



Research Paper

Prevalence of urinary tract pathogen and its antimicrobial susceptibility pattern in children admitted in KMCH, Katihar, Bihar and compare its susceptibility pattern from national trend

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Abstract

Objective: This study was conducted to determine the prevalence of organism causing UTI, effect of gender & age on its prevalence, the antimicrobial susceptibility and resistance profile of bacterial isolates and compare it from national trend.

Method: Consecutive patient with culture positive UTI were enrolled in this study.

The urine samples were processed and microbial isolates were identified by conventional methods. Antimicrobial susceptibility testing was performed on all bacterial isolates by Kirby bauer's disc diffusion method.

Result: 73 consecutive culture positive urinary sample from May 2017 to September 2018, was analysed. Most common organism isolated is *E.coli* (n=36) followed by *klebsiella* (n=11), *staphylococcus aureus* (n=11), *enterococcus species*(n=7), *candida* (n=7), *proteus mirabilis* (n=1). Most of the *E. Coli* was resistant to ceftriaxone followed by amoxicillin and maximum sensitivity seen with nitrofurantoin. Maximum resistance of *klebsiella* was seen with amoxicillin followed by ceftriaxone. None of the *staphylococcus aureus* isolated in this study was sensitive to amoxicillin and maximum resistance seen with cephalixin followed by cotrimoxazole and teicoplanin.

Discussion: most common organism causing UTI comes out to be *E.coli* and *klebsiella* which shows increasing resistant to ceftriaxone and amoxicillin in pediatric age group. This necessitates the need to form regional antibiogram to guide the therapy.

Keyword: UTI (urinary tract infection), *E.coli*, *klebsiella*, *staphylococcus aureus*, amoxicillin, ceftriaxone.

Introduction

Urinary tract infection (UTI) is one of the most common childhood bacterial infections. UTI constitute a common cause of morbidity that in

association with abnormalities of the urinary tract contribute to long term complications including hypertension and chronic renal failure, hence substantial financial burden to society increases¹.

Thus the current goal of management of UTI is early detection and appropriate antimicrobial treatment. Initial empirical antimicrobial treatment should be based on the knowledge of most likely pathogens causing UTI and its local antibiotic susceptibility data.

About 90% of the first symptomatic UTI and 70% recurrent infection are due to *Escherichia coli*¹. *Proteus* species may be causative in about a third of boys with acute cystitis. Other organism including *Klebsiella*, *Staphylococcus epidermidis* and *Streptococcus faecalis* may occasionally be responsible. *Proteus* and *pseudomonas* are associated with recurrent UTI, instrumentation and nosocomial infection. *Candida albicans* infections are relatively common in preterm infants, immunocompromised and following prolong antibiotics¹⁻⁹.

Changes in antibiotic susceptibility pattern and emergence of antibiotic resistance in community and hospital acquired pediatric uropathogens affect therapy of resistant infections. There are very few reports on resistance pattern of community acquired UTI from India especially in children³⁻⁵. *Escherichia coli* are the most common organism isolated in all these studies. Comparison of antibiogram trends in these studies suggests an increasing resistant trend to ampicillin and cephalosporin over the last few years. In study K V Nisha et al over 274 patient with significant bacteriuria, in kerala, *E.coli* show high level of resistance to ampicillin, cephalosporin (cefixime, cefotaxim), fluoroquinolone (ciprofloxacin, norfloxacin) and cotrimoxazole². In another study by Taneja et al, consisting of 558 isolates, 32.7% and 87% resistant to ampicillin and cephalosporin respectively³. Ghadage et al, have documented 98% and 87% resistance to ampicillin and cephalosporin in their 390 culture positive sample⁴. In the study by sharan et al consisting of 64 samples, 98% and >60% were resistant to ampicillin and cephalosporin respectively⁵. Similarly Rao et al in their 857 culture positive urine samples shows 89% resistance to cephalosporin⁶. There are few regional data from

