

Bacteriological Profile of Urinary Tract Infection in Paediatric Age group along with their Antimicrobial Susceptibility Pattern

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Abstract

This study was conducted in Microbiology Department, government medical college, Baroda, Gujarat between January 2022 to December 2022. Clean catch, midstream and suprapubic aspiration of urine sample were inoculated on CLED agar and incubated. The significant growth of pathogenic bacteria were subjected to antibiotic susceptibility testing. Drug Susceptibility test was done by Kirby-Bauer disc diffusion test. Result was determined as per CLSI guidelines.

Result: A total of 644 urine sample were obtained from pediatric patients suspected having Urinary tract infection. Significant Growth was observed in 208(32%) sample. Male to female ratio was 1:1. Gram negative isolates were 188(90.38%), of which *Escherichia coli* 112(53.85%) being the predominant pathogen, followed by *Klebsiella* spp. 66 (31.73%). Gram positive isolates constituted 20(9.61%) among them Coagulase negative *Staphylococcus*, 01(0.48%) were isolated. *Escherichia coli* showed highest resistance to Nalidixic acid (91.96%), followed by Cefotaxime (88.39%), Cefuroxime (49.11%). *E. coli* showed least resistance to Fosfomycin (5.35%).

Conclusion: *E. coli* is major cause for Urinary tract infection in paediatric age group. Suspected case should be treated with fosfomycin as its higher sensitivity against most pathogens.

Keywords: Urinary tract infection, *E. coli*, Prevalence, Antimicrobial Susceptibility.

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Introduction

Urinary tract infection is the most common paediatric infections, especially in less than 2 years old children. The diagnosis of UTI in young children is important as it may be the marker of urinary tract abnormalities. Early diagnosis is important to preserve renal function of the growing kidney. UTI in pediatric age group is different in all the way from adults mainly by following congenital abnormalities of urinary tract like post-urethral valves, pelvi-ureteric junction obstruction, neurogenic bladder, stricture urethra, vesicoureteral reflux which is very true in infants (<1-year age group). [1] So, it is important.

To determine microorganism causing of Urinary tract infection and their antibiotic susceptibility pattern in paediatric age group. UTIs are often difficult to diagnose in lower pediatric age group because of nonspecific signs and vague symptoms. It is more important to diagnose the condition timely and accurately as it could be the first presentation of an underlying urological anomaly or it may itself can lead to significant morbidity from renal scarring, hypertension and eventually end-stage renal disease. In community and hospital settings the etiology of

UTIs and antimicrobial susceptibility pattern of uropathogens have been changing over the years. [2] The bacterial pathogens causing urinary tract infections (UTI) in children are well known. *Escherichia coli* is the predominant pathogen in the community-acquired urinary tract infection and hospital-acquired urinary tract infection and it is solely responsible for more than 80% of these infections. [3]

The other bacteria which are also responsible for urinary tract infections are *Proteus*, *Klebsiella*, *Enterobacter*, *Pseudomonas*, *Enterococcus* and *Staphylococcus* species. Factors such as changing patient population, extensive use, and misuse of antimicrobial agents could all contribute to changes in the bacterial profile of UTI. Knowledge of antimicrobial resistance pattern of common uropathogens according to local epidemiology is essential for providing clinically appropriate and cost-effective therapy for UTI. [4]

Material and Methods

A retrospective study was carried out in the Microbiology Department, government medical

college Baroda, Vadodara, Gujarat from January 2022 to December 2022. Urine Samples of all pediatric patients who had clinical feature suggestive of Urinary tract infection from in ward pediatric patients included in this study. Clean catch, midstream urine from non-catheterized pediatric patient and suprapubic aspiration of urine samples were collected from infants suspected indoor pediatric patients in sterile universal containers.

Inclusion Criteria: Children at below the age of 12 years. Patients with clinical suspicion of urinary tract infection,

Exclusion Criteria: Children above the age of 12 years. Clean catch, midstream urine from non-catheterized pediatric patient and suprapubic aspiration of urine samples were collected from infants suspected indoor pediatric patients in sterile universal containers. Urine samples were processed within 30 min of collection. Urine microscopy of uncentrifuged urine sample was done and puss cells and bacteria noted. Centrifuged deposits were examined under microscope for the cast and crystals. The urine was cultured on Cysteine lactose electrolyte deficient (CLED) using Semi quantitative method [5] of culture for the isolation of bacterial pathogens from urine samples. The inoculated plates

were incubated at 37°C for 18-24 hours. specimen was considered positive for UTI if growth detected at a concentration of 100,000 cfu/mL.[6]

Significant isolates were identified by conventional methods according to standard laboratory protocol, including colony morphology, gram staining and biochemical reactions. Antibiotic sensitivity test is done using Kirby Bauer disc diffusion method. Antibiotics were selected according to CLSI guidelines. The qualitative data were expressed in proportion and percentages and the quantitative data expressed as mean and standard deviations. The difference in proportion was analyzed by using chi square test. Significance levels for tests were determined as 95% (P< 0.05).

Results

A total of 644 urine sample were obtained from pediatric patients suspected having Urinary tract infection. Significant Growth of bacteria was observed in 208(32%) sample. Table 1 shows the age and gender wise distribution of urinary isolates Out of total 208 positive cases in which 94 cases (45.19%) belong to Female and 114 cases (54.80%) belong to Male category.

