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: One of the most common reasons that patients under the age of five visit the outpatient department is fever. Urinary tract infections (UTIs) as the cause of fever are rarely discussed in contrast to other disorders that are given more attention. Children are often given antibiotics empirically without receiving an appropriate examination for UTIs. It is essential to diagnose a UTI in children who have fever in order to minimise lifelong morbidity and provide prompt treatment.

Aim: The current study set out to assess the prevalence of urinary tract infections (UTIs) in children less than five years old, as well as the accuracy of urine culture and analysis in UTI diagnosis.

Methods: This prospective clinical study assessed 120 hospitalised patients with fever between the ages of two months and five years. For every person, predisposing factors and demographics were noted. Urine samples were collected in bags for individuals under two years old, whereas clean midstream urine was obtained for those over two years old. Every participant had their urine cultured and analysed, and those whose cultures were positive also had an ultrasound.

Results: Klebsiella, Proteus, pseudomonas, and E. coli were isolated in this investigation and their culture growth was monitored. There was evidence of sensitivity to gentamycin, cefoperazone, amikacin, cefotaxin, and nitrofurantoin. The ultrasonography results for the current study subjects who tested positive for culture included two male subjects with hepatomegaly, one female subject with bilateral hydronephrosis with obstruction of the PUJ, one female subject with bilateral hydronephrosis with thickening of the bladder wall, and two female and one male subject with cystitis.

Conclusion: The results of this study indicate that people with substantial pyuria (defined as >5pus cells/HPF in the urine sample) should be further evaluated and start getting antibiotic medication for UTIs right once in order to minimise long-term problems, sequelae, and morbidity.

Keywords: Pyuria, significant growth, febrile illness, prevalence, and urinary tract infection

INTRODUCTION

One of the most common reasons that kids under five visit the emergency room or the outpatient clinic of the paediatrics department is fever. At the Paediatrics Outpatient Department, parents' or patients' most common complaint is that their kid has a fever or

febrile sickness. In contrast to other illnesses that receive more attention, urinary tract infections (UTIs) receive very less attention as the cause of fever, despite evidence from the current literature showing that UTIs contribute significantly to the morbidity in the paediatric population.1. Urinary tract infections in paediatric children are often treated with antibiotics without a thorough evaluation. The most common first symptom in children with UTIs is fever.

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 cause kidney development slowing or scarring occur in children under the age of four, and they are most common in newborn subjects under the age of one year, particularly in infants whose UTI treatment is delayed and in subjects with severe obstruction or reflux. Recurrent UTIs in infants under the age of two raise the risk of kidney scarring; however more than one-third of these youngsters exhibit no symptoms. To lower the risk and possibility of morbidity in young patients, children's urinary tract infections must be diagnosed and treated as soon as possible.3

When children with pyelonephritis reach adulthood, they may suffer renal failure and hypertension as a result of gradual kidney damage from an unexplained cause. Pyelonephritis produces renal scarring in children, which increases the chance of maternal toxemia by 15%, renal failure by 10%, and hypertension by 25% when the patients reach adulthood, according to previous study data.4 The current study sought to assess the prevalence of UTIs among individuals under the age of five, as well as the reliability of urine culture and urine analysis in diagnosing urinary tract infections.

MATERIALS & METHODS

The study focused on individuals who attended the Institute's Outpatient Department of Pediatrics. In this prospective clinical trial, the prevalence of urinary tract infections (UTIs) in children under the age of five was assessed, as well as the reliability of urine culture and urine analysis in the identification of UTIs.

The study included 120 young volunteers of both sexes. Children under the age of five (2 months to 5 years) who reported to the Institute's Department of Pediatrics with a fever and an axillary temperature of less than 37.80 degrees Celsius matched the study's inclusion criteria.

The study excluded subjects who had taken antibiotics within 48 hours of the experiment, those who were less than 2 months or older than 5 years, those who refused to grant consent, and those with genitourinary congenital abnormalities.

Following the final inclusion of 120 research participants, each individual was given a detailed history that included demographics, voiding difficulties, and predisposing characteristics such as urethral instrumentation. An extensive febrile history was recorded, including the extent and duration of the fever, as well as any other system involvement such

as urinary difficulties, diarrhea, vomiting, and nausea. All of the volunteers then had thorough medical tests and investigations.

All subjects had blood testing and urine analysis, which included urine sensitivity and culture. Children with positive culture tests underwent an ultrasonogram. Micturating cystourethrograms (MCU) were carried out on four research subjects. Each of the 120 participants provided a urine sample. Children older than two years old had clean midstream pee collected, but younger people had urine collected using the bag technique, which yielded around 10 ml of urine. The laboratory was then given the collected urine sample for sensitivity testing and culture. Urine was isolated for analysis, culture, and sensitivity by centrifuging the samples in a chamber at 2500 rpm for 30 minutes. The supernatant solution was then decanted, and the remaining sediment was resuspended in the chamber. Leukocyturia and hemoturia were then assessed using a microscopic urine examination. The presence of more than 5 pus cells/ HPF in the urine sample after centrifugation was considered significant for Pyuria in the current study, and sensitivity and culture tests were performed on these subjects. To get an accurate count of the colonies, a 0.01 ml calibrated loop was used to inoculate clear mid-stream pee onto Mac-Conkey agar plates. The plates were then incubated for 24 hours at 35-37°C with aerobic conditions. A colony count of more than 105/ml of single-species organisms were considered as significant in mid-stream urine sample cultures.

Culture-negative samples showed no pathogen growth, mixed development of two or more pathogens, or limited growth. A positive urine culture was defined as having more than 105 colonies of a single urinary tract pathogen per milliliter of material in clear midstream pee.

