensitivity testing and culture. The samples were centrifuged in a chamber for 30 minutes at 2500 rpm to isolate urine for analysis, culture, and sensitivity. The supernatant fluid was then decanted, and the residual sediment was resuspended in the chamber.

Leukocyturia and hematuria were then evaluated using a microscopic urine examination. The presence of >5 puss cells/HPF in the urine sample after centrifugation was deemed significant for Pyuria in the current investigation, and sensitivity and culture tests were conducted in these participants. To get an exact count of the colonies, the clear mid-stream urine inoculation was performed on Mac-Conkey agar plates using a 0.01 ml calibrated loop. The plates were then incubated for 24 hours at 35–37°C under aerobic conditions. A >105/ml colony count of single species organisms was deemed significant on mid-stream urine sample culture.

Culture-negative samples were those that had non-pathogen growth, mixed growth of two or more pathogens, or minimal growth. More than 105 colony development of a single urinary tract pathogen/ml of material in clear midstream urine was considered a positive urine culture.

RESULTS

The purpose of the current prospective clinical investigation was to evaluate the prevalence of urinary tract infections (UTIs) in individuals under the age of five and the reliability of urine culture and urine analysis in the diagnosis of UTIs. 120 children of both sexes, ranging in age from two months to five years, were enrolled in the study. Table 1 includes a list of the research participants' demographic details.

40.83% (n=49) of the study's participants were between the ages of 2 and 5 years, followed by 34.16% (n=41) of those under 1 year, and at least 25% (n=30) of those between the ages of 1-2 years. In the research, there were 52.5% (n=63) females and 47.5% (n=57) men. According to age, 13.33% (n=4) of the individuals with UTI prevalence and culture-positive subjects were between the ages of 1-2 years, while 12.19% (n=5) of the subjects were under 1 year old. Table 1 shows that there were 8.77% (n=5) males and 11.11% (n=7) females who were culture-positive.

Table 1: Demographic and disease characteristics of the study subjects

Characteristics	Number (n=120)	Percentage (%)
Mean age (years)	2.82±2.14	

Age range (years)	2 months-5	
<1	41	34.16
1-2	30	25
2-5	49	40.83
Gender		
Males	57	47.5
Females	63	52.5
UTI prevalence (age-based) (culture positive)		
<1	5	12.19
1-2	4	13.33
2-5	3	6.12
UTI prevalence (gender-based) (culture positive)		
Males	5	8.77
Females	7	11.11

The study results showed that on urine culture growth, it was seen that Proteus was seen in no female and 20% (n=1) culture-positive male, pseudomonas was seen in culture growth of 28.57% (n=2) females and no males, Klebsiella was isolated in 28.57% (n=2) females and 40% (n=2) culture-positive males of the present study, and E. coli was seen in 42.85% (n=3) females and 40% (n=2) males in the present study (Table 2).

Table 2: Culture growth in the urine of culture-positive UTI subjects

S. No	Culture Growth	Females		Males	
		%	n=7	%	n=5
1.	Proteus	0	0	20	1
2.	Pseudomonas	28.57	2	0	0
3.	Klebsiella	28.57	2	40	2
4.	E. coli	42.85	3	40	2

According to Table 3, sensitivity to Cefoperazone, Amikacin, Cefotaxin, Nitrofurantoin, and Gentamycin was seen in 8.33% (n=1), 16.66% (n=2), 33.33% (n=4), and 8.33% (n=1), respectively, of the 12 culture-positive cases.

