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Prevalence, Microbial Profile and Antimicrobial Sensitivity Pattern of Pathogens isolated from Paediatric Patients in a Tertiary Care Hospital in Eastern India

Dr. Rina Das Assistant professor, Dept of Microbiology, Calcutta National Medical College, Calcutta. India.

Dr. Bimal Kumar Mandal Assistant professor, Dept of ENT & Head-Neck Surgery, Calcutta National Medical College, Calcutta, India.

ABSTRACT

Background : A prospective study was conducted at a tertiary care centre in Kolkata, with the aim of finding the profile of the pediatric urinary tract infection, bacterial pathogens and their antibiotic sensitivity pattern. Materials & methods: Urine sample of 642 patients, below 14 years, suspected to have urinary tract infection (UTI) were tested, bacterial agents were identified by semi-quantitative urine culture and antibiotic sensitivity was performed according Clinical laboratory standard institute (CLSI) guideline. Results: Out of 642 samples, 138(21.5%) showed significant bacteriuria where female:male 1.16:1. Among isolates E. coli (34.78%) followed by Klebsiella (31.88%). These agents were most sensitive to Imipenem(79.17%) and Amikacin (79.17%). Out of gram positive bacteria Staphylococcus aureus (15.21%) were predominant and mostly sensitive to Vancomicin (100%) and Linezolide (95.23%). MRSA (28.57%) and MDR (17.39%) among total gram negative were identified in this study.Conclusions: As drug resistance among bacterial pathogens is an evolving process, regular surveillance and monitoring is necessary to provide physician's knowledge on the updated and most effective empirical treatment of UTIs in children to reduce their morbidity and renal damage.

KEYWORDS : Urinary tract infection, antibiogram, CLSI

INTRODUCTION

Urinary tract infection (UTI) is a common bacterial infection in children [1] and also one of the most frequently occurring nosocomial infection [2] .UTI is mainly due to ascending infection from the urethra [3]. The frequency of UTI in infants is 1 to 2% much more common in boys during first 3 months and there after girls. The diagnosis of UTI in young children is important as it may be the marker of urinary tract abnormality [4]. Paediatric urinary tract infection is associated with high morbidity and long term complications like renal scarring, hypertension and chronic renal failure [5]. Bacterial isolates vary with geographical region, acts as reference for guiding the empirical therapy. Periodic evaluation of antimicrobial activity of different antibiotics is essential as the pattern of antibiotic sensitivity may vary over short periods [6].

This study was undertaken to know the clinical and bacteriological profile of urinary tract infection in children, in a tertiary care centre, Calcutta National Medical College, Kolkata.

Materials and methods:

This prospective study was done in Calcutta National Medical College, Kolkata, from June 2015 to May 2016. Children below 14 years attending pediatric outdoor and indoor with symptoms , as well as asymptomatic ones were selected for study. Clean catch mid stream urine samples were collected in a wide mouth sterile container after proper direction to mother or care givers, in case of small children.

These samples processing started within 2 hrs of collection, after screened for macroscopic appearance and presence of significant pyuria (at least 1 pus cell per 7 HPF) by microscopy. If the pus cells in un-centrifuged urine sample showed such high numbers, then the sample allowed to process on MacCokey agar and Blood agar, using semi quantitative urine culture. After overnight incubation at 37 C, the colonies of single type of bacterial growth were counted, calculated to see whether significant bacteriuria (100000 per ml) present or not. The causative agents were confirmed by sets of bio chemical tests after gram stain and motility test. Growth of more than one type of bacteria was considered as contaminated sample. The sensitivity was done by modified Kirby Bauer Diffusion method with the help of CLSI guideline. S. aureus ATCC 25923, E.coli ATCC 25922 and P.aeruginosa ATCC 25873 were used as control stains. The tests were performed for MRSA detection and MDR screening.

Results and Interpretation:

Total 642 samples were collected to find out the causative agents of UTI in children below 14 years of age. Out of which, 138 (21.5%) showed significant bacterial growth in culture were diagnosed to have UTI and analyzed. Among 138, 64 were male and 74 were females (M:F=1:1.16). Age wise they were divided into 4 groups, first group containing age below one year (male-9 and female-6) and others were >1-5 years (male-18 and female-20) , >5-10 years (male-24 and female-31) , >10-14 years (male13 and female-17). Majority of the cases were in the age group of below 10 years. There was no significant difference in growth positive rate in two genders. Overall female predominance and male female ratio was found 1:1.16 but among infant male were predominant.

