

ORIGINAL RESEARCH

Bacteriological profile of urine culture studies with signs and symptoms of urinary tract infection in children of 2-12 years: A cross sectional study

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ABSTRACT

Introduction: Urinary tract infection is one of the most commonly encountered genitourinary disease in paediatric practice. Diagnosis and management of urinary tract infection is a matter of concern in hospital settings and at community level. It accounts for significant morbidity due to potentially dangerous sequelae like renal scarring and hence warrants an early and accurate diagnosis. The clinical diagnosis of urinary tract infection is difficult, due to non-specific or vague symptomatic spectrum seen in children. Often, clinical diagnosis needs to be supported with confirmatory tests like urine culture, which guides in treatment of the infection. **Objective:** To determine the proportion of bacteriological profile diagnosed by urine culture. **Methodology: Study Design:** A Cross-sectional study. **Study Population:** Children between 2 to 12 years of age attending the Paediatric OPD presenting with clinical features of Urinary tract infection. **Sample size:** 75. **Sampling Technique:** Purposive sampling. **Study Period:** November 2019 to November 2020. **Study procedure:** The urine collection technique was explained by the principal investigator in the OPD to the parents as well as the child in the form of video demonstration. Informed consent & assent was obtained. Urine samples were obtained under strict aseptic precautions for urine culture in a sterile container. The sample was then sent to microbiology lab for urine culture. The results obtained from urine culture were analyzed. **Data analysis:** Data was entered into MS Excel and was analyzed using the SPSS trial version software. The type of bacteria also was analyzed as percentage. **Results:** Of the total 75 total samples, 33 were urine culture positive. From the 33 culture positive samples, E. coli was most common isolated organism in 25 children (33.3%), followed by Klebsiella pneumoniae in 4 children (5.3%), Proteus in 2 (2.7%), Enterobacter spp. and Pseudomonas in 1 each. **Conclusion:** The current study shows E. coli to be the most common pathogen in UTI. This warrants the careful selection and judicious use of antibiotics.

Key words: Urinary tract infection, dipstick urine analysis

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INTRODUCTION

Urinary tract infections (UTIs) are the most common bacterial infections seen in the general population. In hospitalized patients, the second most common cause of bacteraemia is UTI.¹ The prevalence of UTI is found to be higher in women. Nearly 20% of UTIs are found in men.² UTIs are the most common source of serious bacterial infection in young children. Overall, 3% to 5% of young febrile children have UTIs, including 5% to 7% of those "without a source of fever."^{3,4} Beyond the diagnosis and treatment of UTIs,

the identification of a UTI in a young child prompts investigation for vesicoureteral reflux and other urinary tract anomalies that may predispose patients to long-term renal complications.^{5,6} Previous publications have noted a relatively low sensitivity of the standard urinalysis (UA) for detecting UTIs in young, febrile infants.⁷

The predominant pathogen responsible for UTI is Escherichia coli followed by Staphylococcus Saprophyticus. Less frequently identified isolates are Klebsiella, Enterobacter and Proteus species.^{8,9} The

diagnosis of UTI is not straight forward making it a challenging task. Dysuria is most common symptom in UTI, experienced by one in four women every year. Dysuria is also the presenting complaint in vaginitis, chlamydial urethritis and pyelonephritis.¹⁰ Sometimes patients with UTI are asymptomatic or have atypical symptoms and signs. Hence, laboratory investigations are required to diagnose UTI. There are several tests available for the diagnosis of UTI. An ideal test is one which is cheap, needs less time and expertise, with high accuracy enabling a reliable and rapid diagnosis in high-risk patients. Urine culture is the gold standard for the diagnosis of UTI.

This study focuses on bacteriological profile in the culture positive samples in urinary tract infection whereby guiding the clinician to select an appropriate antibiotic depending upon the strains isolated.

MATERIALS & METHODS

STUDY DESIGN: Cross Sectional study

STUDY SETTING: Dr. SM CSI Medical College and hospital, Karakonam, Trivandrum, Kerala- Paediatrics and Microbiology departments.

STUDY PERIOD: From November 2018 to November 2020.

