International Research Journal of Medical Sciences _____ ISSN 2320 –7353
Vol. **2(6),** 11-13, June **(2014)** *Int. Res. J. Medical Sci.*

Etiology and Drug Resistance Profile of Pediatric Urinary Tract Infections in Eastern India

Choudhury Payel[*1], Chaudhuri Satya Narayan[2] and Chattopadhyay Chitrita[3]
[1]Dept. of Microbiology, B.U, Burdwan, INDIA
[2]KIEM, Mankar, Burdwan, INDIA
[3]Dept. of Microbiology, BMCH, Burdwan, INDIA

Available online at: www.isca.in, www.isca.me
Received 4th May 2014, revised 18th June 2014, accepted 27th June 2014

Abstract

The present study had been conducted to provide information on the spectrum of bacteria involved in pediatric UTI in Eastern India and their drug sensitivity pattern. Drug susceptibility testing of the isolates were done and the results were interpreted following the Clinical and Laboratory Standards Institute guidelines. The overall prevalence of UTI was found to be 196/300 (65.3%). Escherichia coli was the dominant urinart tract pathogen in our pediatric population, this being followed by Proteus spp. and Klebsiella sp. E. coli displayed high level of resistance against tetracycline and ampicillin. Parenteral antibacterials, like gentamicin, amikacin and nitrofurantoin were found to be effective against urinary tract pathogens.

Keywords: Antibacterial agents, *E. coli*, urinary tract infections, community.

Introduction

Pediatric UTI, if treated early and adequately, the risk of renal scarring and chronic kidney disease can be minimized. In UTIs, antibiotic treatment begins before bacteriological culture results are obtained. Specific geographical locations and time play a crucial role in determining the etiology and antibiotic susceptibility of UTI causing pathogens[1-4]. Moreover, there is increase in resistance among uropathogens worldwide[5,6]. In order to obtain a rational treatment strategy, the antimicrobial resistance pattern in a specific geographical location needs to be continually monitored[6,7]. Substantial work has not been carried out regarding the antimicrobial resistance pattern among UTI causing pathogens in children in the Indian scenario[8,9,10]. As far as we know, no data regarding the antibiotic susceptibility pattern of uropathogens in children from Burdwan district (West Bengal), India, has yet been documented. The 33 month study was carried out in order to investigate the etiologyof pediatric UTI- causing pathogens and their pattern of antibiotic susceptibility in Burdwan district (West Bengal), India. The effect of gender and age on the distribution of uropathogens was also determined.

Material and Methods

Children belonging to the age group of 0-120 months, belonging to both the sexes were included in the study. Children admitted in the hospital with UTI and those receiving antibiotics 48 hours prior to tests were excluded from the study. Most of the patients had been referred by general practitioners, not specialist physicians. The urine specimens were collected and processed using standard laboratory procedures. The plates having significant growth (>10 CFU/ml) as per the Kass count[11] were used for further analysis. After biochemical identification, testing for antimicrobial susceptibility was carried out using the Kirby Bauer method[12], following the Clinical and Laboratory Standards Institute guidelines[13].

Results and Discussion

The incidence of UTI was higher in girls than in boys with 59.6% and 40.3% respectively. The occurrence of *E.coli* was higher in girl patients (60.5%) than in boys (39.4%) (table 1). Similar to other studies, *E. coli* was the uropathogen, occurring significantly in high numbers from females of all age categories[14,15]. There was fewer numbers of patients in the neonatal period, but with the rise in age, the number of cases increased (table 1). *E. coli* occurred predominantly in the age group 24-59 months, in both the gender. Grouping to two age groups (less than or more than 12 months) were done for pathogens that had lesser number of isolates. Some of the Gram negative uropathogens occurred in higher frequency in the >12 months age group in comparison to the <12 months age group, in case of female patients. In boys, few of the bacterial pathogens (Gram positive and Gram negative) was distributed equally among both the age groups (less than12 months and more than 12 months) (table 1).

Invitro susceptibility data: Tetracycline (85.6%) and ampicillin (67.5%) were found to be resistant against *E. coli*. The resistance percentage of *E.coli* against ampicillin were 45, 50 and 100 among the pediatric population in Canada, Europe and Africa, respectively[16-19]. Contrary to the first generation cephalosporins (resistant), third generation cephalosporins like

ceftazidime showed sufficient efficacy against *E. coli*. Gentamicin (94.5%) and amikacin (88.2%), displayed high level of activity towards *E. coli*. Fluoroquinolones, that are widely used to treat UTI, were not effective against the three most commonly isolated Gram negative uropathogen. Analogous to *E. coli*, *Proteus* spp. and *Klebsiella* sp. displayed the highest degree of resistance against tetracycline. The antibiotics that were effective towards *Klebsiella* sp. were gentamicin, amikacin and nitrofurantoin. Similar high susceptibility of *Klebsiella* sp. towards gentamicin (94.9%) and amikacin (100%) were reported by Elpis et al, 2011[6]. Imipenem was cent percent susceptibile towards Proteus spp. Elpis at al (2011) reported high susceptibility percentage of *Proteus* spp. towards imipenem (87.9%)[6].