RESULTS

The current prospective clinical study sought to determine the prevalence of urinary tract infections (UTIs) in children under the age of five, as well as the reliability of urine culture and urine analysis in the diagnosis of UTIs. The research included 120 youngsters of both sexes aged two months to five years. Table 1 lists the demographic information for the research participants. 40.83% (n=49) of the study's participants were aged 2 to 5 years, followed by 34.16% (n=41) of those under one year and at least 25% (n=30) of those aged 1-2 years. The investigation included 52.5% (n=63) females and 47.5% (n=57) males.

According to age, 13.33% (n=4) of the persons with UTI prevalence and culture-positive subjects were between the ages of 1-2 years, while 12.19% (n=5) were younger than one year old. According to Table 1, 8.77% (n=5) of men and 11.11% (n=7) of females tested positive for culture.

The study results showed that on urine culture growth, 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 3 shows that of the 12 culture-positive cases, 8.33% (n=1) were sensitive to Cefoperazone, Amikacin, Cefotaxin, Nitrofurantoin, and Gentamycin, respectively. All 12 research participants with positive cultures had ultrasounds, and the results showed that two men and two women had normal findings. No patient had a pleural effusion with ascites; only

two men and no females had hepatomegaly; and no subject had bladder calculi. In the current study's culture-positive subjects, bilateral hydronephrosis with obstruction of the PUJ was observed in one female and no male, bilateral hydronephrosis with thickening of the bladder wall was also observed in one female and no male, and cystitis was observed in two female and one male culture-positive subjects, according to Table 4.

DISCUSSION

The current prospective clinical study sought to determine the prevalence of urinary tract infections (UTIs) in children under the age of five, as well as the reliability of urine culture and urine analysis in the diagnosis of UTIs. The research included 120 youngsters of both sexes aged two months to five years. 40.83% (n=49) of the study's participants were aged 2 to 5 years, followed by 34.16% (n=41) of those under one year and at least 25% (n=30) of those aged 1-2 years. The investigation included 52.5% (n=63) females and 47.5% (n=57) males.

According to age, 13.33% (n=4) of persons with UTI prevalence and culture-positive subjects were between the ages of 1-2 years, while 12.19% (n=5) were younger than one year. In terms of gender, 8.77% (n=5) males and 11.11% (n=7) females were culture-positive. The demographic and illness aspects mirrored those in studies by Kaufman J et al5 in 2019 and Hoberman A et al6 in 2014, in which the authors demonstrated comparable demographics and disease characteristics to those in the current study. The current study also found that Proteus was only discovered in 20% (n=1) of culture-positive men and no females, whereas pseudomonas was detected in 28.57% (n=2) of culture-positive females and no males.

In the current study, E. coli was detected 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. Of the 12 culture-positive patients, 8.33% (n=1), 16.66% (n=2), 33.33% (n=4), and 8.33% (n=1) were sensitive to Cefoperazone, Amikacin, Cefotaxin, Nitrofurantoin, and Gentamycin, respectively. These findings were consistent with those reported by Hewitt IK et al.7 in 2017 and Robinson JL et al.8 in 2014, who found similar antibiotic sensitivity and growth patterns in the study participants. All 12 research participants with positive cultures had ultrasounds, and the results showed that two men and two women had normal findings.

No patient had a pleural effusion with ascites; only two men and no females had hepatomegaly; and no subject had bladder calculi. The current study's culture-positive subjects had bilateral hydronephrosis with obstruction of the PUJ in one female and no male, bilateral hydronephrosis with thickening of the bladder wall in one female and no male, and cystitis in two female and one male culture-positive subjects. Tullus K9 in 2019 and Primack W et al.10 in 2017 both found diagnoses comparable to those in the current investigation.

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.

REFERENCES

1. NICE Resource impact report: Urinary tract infection in under 16s: diagnosis and management (CG54): National Institute for Health and Care Excellence; 2017.
2. Urinary tract infection in under 16s: diagnosis and management, clinical guideline CG54. United KingdomNational Institute for Health and Care Excellence; 2017.
3. Okarska-Napierała M, Wasilewska A, Kuchar E. Urinary tract infection in children: Diagnosis, treatment, imaging - Comparison of current guidelines. J Pediatr Urol. 2017;**13**:567–73.
4. Cyriac J, Holden K, Tullus K. How to use… urine dipsticks. Arch Dis Child Educ Pract Ed2017;**102**:148–54.
5. Kaufman J, Knight AJ, Bryant PA, et al. Liquid gold: the cost-effectiveness of urine sample collection methods for young precontinent children. Arch Dis Child 2019.
6. Hoberman A, Greenfield SP, Mattoo TK, et al. Antimicrobial prophylaxis for children with vesicoureteral reflux. N Engl J Med. 2014;**370**:2367–76.
7. Hewitt IK, Pennesi M, Morello W, et al. Antibiotic prophylaxis for urinary tract infection-related renal scarring: a systematic review. Pediatrics2017;**139**:e20163145.
8. Robinson JL, Finlay JC, Lang ME, et al. Urinary tract infections in infants and children: diagnosis and management. Paediatr Child Health2014;**19**:315–9.
9. Tullus K. Fifteen-minute consultation: why and how do children get urinary tract infections?Arch Dis Child Educ Pract Ed2019.
10. Primack W, Bukowski T, Sutherland R, et al. What urinary colony count indicates a urinary tract infection in children? J Pediatr2017;**191**:259–61

TABLES

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

Table 1: Demographic and disease characteristics of the study 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

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

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

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

Table 4: Ultrasound findings in the study subjects with UTI