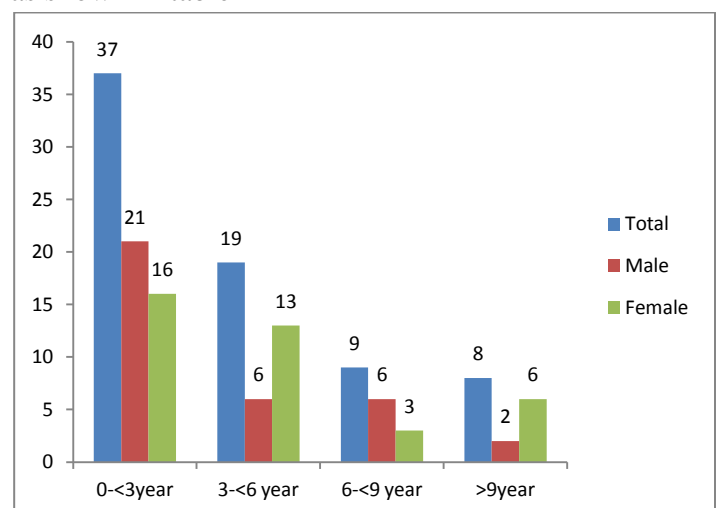
Bihar state till date. It is well known that there may be marked difference in antibiotic sensitivity pattern between various geographic areas within the same country. Thus the aim of this study is to assess microbiological profile and antibiotic resistance trend of uropathogens isolated in community acquired UTI in children from Bihar, especially eastern Bihar.

Subject and Method Setting: The present study was carried out over patients who visited or get admitted in Pediatrics department of Katihar Medical College, with urine culture positive, from May 2017 to September 2018.

Study Design: It is prospective study .Only culture positive urine samples were enrolled in this study. Urinary tract infection was defined according to American Academy of Pediatrics (AAP) guidelines⁹. Cultures was considered positive when there was a growth of single pathogen in a urine specimen of 10⁵CFU/ml collected by midstream catch, 10⁴ CFU/ml for catheterized samples , or any growth obtained by a suprapubic aspiration

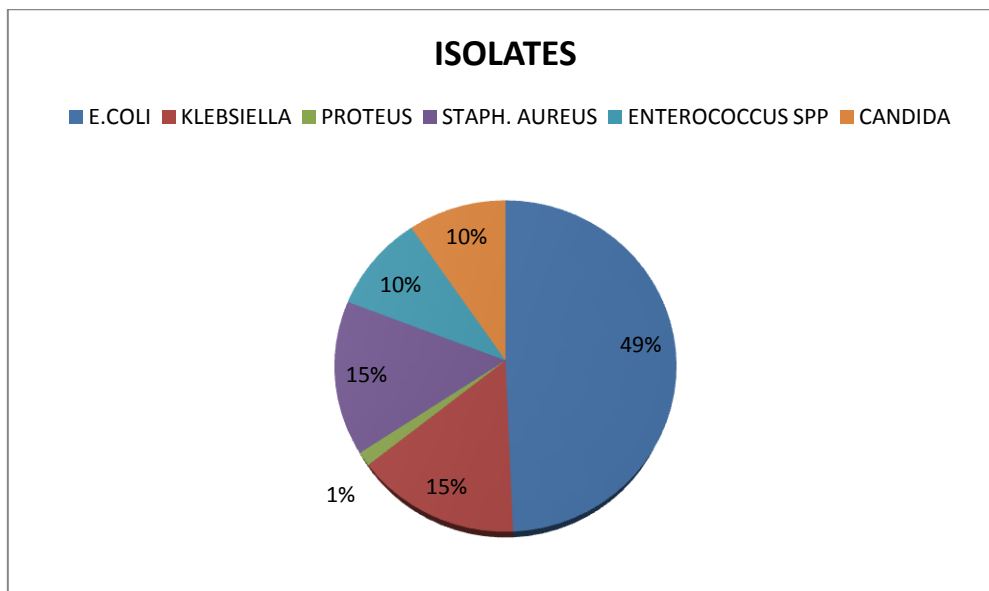
Result

73 culture positive urine samples was analysed, out of them 38 was female (52.05%) and male 35(47.95%). Majority of them is in of age group 0-3 years (male 21, female 16), in age group 3-6 year, and in >9 year there was female dominance, as shown in table



In this study, most common organism isolated was gram negative bacilli (n=48). Among GNB *Escherichia coli* 75% was the most common isolate, followed by *Klebsiella* 22.92% and *Proteus mirabilis* 2.08%.