Table I: Distribution of all isolates identified from urine samples (n=138)

Bacterial isolates	Number of isolates	Percentage
Escherichia coli	48	34.78%
Klebsiella pneumonia Klebsiella oxytoca	36 8	26.08% 5.79%
Acinetobacter spp.	6	4.35%
Pseudomonas aeruginosa	3	2.17%
Citrobacter koseri3	2	1.14%
Proteus mirabilis	3	2.17%
Proteus vulgaris	1	.72%
Staphylococcus aureus (MSSA) Staphylococcus aureus (MRSA)	15 6	10.87% 4.35%
Enterococcous spp.	10	7.25%
Grant total	138	

Growth of gram negative bacteria were more than gram positive and among gram negative E.coli (34.78 %) was dominant uropathogen followed by Klebsiella(31.88%). Staphylococcus aureus (15.21)% was gram positive dominating causative agent detected.

Table-II: Antibiotic sensitivity of gram negative bacilli (n=107)

Antibiotics	E. Coli	Klebslla	Acinetobacter	Citrobacter	Proteus	Pseudomonus
Amikacin	38(79.17%)	30(68.18%)	2(33.33 %)	2(100%)	3(75%)	2(66.67%)
Cefotaxime	18(37.5%)	14(31.81%)	0	1(50%)	2(50%)	0

Antibiotics	E. Coli	Klebslla	Acinetobacter	Citrobacter	Proteus	Pseudomonus
Nitrofurantoin	26(54.17%)	20(45.45%)	0	2(100%)	2(50%)	0
Norfloxacin	20(41.67%)	24(54.54%)	0	2(100%)	3(75%)	0
Amoxyclav	16(33.33%)	14(29.17%)	0	1(50%))	3(75%)	0
Imipenem	38(79.17%)	32(72.72%)	2(33.33%)	2(100%)	3(75%)	3(100%)
Piperacillin-tazobactum	20(41.67%)	22(50%)	1(16.67%)	2(100%)	3(75%)	2(66.67%)
Doxycycline	30(62.5%)	30(68.18%)	0	1(50%)	2(50%)	-
Levofloxacin	34(70.83%)	30(68.18%)	1(16.67%)	1(50%)	3(75%)	3(100%)
Ceftazidime	24(50%)	20(45.45%)	-	-	-	3(100%)
Cefepime	-	-	-	-	-	3(100%)
Colistin	-	-	6(100%)	-	-	3(100%)
Polymixn-B	-	-	6(100%)	-	-	3(100%)

Table III: Antibiotic sensitivity of gram positive cocci isolated

Antibiotic	Staphylococcus aureus	Enterococcus spp.
Nitrofurantoin	10(47.62%)	6(60%)
Norfloxacin	10(47.62%)	-
Linezolide	20(95.23%)	10(100%)
Vancomycine	21(100%)	10(100%)
Doxycycline	15(71.43%)	7(70%)
Amoxyclav	10(47.62%)	6(60%)
Levofloxacin	15(71.43%)	8(80%)
Gentamycin	14(66.67%)	7(70%)
Cefotaxime	12(57.14%)	-

E.coli were most sensitive to Imipenum followed by Amicacin.

S. aureus was most sensitive to Linezolide and Vancomycin. Maximum percentage of MDR were seen in Acinetobacter 4 (66.67%), Klebsiella 12 (27.27%) and E.coli 8 (16.67%). Staphylococcus aureus had 6 28.57% strains of MRSA detected by Cefoxitin resistant test.

Discussion

The present study was conducted in Calcutta National Medical College and Hospital, Kolkata. Urine is the commonest specimen sent to laboratory from OPD of a hospital as well as from admitted cases. A total of 642 urine samples were tested from UTI patients who have not received any antibiotics in the last 15 days. Total number of cases was 642 and culture positive cases were 138 that equals to 21.49% growth rate. Neelam et al [5] showed prevalence of significant bacteriuria 28.3% , Abida Khatoon et al[3] was found growth rate 17.8%. Our study showed marginally higher positive among female children compared with male children and M:F ratio 1:1.16. Similar results were shown by Patel et al [1], V. Vijaya Swetha et al [8] and Latika J Shah [9]. There is variation regarding age group of children with higher prevalence in this study of girls to boys and 40% OPD and 60% indoor sample were tested. This is in accordance with various studies as shown by Ashish et al [4] . But in contrast with Pooja et al [6] were male are predominant cases, presented to pediatric surgery and PICU and Paediatric OPD.

Prevalence of UTI was more in male than in females in age group <1 year 1.5:1 (groups I). However females were predominant overall. Similar situations exist in other studies. Important facts emanating from their study include male infants (25.6%) and toddlers (38.7%) represent the group most vulnerable to UTI due to improper toilet habits, ii) male gender is clearly a risk factor towards acquiring UTI in infancy as more prone to have uro-genital abnormality, iii) male children were paid more attention by their family . Pre-existing congenital anomalies and physiological voiding disturbances contribute to the high burden of disease as seen in other studies [10].

