

Antibiotic Susceptibility Pattern of Uropathogens in Pediatrics Patients



Microbiology

KEYWORDS: Urinary tract infection. Antibiotic susceptibility testing. Resistance. Escherichia coli.

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ABSTRACT

Background: Urinary tract infection in children is very common; it is significant cause of irreversible renal damage in infants and children. UTI in infants and children if untreated may lead to long term complication.

Methods: We receive 800 urine samples from different pediatric wards and NICU, then Isolation and identification of pathogens by conventional method and confirmed by standard method. These all samples are taken from Jan. 2014 to June 2014.

Antibiotic susceptibility test was done using modified Kirby-Bauer disk diffusion method according to CLSI -2014 guidelines.

Results: Out of total 800 urine sample uropathogens isolated from 240(30%) sample. The pathogens isolated were 192(80%) Enterobacteriaceae, 30(12%) were Non fermenters and 9(4%) were Candida spp. and 9(4%) GPC (Gram positive cocci) isolated.

Conclusions: E.coli is the most common organism causing UTI in children. Study results emphasize that uropathogens show resistance to commonly used antibiotics like 2nd and 3rd generation cephalosporines and sensitive to carbapenams and newer fluoroquinolones like levoflox.

Introduction.

The urinary tract is a common site of infection in the pediatric population.

Unlike the generally benign course of urinary tract infection (UTI) in the adult population, UTI in the pediatric population is well recognized as a cause of acute morbidity and chronic medical conditions, such as hypertension and renal insufficiency in adulthood. As a result, it is crucial to have a clear understanding of the pathogenesis of UTI, risk factors, indications for diagnostic tests, and the appropriate uses of antimicrobial agents in the management of children with UTI.

A UTI is defined as colonization of a pathogen occurring anywhere along the

urinary tract: kidney, ureter, bladder, and urethra. Traditionally, UTIs have been

classified by the site of infection (ie, pyelonephritis [kidney], cystitis [bladder],

urethra [urethritis]) and by severity (ie, complicated versus uncomplicated). A

complicated UTI describes infections in urinary tracts with structural or functional

abnormalities or the presence of foreign objects, such as an indwelling urethral catheter. This model does not necessarily reflect clinical management, however. In children, a simpler and more practical approach is to categorize UTI as a first infection versus recurrent infection. Recurrent infections can be further subdivided into (1) unresolved bacteriuria, (2) bacterial persistence, and (3) reinfection.

The initial UTI documented by a proper urine culture is the first infection.

Infections of the urinary tract generally resolve with adequate treatment in most children. In neonates and infants, however, they are presumed to be complicated because of the high association between urinary tract malformation and concurrent bac-

teremia, which predispose children to acute morbidity and long-term renal insufficiency [1,2].

The recurrence of a UTI may be caused by several reasons. Unresolved bacteriuria

is most commonly caused by inadequate antimicrobial therapy. Subtherapeutic levels of the antimicrobial agents may be a result of noncompliance, malabsorption, suboptimal drug metabolism, and resistant uropathogens unresponsive to attempted therapy [3]. In these cases, infection typically resolves after altering the therapy according to antimicrobial sensitivities determined by a proper urine culture.

Bacterial persistence and reinfection occur after sterilization of the urine has

been documented. In the case of bacterial persistence, the nidus of infection in

the urinary tract is not eradicated. Characteristically, the same pathogen is documented on urine cultures during subsequent episodes of UTI despite negative cultures after treatment. The uropathogen frequently resides in a location that is shielded from antimicrobial therapy. These protected sites are often anatomical abnormalities, including infected urinary calculi [4], necrotic papillus [5], or foreign objects, such as an indwelling ureteral stent [6,7] or urethral catheters

[8], which once infected may not be sterilized. Identification of the anatomic abnormality is essential because surgical intervention (extirpation) may be necessary to eradicate the source of infection.

In contrast to bacterial persistence, reinfection is characterized by different pathogens documented on proper urine cultures with each new UTI. UTI most commonly occurs by periurethral colonization [9] and by the fecal-perinealurethral route [10]. Rarely, a fistula between the urinary tract and gastrointestinal tract serves as the source of reinfection [11]. It is important to note that Escherichia coli occurs in many different serotypes, and documentation of what seems to be recurrent E coli UTI may, in fact, represent reinfection rather than bacterial persis-

tence [12]. Serotyping (or careful examination of antimicrobial sensitivity profile) ultimately can establish a diagnosis of reinfection in equivocal situations. As the pathogenesis of UTI has become better understood, it seems that some element of bacterial persistence is more common than previously thought [13]. Similar to bacterial persistence in abnormal conditions with reinfection such as fistulae, surgery may be necessary to correct the source of infection.