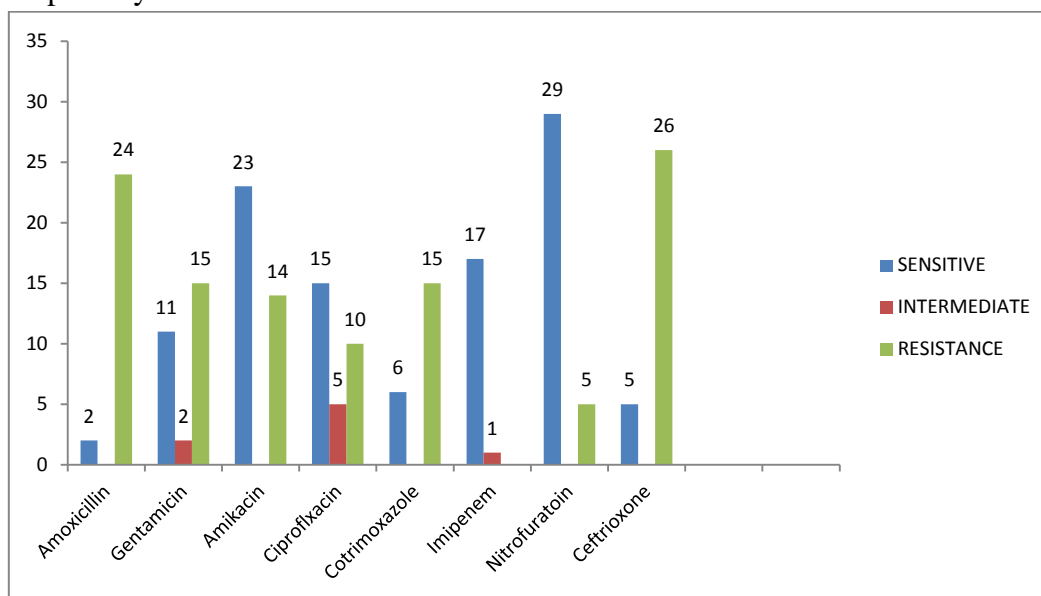
There were total of 18 GPC (Gram positive Cocci) isolates, out of which more number of *Staphylococcus sp.*(61.11%) was present, compared to *Enterococcus sp* (38.88%).



Among *E.coli*, maximum sensitivity was seen with nitrofurantoin (80.60%) followed by amikacin (63.89%), impenam (47.22%), ciprofloxacin (41.67%). Maximum resistance was seen with

ceftriaxone (72.22%) and amoxicillin (66.67%) followed by cotrimoxazole and gentamicin (41.67%) each.

Antibiotic Susceptibility Pattern in *E.Coli*



Among gram positive cocci, staphylococcus was the predominant isolate (61.11%), followed by enterococcus (38.88%).

Among gram positive cocci maximum sensitivity was seen with Nitrofurantoin (88.88%) followed

by Vancomycin (77.78%), linezolid, tetracycline (66.66%) and Teicoplanin (61.11%).

Most of the GPC was resistant to cotrimoxazole (61.11%) followed by ciprofloxacin (50%), amoxicillin, cephalixin, amikacin, gentamicin

(each 44.44%). There was rising trend of resistance to Teicoplanin, Linezolid and Vancomycin.

Staphylococcus aureus was mostly sensitive to Nitrofurantoin (90.1%) followed by vancomycin, amikacin (63.63% each), followed by linezolid and gentamycin (each 54.55%). Most of them were resistant to cephalixin (72.72%) followed by teicoplanin, cotrimoxazole(54.55% each)

All isolates of Enterococcus was sensitive to vancomycin (100%), followed by nitrofurantoin linezolid and teicoplanin (85.71%) each and mostly resistant to cotrimoxazole (71.43%), amikacin and gentamicin (57.14% each), followed by amoxicillin (42.86%). No resistance was seen with vancomycin and teicoplanin.

