

Antibiotic Resistance Pattern of Urinary Pathogens in Pediatric Patients in a Tertiary Care Center at Kanpur

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Abstract: ***Introduction:** Urinary tract infection in children is an infection that occurs within the urinary tract system, which consists of the urethra, bladder and kidney. The infection is named after the location in the urinary tract. The aim of the study is to determine the Antibiotic Resistance Pattern of Urinary Pathogens in Pediatric Patients at a Tertiary Care Center at Kanpur. **Material and Methods:** This study was conducted in children >12 years with suspected urinary tract infections from in Rama Medical College Hospital and Research Centre Kanpur. Urine samples were collected for urinalysis and culture. Antibiotic susceptibility test was performed as per the clinical and laboratory standards institute (CLSI) guidelines 2016. Result: Common uropathogens isolated from this study showed high resistance to widely used antibiotics especially amoxicillin cefotaxime, ceftriaxone, ofloxacin, levofloxacin amikacin erythromycin, clindamycin, tetracycline, co-trimoxazole, nitrofurantoin. **Conclusion:** Males were more affected with urinary tract infections. Colistin, piperacillin tazobactam, gentamycin, imepenem, meropenem, norfloxacin vancomycin, tigecycline, tetracycline, co-trimoxazole linezolid, teicoplanin have lower antibiotic resistance rates and can be used in the treatment of UTI in children.*

Keywords: Children, Urinary pathogens, Resistance Pattern

1. Introduction

Urinary tract infections (UTIs) are the frequently seen important infections in the pediatric age [1]. In the pediatric age group, incidence of morbidities of bacterial infections ranks second after that of upper respiratory infections [2]. Urinary tract infections in children are generally caused by a microbe, such as bacteria. Typically, infants between the ages of 6 to 12 months more likely develop the infection [3]. Urinary tract infection is one of the most common diseases in children. At least 8 % of girls and 2 % of boys will have urinary tract infection in childhood [4]. Antibiotic resistance has become a major global problem especially in India where 80% of *Escherichia coli* is resistant to penicillins, cephalosporins and quinolones. Treatment of UTI is becoming difficult because of the antibiotic resistance in bacteria especially with *Escherichia coli* producing extended spectrum β -lactamases (ESBLs) [5].

This study was under taken to know the Antimicrobial Susceptibility Pattern of Urinary Pathogens in Pediatric Patients in Rama Medical College Hospital & Research Centre, Kanpur.

2. Aim and Objectives

Aim of the study is to study the Antibiotic Resistance Pattern of Urinary Pathogens in Pediatric Patients at Rama Medical College Hospital & Research Centre Kanpur. And objectives are to study resistance pattern to commonly used antibiotics in pediatric population at Rama Medical College.

3. Material and Methods

This study was carried out at Department of Microbiology in Rama Medical College Hospital & Research College Kanpur, Uttar Pradesh, India.

This is a prospective and observational type. Children who have taken medication (Antibiotics) in past one week were excluded from the study. Clean-catch, mid stream urine sample was needed. Microscopic and macroscopic examination was performed. Urine culture was done semi-quantitatively on 5% sheep Blood Agar and MacConkey Agar plates incubated at 37°C overnight. The isolates were identified based on colony appearance, gram stain and standard biochemical tests.

Antimicrobial Susceptibility Test

AST was performed by Kirby-Bauer disc diffusion method as per CLSI guidelines (2016).

Kirby-Bauer Disc Diffusion Method [6]

A cotton swab was dipped into inoculum and squeezed to drain out the excess fluid. Then the swab was inoculated on the MHA plate by streaking the swab three times over in entire agar surface.

- After drying the surface of agar plate for 3-5 minutes the antibiotic discs were applied using either sterile forceps or multi disc dispenser.
- For each strain a bacterial suspension adjusted to 0.5 McFarland was used.
- Disc was placed closer than 20 mm (centre to centre) on the MHA plate.
- Ordinarily, maximum up to 6 discs were applied on a 100 mm plate.
- The plates were then incubated at 37 °C for 16-18 hours. When tested for MRSA results were read only after 24 hours incubation.
- The zones of complete growth or inhibition around each of the disc were measured by using a ruler or vernier caliper. The diameter of disc was also included in this measurement.