Table-1
Distribution of UTI causing pathogens on the basis of gender and age

Escherichia coli	**Males**	**Females**	**Total**
<12 months	12	09	21
12-23 months	10	08	18
24-59 months	13	33	46
60-120 months	06	13	19
***Proteus* spp.**			
<12 months	08	07	15
>12 months	04	14	18
***Klebsiella* sp.**			
<12 months	06	04	10
>12 months	06	14	20
***Enterococcus* sp.**			
<12 months	02	01	03
>12 months	02	06	08
S. aureus			
<12 months	0	01	01
>12 months	02	02	04
Others			
<12 months	03	01	04
>12 months	03	05	08
Total	79	117	196

Table-2
Antimicrobial susceptibility and resistance percentage in *E. coli*

Antibiotic	***Escherichia coli***	
	Sensitivity%	**Resistance%**
Ampicillin	32.5	67.5
Amikacin	88.2	11.8
Cephalexin	34.7	65.3
Ceftazidime	73.0	27.0
Ciprofloxacin	36.0	64.0
Co-trimoxazole	33.8	66.2
Gentamicin	94.5	5.5
Nitrofurantoin	100	0
Tetracycline	14.4	85.6
Imipenem	NT	-

Conclusion

In our study, *E. coli* was the predominant uropathogen, which is in concordance to other pediatric studies. There was change in the frequency of uropathogens according to gender and age. This study provides valuable laboratory data to monitor the status of antimicrobial resistance among uropathogens in this geographical area. High incidence of microbial resistance was seen against tetracycline, ampicillin, cephalosporins (first generation), fluoroquinolones and co-trimoxazole. The antibiotics that were found to be effective against most of the uropathogens in our study were nitrofurantoin and parenteral drugs, like gentamicin and amikacin. We, therefore, suggest empirical selection of antibiotics must be based upon an insight into the distribution of uropathogens in the local area and their drug susceptibilities rather than on guidelines laid universally. Furthermore, in each region monitoring of drug resistance pattern among uropathogens must be carried out regularly.

References

1. Chomarat M., Resistance of bacteria in urinary tract infections, *Int.J of antimicro. Agen.*, **16**, 483-7 **(2000)**

2. Gupta K., Emerging antibiotic resistance in urinary tract infections, *Inf. Dis. Clin. of North America.*, **17**, 243–59 **(2003)**

3. Prais D et al., Bacterial susceptibility to oral antibiotics in community acquired urinary tract infections, *Arch. of dis. in childhood*, **88**, 215–8 **(2003)**

4. Sefton A. M., The impact of resistance on the management of urinary tract infection, *Int. J of antimicro. Agen.*, **16**, 489–91 **(2000)**

5. Prakash D. and Saxena R. S., Distribution and Antimicrobial Susceptibility Pattern of Bacterial Pathogens Causing Urinary Tract Infection in Urban Community of Meerut City, India, *ISRN Microbiol.,* 1-13 **(2013)**

6. Elpis M., et al., Antimicrobial susceptibility of pediatric uropathogens in Thrace, Greece, Int. Urol. Nephrol., **43,** 549–55 **(2011)**

7. Gruneberg G. N., Antibiotic sensitivities of urinary pathogens, 1971-1982, *J Antimicrob Chemothr.,* **14**, 17-23 **(1984)**

8. Biswas D. and et al., Choice of antibiotic for empirical therapy of acute cystitis in a setting of high antimicrobial resistance, *Ind. J. of Med. Sci.*, **60 (2)**, 53–58 **(2006)**

9. Akram M., Shahid M, and Khan A. U., Etiology and antibiotic resistance patterns of community-acquired urinary tract infections in J N M C Hospital Aligarh, India, *Ann. of Cli. Microbiol. and Antimicr.*, **6(4), 2007**

10. Kothari A. and Sagar V., Antibiotic resistance in pathogens causing community-acquired urinary tract infections in

India: a multicenter study, *The J of Inf. in Dev. Coun.*, **2 (5),** 354–58 **(2008)**

11. Azra S. H., Nair D., Kaur J., Baweja G., Deb M., Aggarwal P., Resistance patterns of urinary isolates in a tertiary Indian hospital, *J Ayub Med Coll Abottabad.,* **19**, 39-41 **(2007)**

12. Kirby W. M., Bauer A. W. and et al., Antibiotic susceptibility testing by a standardized single disk method. *Am. J. Clin. Pathol.,* **45**, 493–96 **(1966)**

13. Clinical Laboratories Standards Institute (CLSI). Performance of standards for antimicrobial disk susceptibility tests; approved standards, 10th ed. M02- A10. Vol 29. Wayne, PA: CLSI; **(2009)**

14. Nys S. et al., Urinary tract infections in general practice patients: diagnostic tests versus bacteriological culture, *J. of Antimicro. Chemo.,* **57(5)**, 955–58 **(2006)**

15. Nys S. et al., Antibiotic treatment and resistance of unselected uropathogens in the elderly, *Int.J of Antimicro. Agen.,* **27(3)**, 236–41 **(2006)**

16. Adjei O. and Opoku C., Urinary tract infections in African infants, *Int. J. Antimicrob. Agen.,* **24**, 32–4 **(2004)**

17. Allen U., MacDonald N. and Fuite L., Risk factors for resistance to first-line antimicrobials among urinary tract isolates of Escherichia coli in children, *CMAJ*, **160**, 1436–40 **(1999)**

18. Haller M., Brandis M. and Berner R., Antibiotic resistance of urinary tract pathogens and rationale for empirical intravenous therapy, *Pediatr. Nephrol.,* **19**, 982-6 **(2004)**

19. Prais D. et al. Bacterial susceptibility to oral antibiotics in community acquired urinary tract infection, *Arch. Dis. Child.,* **88**, 215–18 **(2003)**