Most of the Candida infection was noted in neonatal period (57.71%).

Table 1: Antibiotic Susceptibility Pattern of Staphylococcus aureus (n=11)

Antibiotic	Susceptible	Resistant
Amoxicillin	0	4
Cephalexin	1	8
Amikacin	7	4
Gentamicin	5	4
Cotrimoxazole	4	6
Ciprofloxacin	5	3
Nitrofurantoin	10	1
Vancomycin	7	4
Linezolid	6	4
Teicoplanin	4	6
Tetracycline	10	1

Table 2: Antibiotic Susceptibility Pattern of Enterococcus Spp. (n=7)

Antibiotic	Susceptible	Resistant	Intermediate
Amoxicillin	1	3	
Amikacin	1	4	1
Gentamicin	1	4	-
Cotrimoxazole	1	5	-
Ciprofloxacin	0	6	-
Nitrofurantoin	6	0	-
Vancomycin	7	0	-
Linezolid	6	1	-
Teicoplanin	6	0	-
Tetracycline	2	3	-

Discussion

Out of 73 culture positive sample, number of GNB (n=48) is greater than GPC (n=18). Among

GNB, Escherichia coli (N=36) was the most common organism isolated as a causative organism of UTI, which is consistent with the study of K.V.Nisha et al², Kothari et al⁷, Dash et al⁸. followed by E.coli was klebsiella (n=11).World wide data also show that E.coli and klebsiella spp. are the commonest uropathogens isolated in UTI patients.

Among gram positive cocci, Staphylococcal species (n=11), was most common isolate, followed by Enterococcus (n=7).

Candida (n=7) was most commonly isolated in neonatal age group.

Female (n=38) slightly outnumbered the Male (n=35) and it comparable with the study of Ghadage et al⁴.

Most common age group affected is less than 6 year (n=56) and mostly less than 3 years (n=37).It is comparable with the study done by Taneja et al, which shows the most common age group is less than 5 years and mostly the infants³.

In present study, maximum number of E.coli was resistant to ceftriaxone (72.22%) followed by Amoxicillin (66.67%) and Cotrimoxazole, Gentamicin, Amikacin (approx. 40%), which is consistent with study of K.V. Nish².4 isolates of E.coli had shown resistance to imipenem, which shows a worsening situation as imipenem mostly used as reserve drug.

Maximum sensitivity is seen with Nitrofurantoin (80.6%) and Amikacin (63.89%) and minimum sensitivity to amoxicillin(5.55%).

Among gram positive cocci, none of the staphylococcus aureus had shown sensitivity towards amoxicillin, and maximum resistance seen with cephalixin (72.22%), followed by cotrimoxazole, teicoplanin (54.55% each) and equally resistant to amikacin, gentamicin, vancomycin, linezolid.

Conclusion

This study allows comparison of resistance pattern to antimicrobials in childhood UTI among children visiting to Katihar Medical College, which reflects population of eastern Bihar. It

shows increasing resistance among E.coli and klebsiella to Cephalosporins, Penicillin, Cotrimoxazole. Traditionally first line drug used for treating childhood UTI such as Amoxicillin, Cephalosporin, and Cotrimoxazole, might no longer be adequate. There is also increasing trend of resistance among staphylococcus aureus to Amoxicillin, Cephalosporin and alarmingly to Vancomycin, Linezolid & Teicoplanin, which is mostly used as reserve drug.

Increasing resistance to oral drug, in our study, mostly due to injudicious use of antibiotic in the past decades.

Resistance is emerging for broad spectrum drugs mostly due to injudicious and inappropriate use, what is more alarming is the emergence of resistance to reserve drugs. At this point a strong antibiotic stewardship is required to prevent emergence of resistance among various organisms and generate a regional data on antibiogram pattern to guide therapy.

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