- The interpretation of zone size into sensitive, intermediate or resistance was based on the standard zone size interpretant chart as per CLSI guidelines (2016) [109].
- Control strains were tested each time when a new batch of discs or MHA was used.

Antibiotics for Gram Positive: Amoxycillin (20µg), Erythromycin (5µg), Clindamycin (2µg), Tetracycline (10µg), Linezolid (10µg), Vancomycin (5µg), Teicoplanin (30µg), CoTrimoxazole (25µg), Nitrofurantoin (50µg).

Antibiotics for Gram Negative: Amoxycillin (20µg), Piperacillin/tazobactam (100µg), Cefotaxime (30µg), Ceftriaxone (30µg), Gentamycin (10µg), Amikacin (30µg), Ofloxacin (1µg), Levofloxacin (1µg), Imipenem (10µg), Meropenem (10µg), Colistin (10µg), Nitrofurantoin (50µg), Tigecycline (10µg).

Total of 100 Urine Samples were collected from the patients among them 39 isolates obtained, gram negative bacteria had a higher frequency of occurrence than gram positive bacteria and yeasts. Out of 39 positive samples 28 showed gram negative bacteria among them most common isolate was *Escherichia. coli* (48.75%), followed by *Klebsiella oxytoca* (12.82%), *Klebsiella pneumoniae* (7.69%), and *Pseudomonas aeruginosa* (2.56%). 7 were gram positive bacteria In which most common were *Enterococcus faecalis* (12.82%) followed by MSSA (5.12%), and 4 were *Candida* species in which *C.tropicalis* (5.12%) and *C.krusei* (5.12%).

In case of *Escherichia.coli* amoxicillin showed maximum resistance 68.42 % followed by levofloxacin (52.63 %). In case of *Klebsiella* Species amoxicillin ceftriaxone showed maximum resistance 63 % followed by amikacin 50 %. In case of *Pseudomonas aeruginosa* amoxycillin cefotaxime, ceftriaxone, ofloxacin, levofloxacin were 100% resistant. (Figure 1)

4. Results

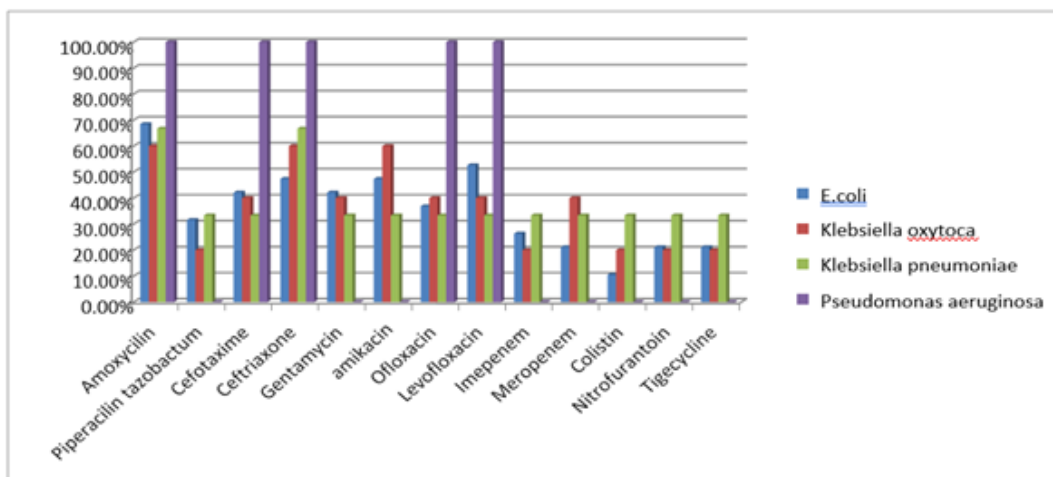


Figure 1: Antibiotic Resistance Pattern for Gram Negative Bacteria

In case of *Enterococcus faecalis* amoxicillin showed maximum resistance 60% In case of MSSA amoxicillin, erythromycin, clindamycin, tetracycline, co-trimoxazole, nitrofurantoin showed maximum resistance 50%.