Methods

We have taken 800 urine samples ,which we are receiving from different pediatric wards and NICU of civil hospital ahmedabad. (from jan.2014 to june 2014).

then , Isolation and identification of pathogens by conventional method and confirmed by standard method.

First microscopy and then culture & sensitivity.

Antibiotic susceptibility test was done using modified Kirby-Bauer disk diffusion method according to CLSI -2014 guidelines.

modified Kirby-Bauer disk diffusion method .⁽¹⁴⁾

REQUIRED

Mueller hinton agar: prepare and sterilize the medium as instructed by the manufacturer.the PH of the medium should be 7.2-7.4. pour in to 90 mm diameter sterile petri dishes to a depth of 4mm.

Control each new batch of agar by testing it with a control strain of E. faecalis (ATCC 29212 or 33186) and co-trimoxazole disc. The zone of inhibition should be 20 mm or more in diameter.

Store the plates at 2-8° C in sealed plastic bags.they can be kept for up to 2 weeks .

For use ,dry the plates with their lids slightly raised in a 35-37°C incubator for about 30 minutes.

sporines and sensitive to carbapenams and newer fluoroquinolones like levoflox.

TABLE-1 (% and number of different organism isolated)

Total samples.	Growth.	Enterobacteriaceae	Non Fermenter	CANDIDA	GPC
800	240	192	30	9	9
	(30%)of total sample.	(80%) of total positive sample.	(12%) of total positive sample.	(4%) of total positive sample.	(4%) of total positive sample.

TABLE-2 (% and number of different organism isolated)

Enterobacteriaceae.	E.coli	130 (67%) of total Enterobacteriaceae.
	Klebseilla spp.	48 (25%) of total Enterobacteriaceae.
Non Fermenter .	Pseudomonas aeruginosa	23 (76%) of total Non fermenter
	acinetobacter spp.	7 (24%) of total Non fermenter
GPC(gram positive cocci).	Enterococcus spp.	7 (77.8%) of total GPC

- Most common E. coli in Enterobacteriaceae ,then Klebseilla spp. other include proteus, citrobacter and morgenella spp..
- In Non fermenter group most common organism were Pseudomonas aeruginosa and other organism were acinetobacter spp.
- In Gram positive cocci most common organism were Enterococcus spp.

Antimicrobial discs. ⁽¹⁴⁾

The choice of antimicrobials to be included in susceptibility tests will depend on the pathogen, the specimen, range of locally available antimicrobials, and local prescribing policies.

An oxacillin disc is representative of the whole group of beta-lactamase resistant penicillins when testing staphylococci.

About 1 hour before use ,the working stock of discs should be allowed to warm to room temperature ,protected from direct sunlight.

Results

- Out of total 800 urine sample uropathogens isolated from 240(30%) sample.
- The pathogens isolated were 192(80%) **Enterobacteriaceae**, 30(12%) were **Non fermenters** and 9(4%) were **Candida spp.** and 9(4%) **GPC (gram positive cocci)**isolated.
- In **Enterobacteriaceae group** most common organism was **E.coli** 130(67% of total enterobacteriaceae).
- Other organism are **Klebseilla** spp. 48(25% total enterobacteriaceae) and other include proteus, citrobacter and morgenella spp..
- In Non fermenter group most common organism were **Pseudomonas aeruginosa** 23(76% of total non fermenter),and other organism were acinetobacter spp. 7(24% of total non fermenter).
- In Gram positive cocci most common organism were **Enterococcus spp.**7(77.8% Of total GPC).
- E.coli is the most common organism causing UTI in children.
- Study results emphasize that uropathogens show resistance to commonly used antibiotics like 2nd and 3rd generation cephalo-

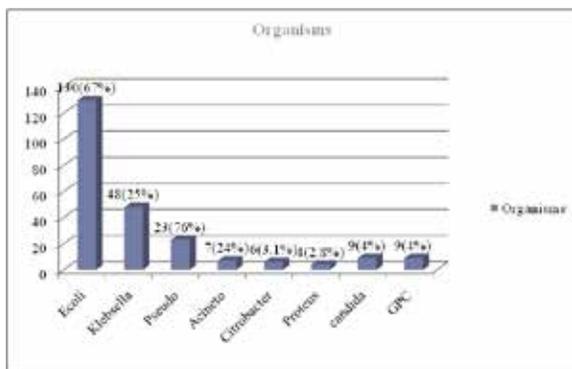


TABLE-3
ANTIBIOTIC SUSCEPTIBILITY PATTERN OF E-COLI SPP.
(% of resistance)

Cefaclor	78%
Ceftriaxone	70%
Ampicillin-sulbactam	35%
Ceftriaxone-tazobactam	25%
Levoflox	12%
Piperacillin-tazobactam	25%
Gentamycin	45%
Cotrimoxazole	35%
tetracyclin	70%

E.coli is resistance to 2nd and 3rd generation of cephalosporines and also tetra cyclin and less resistance to Ampicillin-sulbactam , Ceftriaxone-tazobactam , Piperacillin-tazobactam , Gentamycin , Cotrimoxazole.

