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RESEARCH ARTICLE

Occurrence of urinary tract infection among children attending Gandaki Medical College Teaching Hospital and Research Center, Pokhara, Nepal

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ABSTRACT

INTRODUCTION: Urinary tract infection (UTI) is considered as the most common bacterial infectious disease seen among the pediatric patients. Most commonly, members of *Enterobacteriaceae*, particularly uropathogenic strains of *E. coli* and *Enterobacter* spp. are the primary causative pathogens of UTI in the different part of the world. Emergence of antimicrobial resistance rates among pathogens recovered from urinary tract infections is an increasing problem in the specific region.

MATERIALS AND METHODS: Prevalence and anti microbial susceptibility pattern of the bacterial uropathogens isolated from the children attending Gandaki Medical College Teaching Hospital and Reserch Center (GMC) Nepal. A total of 155 children aged upto 15 years were included in this study. Urine cultures were carried out and the isolates were identified by Gram staining and conventional biochemical methods. Antimicrobial susceptibility testing was performed by disk diffusion method according to the Clinical and Laboratory Standards Institute (CLSI).

RESULTS: In the present study 21.3 % of the sample size, showed significant bacterial growth. *E. coli* was the most frequently occurring pathogen (39.40%), followed by *Proteus* spp. 21.2%, *Citrobacter* spp. and *Streptococcus faecalis* (12.1%) *Klebsiella* spp. (9.1%), and *Staphylococcus aureus* and *Enterobacter* (3.0%). Susceptibility rate of *E. coli* were 69.2% to Gentamycin and Amikacin, 53.8% to Norfloxacin, 38.4% to Nalidixic acid and Norfloxacin.

CONCLUSIONS: Pediatric urine culture isolates were becoming increasingly resistant to commonly used antibiotics. Finally, we suggest that empirical antibiotic selection should be based on knowledge of the local prevalence of bacterial organisms and antibiotic sensitivities rather than on universal guidelines.

KEY WORDS: Urinary tract infection, Antimicrobial susceptibility, Gram positive, Gram-negative

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INTRODUCTION

Urinary tract infections (UTI) in children are usually associated with high morbidity and long term complications if they are not treated in the beginning. The incidence varies according to age, races and sex of children.[1,2] UTI (25.6%) is common in male children under the age of one year.[3] UTI occurs in 1% of boys and 3-5% of girls.[4] It is shown that 7% of girls and 2% of boys will have asymptomatic, culture confirmed UTI by six years of age.[5] Symptoms of UTI may be minimum and non specific in infants and small children.[6] The prevalence of UTI in febrile infants is greater with younger age, with a range of nearly 7% among the febrile newborn.[7]

Majority of UTI in children result due to ascending infection, although hematogeneous spread may be more common in the first year of life. Individual differences in susceptibility to UTI may be due to host factors such as production of urethral and cervical IgA antibodies as well as other factors that influence bacterial adherence to the introitus and the urethral epithelium.[8,9] Congenital anomalies of the urinary tract such as posterior urethral valve, vesico-ureteric reflux, ureteric duplex, etc., are also well known causes of UTI in children.[8]

Recognition of UTI in children should be made as early as possible to prevent from high morbidity and long term complications like renal scarring, hypertension, and chronic renal failure.[6] Investigation of early UTI are of very importance.[10] *Escherichia coli* constituted for 93.3% followed by *Proteus* spp. *Klebsiella* spp., *Citrobacter* spp., *Staphylococcus aureus* and others.[11]

In recent years, widespread use of antibiotics has been resulted in an increasing incidence of antibiotic resistance among the urinary tract pathogens all over the world. Worldwide, emerging of antibiotic resistance is increasing among the urinary pathogens.[12,13] The increase in resistance of microorganisms to antimicrobial agents, especially in hospitalized patients, demands rapid identification of the pathogen.[14,15,16] Early information enables the selection of the appropriate antibiotic prior to the results of susceptibility tests and may thereby prevent outbreaks.[17] The aim of the microbiology laboratory in the management of urinary tract infection is to reduce morbidity and mortality through accurate and timely diagnosis with appropriate antimicrobial sensitivity testing. This study was carried out to see the sensitivity pattern of uropathogens in the children.

MATERIALS AND METHODS

This cross-sectional study was carried out in the Department of Microbiology, Gandaki Medical College Teaching Hospital and Reserch Center (GMC) Pokhara, Kaski from to June 2005 to May 2006.

The clean-catch mid-stream urine sample were collected[18] only from new suspected UTI patients aging upto 15 years from outdoor and indoor patients of GMC Hospital and examined under microscope.[19] Samples showing >5 pus cell/HPF were included in the study[20] and cultured into MacConkey Agar, CLED agar and sheep Blood Agar media.[21,22] Mueller-Hinton agar was used for susceptibility testing and Nutrient agar for preservation of organism. All isolates were tested for antimicrobial susceptibility against different antibiotics using the disc diffusion method .[23, 24] The zone size was translated into the 3 susceptibility categories, namely Susceptible (S) intermediate (I) and Resistant (R) was done according to CLSI.[25]

RESULTS

Out of 115 children, 33 were found to be culture positive. Fifteen cases that showed mixed growth were excluded in the present study. The age and gender of children from whom the culture positive samples were collected are shown in table 1. Majority of the cases were of less than 10 years of age. Maximum number of cases was seen in age group 6-10 years of age, where males were 9 and females were 4 and majority of female culture positive cases were in age group 2-5 years.

