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Original Research Article

Clinical profile and gram negative bacterial profile of urinary tract infection in children attending a tertiary care hospital of Tamilnadu, India

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ABSTRACT

Background: Urinary tract infection (UTI) is one of the most common infections caused by bacterial pathogens seen mostly in developing countries. This study was done to assess the clinical and gram negative bacterial profile of pathogens causing urinary tract infection, which helps the clinician to diagnose early and give presumptive antibiotic to prevent complications.
Methods: Specimen was collected in sterile, leak proof container by clean catch mid-stream technique. Isolation of uropathogens was performed by a surface streak procedure on both blood agar and Mac Conkey Agar (Himedia, India) using semi quantitative method by using standard loop technique and Identified as per standard CLSI guidelines. Antibiogram of the isolates was performed and read as per standard manufacturer's instructions.
Results: UTI was more common in female children than male, and half were in the age group 1-5 years. Fever is the most common presentation (58.6%) followed by dysuria (46.4%) abdominal pain (45%) and decreased appetite (23.6%). *Escherichia coli* was the most common (73.6%) isolate followed in order by *Klebsiella* sps (15.7%), *Citrobacter* sps (2.1%) *Proteus* sps (5%) and *Pseudomonas* sps (3.5%). Nitrofurantoin (86%) was the most sensitive antibiotic followed by cefexime (84.7%), gentamicin (82%) and ciprofloxacin (81%) for *E. coli. Klebsiella* was sensitive to gentamycin, ciprofloxacin. Greater degree of resistance was noted to ampicillin, cotrimoxazole and nalidixic acid.
Conclusions: The common clinical feature assosciated with UTI was fever and commonest causative organism for UTI was *E. coli*. The appropriate antibiotic *in-vitro* were cefexime and gentamicin in this study. Higher degree of resistance was found in antibiotics such as amipicllin, cotrimioxazole, cephalexin, nalidixicacid.

Keywords: Antibiotic susceptibility, Bacterial isolates, Dysuria, UTI

INTRODUCTION

Urinary tract infections (UTIs) are one of the most common bacterial infections affecting humans throughout their life span.[1] UTIs may be presented as an asymptomatic or symptomatic and it may be uncomplicated or complicated.[2] Escherichia coli is the most common cause of UTIs, accounting for about 85% of community acquired and 50% of hospital acquired infections, it predominates strongly at most ages.[3] It is estimated that at least 1% of boys and 3% of girls develop urinary tract infection during first ten years of life.[4] UTI is mainly due to ascending infection from the urethra. The diagnosis of UTI in young children is important as it may be the marker of urinary tract abnormalities.[5] This study was undertaken to assess the clinical and gram negative bacteriological profile of pathogens causing urinary tract infection in children

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METHODS

This was a prospective study done in Saveetha Medical College and Hospital from June 2015 to May 2016. Children aged 5 to 15 years attending pediatric outpatient department with symptoms like fever, abdominal pain, dysuria, were subjected for urine routine and culture and sensitivity. A total of 200 samples were collected. Consent was taken from the parents or guardians before enrolling them in the study. Specimen was collected in sterile, leak proof container by clean catch mid-stream technique after cleaning the perineal area and sent to the clinical laboratory. The samples were inoculated on Blood agar and Mac Conkey agar within one hour of collection and incubated at 37^0C. Then the bacterial uropathogens were isolated and tested for antimicrobial drug resistance patterns. Isolation of uropathogens was performed by a surface streak procedure on both blood agar and Mac Conkey Agar (Himedia, India) using semi quantitative method by using standard loop technique and incubated aerobically at 37^0C for 24 hours. The culture plates were read for bacterial growth to decide whether the growth was pure growth or mixture. Further, if growth was found to be pure, whether it was significant growth or low count significant or insignificant growth. Growth was considered as a significant when there was ≥105 cfu/ml of middle stream urine following Kass, Marple and Sandford criteria. Bacterial identification was done using phenotypic characters such as study of colony characteristics and biochemical tests, namely catalase test, oxidase test, indole test, citrate utilization test, H_2S production, lactose fermentation, urea hydrolysis, gas production, motility test.[6] Antimicrobial susceptibility test of isolates was performed by disk diffusion method according to Clinical and Laboratory Standards Institute (CLSI) guide lines.[7] The antibiotic discs used for the study were obtained from Himedia, India. 140 cases with positive urine cultures were included in the study. Samples with mixed growth were excluded from the study. History and clinical examination and findings of culture sensitivity were recorded and then analysed.