Table 1: Age and gender wise distribution of the culture

Age	Male	Female
0 to 1 month	21(18.42%)	13(13.83%)
1 month to 2 years	14(12.28%)	10(10.64%)
2 years to 5 year	72(63.16%)	52(55.32%)
5 years to 12 year	11 (9.64%)	15(15.95%)

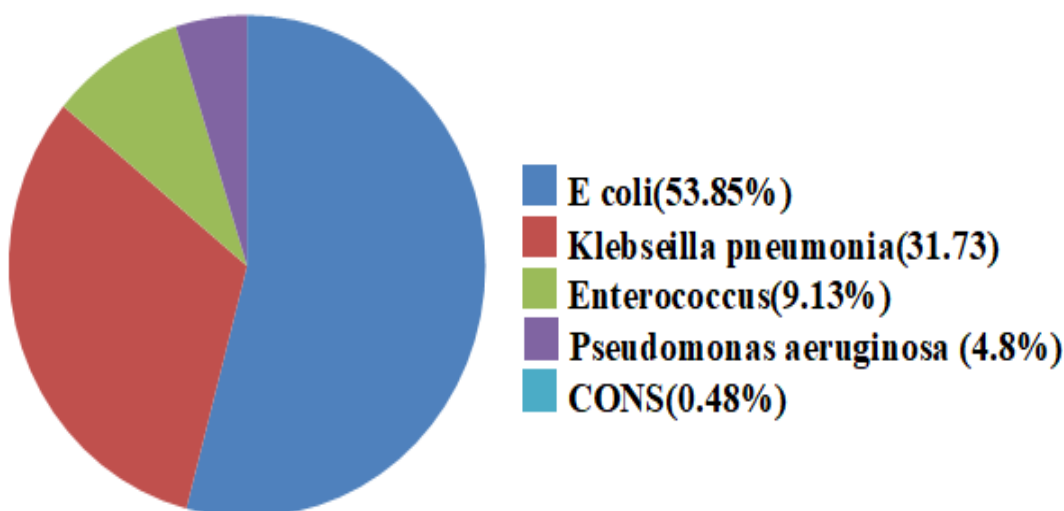


Figure 1:

Table 2: Antibiotic sensitivity pattern of gram-positive bacteria

Antibiotic	Enterococcus Group %(n=28)	<i>Staphylococcus aureus</i> %(n=4)
Penicillin G	14%	92%
Amoxy+clavulanate	-	-
Ampicillin	11%	-
Cefoxitin	-	-
Vancomycin	94%	92%
Linezolid	93%	99%
Doxycycline	15%	-
Fluoroquinolones	-	
Erythromycin	4%	60%
Clindamysin	-	70%
Gentamycin	18%	85%

Table 3: Antibiotic sensitivity pattern of gram-negative bacteria

Antibiotic	<i>E.coli</i>	<i>Klebsiella pneumoniae</i>	<i>Pseudomonas aeruginosa</i>
Nitrofurantoin	82%	43%	-
Cefotaxime	10%	8%	-
Cefuroxime	5%	3%	-
Co-trimaxzole	17%	11%	-
Doxycycline	6%	6%	-
Meropenem/imipenem	2%	1%	60%
Ceftriaxone	-	0%	-
Polymyxin B	-	-	17%
Nalidixic acid	4%	10%	-
Fosfomycin	92%	78%	-
Fluoroquinolones	10%	6%	75%

With regard to the antibiotic sensitivity pattern of Gram negative bacteria in which *E. coli* and *Klebsiella* were found to be most sensitive to Fosfomycin followed by Nitrofurantoin. Enterococcus was found to be most sensitive to Vancomycin and Linezolid followed by levofloxacin.

Conclusion

E.coli is major cause for Urinary tract infection in paediatric age group. Suspected case should be treated with fosfomycin as its higher sensitivity against most pathogens. Drug resistance pattern amongst urinary isolates of pediatric age group patients indicates that antibiotic selection should be based on knowledge of the local prevalence of bacterial organisms and antibiotic sensitivities rather than empirical treatment. This study emphasize the need for the development of protocol for rational use of antibiotics and clinicians should be trained for importance of rational use of antibiotics.

Discussion

Urinary tract infection in the pediatric patient is a significant source of morbidity and considerable mortality. It is generally agreed that pediatric patient with UTI requires further investigation and treatment to minimize future complications, since UTIs in pediatric patients can be due to congenital abnormality of renal system also.[7] The present study documents distribution and susceptibility

patterns of various bacterial isolates from urine of pediatric patients over a period of 12 months at Microbiology Department, government medical college, Baroda, Gujarat between January 2022 to December 2022 [1]. Urinary tract infection in the pediatric patient is a significant source of morbidity and considerable mortality. It is generally agreed that pediatric patient with UTI requires further investigation and treatment to minimize future complications, since UTIs in pediatric patients can be due to congenital abnormality of renal system also. The present study documents distribution and susceptibility patterns of various bacterial isolates from urine of pediatric patients over a period of 12 months at Microbiology Department, government medical college, Baroda, Gujarat between January 2022 to December 2022.

With regard to the antibiotic sensitivity pattern of isolates Enterococcus were found to be most sensitive to Fosfomycin (100%), followed by, Vancomycin (94%) and linezolid (93%) our findings are not consistent with the Mulla S et al.[9] This finding emphasizes the geographical variation seen in the susceptibility patterns of uropathogens to different drugs. *E. coli* was the most common organism was found to be most sensitive to fosfomycin (100%) followed by Nitrofurantoin (82%) and the least sensitive was Penicillin group of drugs. *Klebsiella pneumoniae* constitute the third most common agent for UTI and was found to be

most sensitive to Fosfomycin, meropenem and norfloxacin.

Uropathogens are showing trend of increase in the antimicrobial resistance pattern in entire part of the world which can be explained by the fact that drugs are easily available over the counter in many countries, where prescription is not monitored and regulated leading to misuse of many antimicrobials.

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