Table 3: Antibiotic sensitivity in organism grown on urine culture in study subjects

S. No	Sensitivity to antibiotics	Number (n=12)	Percentage (%)
1.	Cefoperazone	1	8.33
2.	Amikacin	2	16.66
3.	Cefotaxin	4	33.33
4.	Nitrofurantoin	1	8.33
5.	Gentamycin	4	33.33

All 12 research participants with positive cultures had ultrasounds, and the results revealed two men and two females with normal findings. No patient had a pleural effusion with ascites, only two men and no females had hepatomegaly, no subject had bladder calculi, In the culture-positive subjects of the current study,

bilateral hydronephrosis with obstruction of the PUI was observed in 1 female and no male, bilateral hydronephrosis with thickening of the bladder wall was also observed in 1 female and no male, and cystitis was observed in 2 female and 1 male culture-positive subjects, as shown in Table 4.

Table 4: Ultrasound findings in the study subjects with UTI

S. No	Ultrasound findings	Females	Males
1.	Normal	2	3
2.	Bilateral hydronephrosis with obstruction of PUI	1	0
3.	Bilateral hydronephrosis with bladder wall thickening	1	0
4.	Cystitis	2	1

DISCUSSION

The purpose of the current prospective clinical investigation was to evaluate the prevalence of urinary tract infections (UTIs) in individuals under the age of five and the reliability of urine culture and urine analysis in the diagnosis of UTIs. 120 children of both sexes, ranging in age from two months to five years, were enrolled in the study. 40.83% (n=49) of the

study's participants were between the ages of 2 and 5 years, followed by 34.16% (n=41) of those under 1 year, and at least 25% (n=30) of those between the ages of 1-2 years. In the research, there were 52.5% (n=63) females and 47.5% (n=57) men.

According to age, 13.33% (n=4) of the individuals with UTI prevalence and culture-positive subjects were between the ages of 1-2 years, while 12.19%

(n=5) of the subjects were under 1 year old. In terms of gender, there were 8.77% (n=5) males and 11.11% (n=7) females who were culture-positive. The demographic and illness features matched those in studies by Kaufman J et al⁵ in 2019 and Hoberman A et al⁶ in 2014, in which the authors illustrated comparable demographics and disease characteristics to those in the current research.

The findings of the current investigation also revealed that on urine culture growth, *Proteus* was only detected in 20% (n=1) of culture-positive men and no females, *Pseudomonas* was only detected in 28.57% (n=2) of culture-positive females, and no males.

In the current investigation, *E. coli* was found in 42.85% (n=3) females and 40% (n=2) men, whereas *Klebsiella* was isolated in 28.57% (n=2) females and 40% (n=2) culture-positive males. Sensitivity to Cefoperazone, Amikacin, Cefotaxin, Nitrofurantoin, and Gentamycin was observed in 8.33% (n=1), 16.66% (n=2), 33.33% (n=4), 8.33% (n=1), and 33.33% (n=4) of the 12 culture-positive individuals, respectively. These findings were in line with those made by Hewitt IK et al.⁷ in 2017 and Robinson JL et al.⁸ in 2014, who observed comparable antibiotic sensitivity and growth trends in the research individuals.

All 12 research participants with positive cultures had ultrasounds, and the results revealed two men and two females with normal findings. No patient had a pleural effusion with ascites, only two men and no females had hepatomegaly, no subject had bladder calculi, In the culture-positive subjects of the current study, bilateral hydronephrosis with obstruction of the PUJ was observed in 1 female and no male; bilateral hydronephrosis with thickening of the bladder wall was also observed in 1 female and no male; and cystitis was observed in 2 female and 1 male culture-positive subjects. Tullus K⁹ in 2019 and Primack W et al.¹⁰ in 2017 both of which found similar diagnoses to those in the individuals of the present study.

CONCLUSION

Within its limitations, the current study comes to the conclusion that patients with pyuria who have >5pus cells/HPF in the urine sample should be regarded as

having significant pyuria and should be further evaluated for early initiation of antibiotic therapy to treat UTIs in order to minimize long-term complications, sequelae, and morbidity. Small sample size, a briefer monitoring period, and geographic region biases were some of the study's drawbacks. A firm conclusion will thus be reached with the aid of more longitudinal studies that have a bigger sample size and a longer monitoring period.

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