RESULTS

Out of the 140 culture positive cases, 61 (43.5%) were male children and 79 (57.5%) were female children. Age wise, 40 (29%) cases were in the age group 1 to 5 years. Majority of these patients had fever (58.6%) Other clinical features were abdominal pain (45%), dysuria (46.4%) decreased appetite (23.6%). Out of the140 cases, *Escherichia coli* was isolated in 103 (73.6%) followed by *Klebsiella* sps in 22 (15.7%), *citrobacter sps* in 3 (2.1%) *Proteus* sps in 7 (5%) and *Pseudomonas* sps in 5 (3.5%). Most of the organisms were highly sensitive to nitrofurantoin and amikacin. Sensitivity to quinolones and third generation cephalosporins varied according to the organism. Nitrofurantoin (85.4%) was the most sensitive antibiotics followed by cefexime (81.5%), gentamicin (80.5%) and ciprofloxacin (79.6%) for *E. coli*. *E. coli* was resistant to ampicillin in 92.2%, cotrimoxazole in 66% and nalidixic acid in 63.1%. While *Klebsiella spp.* was most resistant to nalidixic acid (72.72%) followed by cephaleaxin (70.59%) and the most sensitive antibiotics were gentamicin followed by ciprofloxacin, nitrofurantoin and cefexime. Sensitivity was noted to gentamicin, cefexime, ciprofloxacin, and nitrofurantoin in case of *Proteus spp.*

Table 1: Cases distribution according to clinical features.

Clinical features	%
Fever	58.6%
Abdominal pain	45%
Dysuria	46.4%
Decreased appetite	23.6%

Table 2: Organisms isolated in UTI.

Organism isolated	Number	Percentage
E.coli	103	73.6%
Klebsiella *spp*	22	15.7%
Proteus *spp*	7	5%
Citrobacter *spp*	3	2.1%
Pseudomonas *spp*	5	3.5%

Table 3: Antibiotic resistant patterns.

Antibiotics	E.coli	Klebsiella *spp*	Proteus *spp*
Ampicillin	92.2%	95.4%	100%
Ciprofloxacin	20.4%	18.1%	42.86%
Gentamycin	19.5%	13.6%	42.86%
Nitrofurantoin	14.6%	22.7%	-
Cefexime	18.5%	22.7%	14.2%
Cotrimoxazole	66%	63.6%	100%

DISCUSSION

In this study the total numbers of samples collected were 200. Prevalence rate of isolation of urinary pathogen in our study was 70%. It is similar to the study by Das RN et al isolation rate was 71.6%.[8] Our study showed UTI was more common in female children than male children but was not so significant it is correlated with study done by Sukla OP et al.[9] Females are more prone to UTIs than males because, in females, the urethra is much shorter and closer to the anus.[10] Several reports have indicated that females are more prone to having UTIs than males Kolawale et al.[11] E. coli was the most common isolated organism in our study with percentage of (73.6%). This was in seen in other studies by Gupta et al, Moges et al, Sibi et al.[12-14] The second most common isolated pathogen was Klebsiella in our study accounting for 15.7%. This was in agreement by Khameneh et al.[15] It is followed by, *Citrobacter sp, Proteus sp and*

pseudomonas. Similar finding was also reported by Bareilly S.[16]

Though fluoroquinolones are preferred as initial agents for empiric therapy of UTIs because of their unique characteristic of broad antibacterial spectrum, unique mechanism of action, good absorption from the gastrointestinal tract, excellent tissue distribution as well as low incidence of adverse reaction, inhibition of DNA topoisomerase (gyrases) but in our study, the most effective drug found was gentamicin, cefexime and nitrofurantoin among the tested antimicrobial agents.[17] This finding is correlated with the study done by Basnet BB et al.[18]

In this study *E. coli* was resistant to ampicillin (92.2%) the similar findings were seen in a study by Bashir MF et al and resistant to Nalidixic acid is 63.1% i.e slightly lower than one study at Nepal.[19,20] For *Kelbsiella spp.* gentamicin showed the greatest effectiveness and ciprofloxacin which is much less that of Sharma et al. study conducted on 2011 *Klebsiella spp.* were resistant to nalixidic acid about 73.5% which is much lower than Sharma et al.[20] All Proteus spp. are resistant to cotrimoxazole and norfloxacin where as 57.1% sensitive towards gentamycin, ciprofloxacin.

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