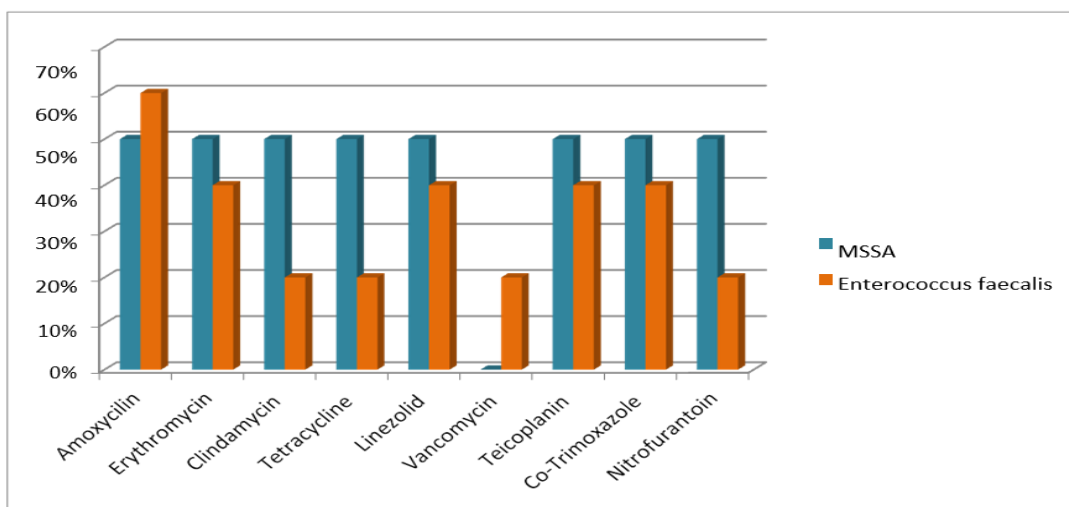


Figure 2: Antibiotic Resistance Pattern for Gram Positive Bacteria

5. Discussion

Antibiotic Susceptibility Pattern of Gram Negative Bacteria

In our study *Escherichia.coli* was amoxicillin showed maximum resistance 68.42 % followed by levofloxacin (52.63 %) and Chang teng wu et al stud [4] showed 82.9% resistance to amikacin and 77.9% to piperacillin., Nirmaljit et al study [7] showed 76 % resistance to norfloxacin followed by cefotaxime, ceftazidime 73%, co-trimoxazole 75% and 64% to ampicillin.

In case of *Klebsiella* Species Amoxicillin Ceftriaxone showed maximum resistance 63% followed by amikacin 50% and chang teng wu et al stud [4] showed 98% resistance to ampicillin, Nirmaljit et al stud [7] showed 76% resistance to ampicillin followed by cefotaxime, ceftazidime co-trimoxazole 69% and amoxy-clavulanic acid 62%.

In case of *Pseudomonas aeruginosa* amoxycilin cefotaxime, ceftriaxone, ofloxacin, levofloxacin were 100% resistant. Nirmaljit et al study showed 100% resistance to ciprofloxacin followed by amikacin, gentamycin, ampicillin and 50 %to ceftazidime.

Antibiotic Susceptibility Pattern of Gram Positive Bacteria

In case of *Enterococcus faecalis* Amoxicillin showed maximum resistance 60%. Amit et al [8] study showed 93.33% resistance to Ciprofloxacin 88.33% to Gentamycin, 81.66%to Clindamycin, 78.33% to Erythromycin and 75% resistance to Nitrofurantoin In case of MSS Aamoxicillin, erythromycin, clindamycin, tetracycline, co-trimoxazole, nitrofurantoin showed maximum resistance 50%.

6. Conclusion

Urinary tract infection is the most common and a serious health affecting problem both in the community and hospital. Urinary tract infection (UTI) is a problem that is frequently encountered by pediatric healthcare providers. Over recent decades, the importance of UTI has been increasingly recognized, in particular the role of UTI as an occult cause of febrile illness in children.

There is a high antibiotic resistance to commonly used antibiotics among children, Common uropathogens isolated from this study showed high resistance to widely used antibiotics especially amoxycilin cefotaxime, ceftriaxone, ofloxacin, levofloxacin amikacin erythromycin, clindamycin, tetracycline, co-trimoxazole, nitrofurantoin. Colistin, piperacilin-tazobactam, gentamycin, imepenem, meropenem, norfloxacin vancomycin, tigecycline, tetracycline, co-trimoxazole linezolid, teicoplanin have lower antibiotic resistance rates and can be used in the treatment of UTI in children.

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