STUDY POPULATION: Children between 2 to 12 years of age attending the Paediatric OPD presenting with clinical features of Urinary tract infection of Dr. Somervell Memorial CSI Medical College and hospital during the study period.

INCLUSION CRITERIA

All Febrile children within 2 to 12yrs. having clinical features of UTI dysuria, burning micturition, urgency, frequency, suprapubic pain, incontinence, haematuria, abdominal pain, back pain, flank pain, malaise, nausea or vomiting¹¹ attending Paediatric OPD will be studied.

EXCLUSION CRITERIA

- Children who have received antibiotics 48 hours prior to hospital visit.
- Children having fever with co morbid conditions like Upper respiratory tract illness, lower respiratory tract illness
- Children with indwelling Foleys catheter.
- Diagnosed cases of Immunodeficiency disorders.
- Patient diagnosed with nephritic syndrome and urinary tract anomalies with UTI features.
- Children whose parents who do not give consent.

SAMPLING

Sample Size Calculation

$$n = \frac{[(Z\alpha/2)^2 * SN(1-SN)]}{(d^2 * Prevalence)}$$

$$= \frac{[(4 * 0.7574) * (1 - 0.7574)]}{(0.15^2 * 0.453)}$$

$$= 0.7349 / 0.0101$$

$$= 72.10 = \text{approx. } 75^{12}$$

Z $\alpha/2$ -Desired level of statistical significance SN-sensitivity of both nitrite and leukocyte esterase d-

clinically expected variation (approx. 15%) p-prevalence of UTI (i.e., 45.3%)¹².

SAMPLING TECHNIQUE: Convenient Sampling.

STUDY VARIABLES: Age, gender, urinary culture result.

DATA COLLECTION TOOL

- **Proforma:** Semi structured with sociographic clinical variables.
- To confirm the presence of UTI-the gold standard method of urine culture will be done. After mid-stream urine collection through aseptic conditions transferred to a sterile plastic container- its then brought to the microbiology laboratory where sample of urine is added to a Petri dish and stored at body temperature. Within 3 days any bacteria or yeast in the sample will multiply and grow if present. The lab technician under microscopy will assess the number, shape & properties of the bacteria if present. If there are no harmful microbes, the culture is called "negative". If there are bad germs grown it's called "positive".

DATA COLLECTION METHOD

- The urine collection technique was explained by the principal investigator in the OPD to the parents as well as the child in the form of video demonstration.
- Informed consent & assent was obtained
- Urine samples was obtained under strict aseptic precautions for urine culture in sterile container.
- The sample was sent to microbiology lab for urine culture
- The results obtained from urine culture were assessed for bacteriological profile.

DATA ENTRY AND ANALYSIS

Data was entered into MS Excel and was analysed using the SPSS trial version software. The type of bacteria also was analysed as percentage.

ETHICAL CONSIDERATION

Ethical permission was obtained from the institutional ethics committee, Dr. Somervell Memorial C.S.I medical college. A written informed consent in English and local language (Malayalam/Tamil) was obtained from the parents and assent from children. Confidentiality of the data and study subjects was strictly being maintained throughout the study.

RESULTS

A study done as a hospital based cross-sectional study were children between 2 to 12 years of age attending the Paediatric OPD presenting with clinical features of Urinary tract infection at Dr. Somervell Memorial CSI Medical College and who satisfy our criteria were included in the study. In total of 75 children between 2 to 12 years of age were included in our study. The

results will be discussed under these headings; baseline characteristics, presenting symptoms, urine dipstick, urine culture levels, validity of urine dipstick test.