Drug of choice is newer fluoroquinolones like levoflox, carbapenems and polymyxin-B.

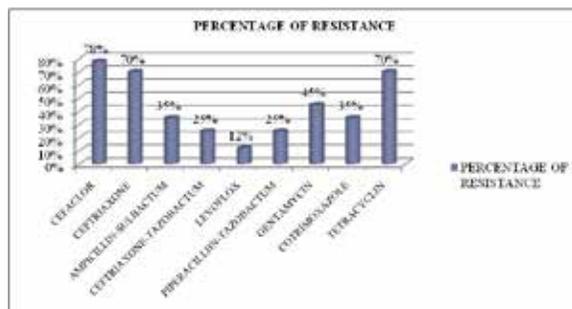


TABLE-4
ANTIBIOTIC SUSCEPTIBILITY PATTERN OF KLEBSIELLA SPP.
(% of resistance)

Cefaclor	84%
Ceftriaxone	80%
Ampicillin-sulbactam	40%
Ceftriaxone-tazobactam	33%
Levoflox	19%
Piperacillin-tazobactam	40%
Gentamycin	58%
Cotrimoxazole	55%
tetracyclin	75%

Kleisella spp. is resistance to 2nd and 3rd generation of cephalosporines and also tetra cyclin and less resistance to Ampicillin-sulbactam , Ceftriaxone-tazobactam , Piperacillin-tazobactam , Gentamycin , Cotrimoxazole.

Drug of choice is newer fluoroquinolones like levoflox, carbapenems and polymyxin-B.

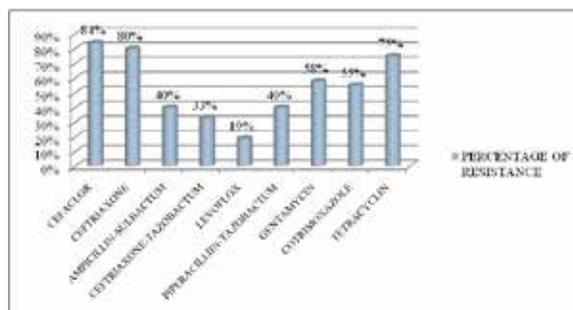


TABLE-5
ANTIBIOTIC SUSCEPTIBILITY PATTERN OF PSEUDOMONAS AERUGINOSA. (% of resistance)

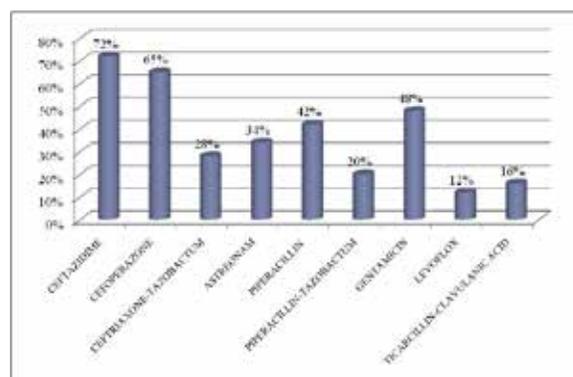
Ceftazidime	72%
Cefoperazone	65%
Ceftriaxone-tazobactam	28%
Astreonom	34%
Piperacillin	42%
Piperacillin-tazobactam	20%
Gentamycin	48%
Levoflox	12%
Ticarcillin-clavulanic acid	16%

Here also pseudomonas aeruginosa is resi. to 2nd and 3rd generation of cephalosporines,

Less resistance to streptomycin, piperacillin, B-lactamase inhibitor, gentamycin .

Drug of choice is newer fluoroquinolones like levoflox, carbapenems and polymyxin-B.

(% of resistance)



Conclusion:

- E.coli is the most common organism causing UTI in children.
- Study results emphasize that uropathogens show resistance to commonly used antibiotics like 2nd and 3rd generation cephalosporines and sensitive to carbapenams and newer fluoroquinolones like levoflox.
- Uropathogens are also sensitive to gentamycin and B-lactamase inhibitors, but resistance to tetracyclin.
- E.coli and Kleisella spp. are also sensitive to cotrimoxazole. pseudomonas aeruginosa is sensitive to streptomycin and piperacillin.
- But main drug of choice is carbapenams and newer fluoroquinolones

like levoflox, because minimum samples are resistance to them.

- Another drug of choice is also polymyxin –B.
- Above study shows emerging multidrug resistance, So UTI is better treated with specific antibiotics after culture and sensitivity report, Proper use of drugs by patients, proper prescription by the doctors. Drug course should not be interrupted in between.
- This all attempts help us to reduce the increasing resistance of drugs.

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