Table 1. Age and gender wise distribution of children

Age (years)	Sex		Total
	Male	Female	
<2	1	1	2
2-5	4	8	12
6-10	9	4	13
11-15	3	3	6
Total	17	16	33

E. coli (39.4%) was the most commonly isolated organism with majority in female than that of male followed by *Proteus* spp. (21.2%), *Citrobacter* ssp. and *Streptococcus fecalis* (12.1%), *Klebsiella* spp. (9.1%) and *staphylococcus aureus* and *Enterobacter* spp. (3%). *Streptococcus fecalis* was found to be more frequent among male than female.

DISCUSSION

Among 155 urine samples tested 33 (21.30%) cultures showed single type of growth, 15 showed mixed type of growth which were not included in the present study and rest of them no growth. Out of all 21.30% were cultures positive in our study, Malla et al. (39.5%),[26] Taneja et al (28.3%)[27] Rai et al. (28.6%)[11] and Sohely et al (46.6%),[28] Malla et al. (57%),[29] which was higher than our study,lower positive rate than present study (1.39%),[30] Jha et al, (7.3%)[31] and Godwin et al, Ranjbar et al (16.2%).[32] Such variations might be due to inclusion of only those having complication of renal disease in higher culture cases and lower rate positive culture due to inclusion of all children of certain locality and variation on sample size .

UTI is found to be the common problem in children and depends upon the age and sex of the children. Occurrence of UTI among male children is more than female in first year of life and female after one year of age. Present study showed equal number of cases in first year of age. Present study shows marginally high rate of UTI among male children as compared to that of female. This might be due to more preference given to son than daughter/due to the uncircumscribed cases in Nepalese society.

E. coli (39.4%) was the commonest bacterial isolates of all positive cases followed by *Proteus* spp. and others. Which was somewhere near to that of Godwin et al (36.4%),[31] Ranjbar et al. (40%).[32] On the other hand present finding was lesser than the finding of GK et al (93.3%),[11] Taneja et al. (47.1%),[27] Aiyegoro et al. (52.77%),[33] and Jha B K et al. (1.39%).[30] This variation can be due to age groups, congenital anomalies of urinary tract.[8] The bacterial isolates in the present study are similar to that of Regmi et al[34] and Rai et al.[11]

E. coli was the principal isolates showing marginally high infection among male childrens showing high susceptibility to Amikacin and Gentamycin (69.2%) followed by Norfloxacin, Nalidixic acid and Ofloxacin. Kumari et al.[35] reported Amikacin as the most sensitive followed by Gentamycin, in agreement to the present study. Others, Malla et al.[29] from Pokhara, Das et al from western part of Nepal showed Amikacin was the most sensitive drug.

Proteus spp. was found to be the causative agent to about 21.2% of cases in agreement to that of Godwin et al and close to that of Rai et al.[11] and Shrestha et al.[36] It was found higher than the findings of Younis N et al.,[37] Kalantar E et al.,[38] Taneja N et al.,[27] Aiyegoro et al.,[33] and Sohley et al.[28]

Proteus spp. was found to be sensitive to Amikacin (100%) followed by Gentamycin, Ciprofloxacin & Ofloxacin by (42.8%) and Norfloxacin and Nalidixic acid by (28.5%) as reported by Malla et al.[29] with differences in resistance differences .

In the present study Amikacin and Gentamycin have the highest sensitivity. This study suggests to include in the empirical formulae of the hospital.

CONCLUSIONS

Enteriobacteriaceae family was found to be the most common pathogen that causes UTI among the children. UTI is a significant problem in children and still it is a major cause of high morbidity and

Table 1. Antibiotic susceptibility pattern of different uropathogens isolated

Organisms	Antibiotics Susceptibility (%)						
	Gentamycin	Amikacin	Norfloxacin	Nalidixic acid	Ofloxacin	Ciprofloxacin	Cefotaxim
E. coli	69.2	69.2	53.8	38.4	38.4	-	-
Proteus spp.	85.7	100	28.5	28.5	42.8	42.8	-
Citrobacter spp.	75	100	75	-	25	25	-
Streptococcus feacalis	50	100	75	-	-	50	50
Klebsiella spp.	85.7	100	28.5	-	-	42.8	-

"-", not tested

mortality in developing world. Regular monitoring in large scale is required at regular intervals in order to identify the reliable information about the resistance patterns of urinary pathogen. Finally it is suggested that empirical antibiotic selection should be based on the knowledge of local prevalence of bacteria and their sensitivities rather than the Universal guidelines.

CONFLICT OF INTEREST: None to declare.

FINANCIAL INTEREST: None to declare.

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