The common UTI prevalence was found in >5-10 years age group having 39.86% patients followed by >1-5years age group having 27.54(%). Pooja et al [6] found majority of growth positive cases were in the age group of less than six years. Ashish Jitendranath et al [4] noted the age group 0-6 years is the most affected UTI.

Most common organism found in growth positive culture in UTI in our study was Escherichia coli 34.78 % and Klebsiella was found 31.87whicsimilar to Latika J et al [9] and V. Vjaya Swetha et al[8].

Out of gram positive bacteria staphylococcus aureus (15.21%) was predominant and of which 28.57% were MRSA which is similar to Palak Gupta et al [7].

This study detected MDR cases 17.39%. This was in accordance with the study done by Ashish J et al [4].

With regard to the antibiotic sensitivity pattern of isolates, gram negative bacteria (E.coli) were most sensitive to Imipenem(79.17%) and Amikacin (79.17%) and gram positive bacteria were most sensitive to Linezolide(95.23%) and Vancomycin (100%). Goenka et al[2] showed gram positives were highly susceptible to Linezolid, Teicoplannin, Amikacin. Among the tested antibiotics the highest susceptibility for E. coli was shown by Imipenem (90.9%), Piperacillin-tazobactam (77.7%), Amikacin (81.8%), Gentamicin(79.5%) ((Gupta et al [7])

Conclusion

The present study highlights the need for periodic monitoring of organisms with antibiotic sensitivity of same and thereby to make it more cost effective particularly in the impoverished countries like ours. Antimicrobial resistance is natural biological response of microbes to antimicrobial drugs and resistance may be acquired or inherent. The pattern of resistance to commonly used antibiotics for treating UTI alerts us against indiscriminate usage of antibiotics. Early diagnosis, identification along with sensitivity helps in reducing its mortality and morbidity, if the treatment is given for appropriate doses and duration.

REFERANCES

[1] Ami H Patel, Rekha H Bhavsar, Pinakin Trivedi, Shivani R Mehta. Urinar Tract Infections in Children: Clinical Profile, Bacteriology and Antibiotic Sensitivity Pattern. GCSMC J Med Sci; July-December 2015; Vol(V) No (II) : 75-81.

[2] Dr. Abhishek S Goenka. et al. Study of Bacteriological Profile of Urinary Tract Infection among Patient Attending Tertiary Care Center. Int. J of Inform. Res. And Review.July 2015 ; Vol. 2(07):929-932.

[3] Abida Khatoon, Meher Rizvi, Asfia Sultan, Fatima Khan, Indu Shukla, Haris M. Khan. Prevalence, Microbial Profile and Antimicrobial Sensitivity Pattern of Uropathogens Isolated from Paediatric Patients.Int. Curr. Microbiol. Sci. 2015; Special Issue-1:10-18.

[4] Ashish Jitendranah, Radhika R, Bhargavi L, Geetha Bhai and Ramla Beevi. Microbiological Profile OF Urinary Tract Infection in Pediatric Population from a Tertiary Care Hospital in South Kerala. J of Bact. & Mycol. June15, 2015 ; Vol1(1), 1/5-5/5.

[5] Neelam Taneja, Shiv Sekhar Chatterjee, Meenakshi Singh, Surjit Singh & Meera Sharma. Pediatric urinary tract infections in a tertiary care center from north India. Indian J Med Res January2010; 131:101-105.

[6] Pooja Patel, R.N. Garala. Bacteriological profile and antibiotic susceptibility pattern (antibiogram) of urinary tract infections in paediatric patients. J of Res in Med and Dental Sci. January-Maarch 2014; Vol 2 (1): 20-23.

[7] Palak Gupta, Jharna Mandal, Sriram Krishnamurthy, Deepak Barathi & Nandini Pandit. Profile of urinary tract infections in paediatric patients. Indian J Med Res April 2015; 141: 473-477.

[8] V. Vijaya Swetha, U. Sreenivasa Rao, P. Hema Prakash and S. Subbarayudu. Aerobic bacteriological profile of urinary tract infections in a tertiary are hospital. Int. J. Mcrobiol. App. Sci. 2014 3(3):120-125.

[9] Latika J Shah, Geeta M Vaghela, Hetvi Mahida. Urinary Tract Infection: Bacteriological Profile and its Antibiotic Susceptibility in Westren India. NJMR. Jan-March 2015; Vol 5 (1):71-74.

[10] Zorc JJ, Kiddoo DA, Shaw KN,. Diagnosis and management of pediatric urinary tract infections. Clin Microbiol Rev 2005; 18:417-22.