The distribution of gender showed that females were the more than half of the total at 57.3% (43 nos.) and males were less than half at 42.7% (32 nos.). The mean age of the study population is 6.7 ± 2.8 years, in that males were having higher mean age of 6.87 ± 2.4 years when compared to 6.56 ± 3.1 years for females. The age and gender wise distribution showed males were higher in age groups 5 to 8 years (37.5%), however females were highest in the age group 2 to 5 years (37.2 %). Lowest number of males and females were in 8 to 12 years' group; 28.1% and 30.2% respectively. (Refer Table 1)

The presenting symptoms showed majority of the children had fever with chills and rigors (52%), followed by abdominal pain in 30 (40%), dysuria in 20 children (26.7%), Burning micturition in 19 children (25.3%) and increased straining during voiding in 1 child (1.3%). (Refer Table 1)

Urine culture was done in all subjects, in that 33 were positive (44%) and rest were negative (56%). The urine culture done showed 42 children with negative results. E. coli was most common isolated organism in 25 children (33.3%), followed by Klebsiella pneumoniae in 4 children (5.3%), Proteus in 2 (2.7%), Enterobacter spp. and Pseudomonas in 1 each. (Refer Table 2)

Table 1: Baseline Characteristics of the study population

Baseline	Results	
Age	6.7 ± 2.8 years	
Males	6.87 ± 2.4 years	
Females	6.56 ± 3.1 years	
Sex Ratio (M: F)	0.74:1	
Age & Gender distribution	Male'sn (%)	Female'sn (%)
2-5 years	11(34.4)	16 (37.2)
5-8 years	12(37.5)	14 (32.6)
8-12 years	09(28.1)	13 (30.2)
Presenting Symptoms	Yes, n (%)	No n (%)
Fever with chills & Rigors	39 (52)	36 (48)
Dysuria	20 (26.7)	55 (73.3)
Burning Micturition	19 (25.3)	56 (74.7)
Abdominal pain	30 (40.0)	45 (60.0)
Increased Frequency of voiding	00 (00.0)	00 (00.0)
Increased Straining During voiding	01 (01.3)	74 (98.7)
	Positive	Negative
Urine Culture	42 (56.0)	33 (44.0)

Table 2: Urine Cultures of the study population

Urine Culture organisms	Absent: n (%)
Culture negative	42 (56.0)
E. Coli	25 (33.3)
Klebsiella pneumoniae	04 (05.3)
Enterobacter spp.	01 (01.3)
Proteus	02 (02.7)
Pseudomonas	01 (01.3)

Discussion

Clinically, the diagnosis of UTI can be difficult as symptoms are nonspecific. The only way to reliably exclude a UTI is by the laboratory examination of a urine specimen. Urine culture shall be the gold standard with specificity of 99%.

In our study the presenting symptoms showed majority of the children had fever with chills and rigors (52%), followed by abdominal pain in 30 (40%), dysuria in 20 children (26.7%), Burning micturition in 19 children (25.3%) and increased straining during voiding in 1 child (1.3%). However, studies by Abilashet *al.*¹³ showed different picture

with most common presenting symptom was burning sensation (83.09%) followed by pain while passing urine (53.68%) and lower abdomen (53.68%). A similar study by Devarajaet *al.*¹⁴ reported a similar observation in which 87.5% of the patients had dysuria and abdominal pain which slightly differs from the findings of our study, whereas Chandrasekhar *et al.*^[15] observed only 48.6% of the patients who had community acquired UTI presented with dysuria. However, Mishra *et al.* observed suprapubic pain (89%) had a higher sensitivity than dysuria (81%)¹⁶.

In our study the urine culture showed *E. coli* was most common isolated organism in 25 children (33.3%), followed by *Klebsiella pneumoniae* in 4 children (5.3%), *Proteus* in 2 (2.7%), *Enterobacter* spp. and *Pseudomonas* in 1 each. The findings of our study corroborate with many of the other studies. *E. coli* was susceptible with oral nitrofurantoin which is consistent with literature¹⁷. The sensitivity pattern of parenteral antibiotics also corroborates with existing evidences¹⁸. In a study by Marsha *et al.*, the most common isolated pathogen was *E. coli*, which was detected in 283 (74.9%) isolates which corroborates with our findings¹⁹.

Paediatric UTIs are treated with two purposes: to eliminate infection thus, preventing systemic illness and to prevent or reduce possible long-term complications such as renal scarring and hypertension²⁰.

CONCLUSION

The current study shows *E. coli* to be the most common pathogen in UTI. This warrants the careful selection and judicious use of antibiotics.

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