ISSN 2091-2889 (Online)
ISSN 2091-2412 (Print)

Journal of Chitwan Medical College 2013; 3(5): 22-25
Available online at: www.jcmc.cmc.edu.np

ORIGINAL RESEARCH ARTICLE

BACTERIOLOGICAL PROFILE OF URINARY TRACT INFECTION IN CHILDREN AT GMC TEACHING HOSPITAL

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ABSTRACT

This study aimed to find bacterial profile of urinary tract infection (UTI) in children between 2 months to 15 years of age. This is a hospital based retrospective study conducted at Gandaki medical college and teaching hospital, Pokhara over a period of 18 months. Among the total 575 children enrolled for the study, 110 children (19.1%) were found to be culture positive. Most common age group having culture positivity is 1-5 years (40%). Present study showed that UTI is more common in girls (69.1%) than in boys (30.9%). E. coli was still the most commonly isolated bacteria (70.9%) followed by Proteus (20%), Klebsiella (5.4%) and Pseudomonas sp. in (1.8%). E. coli was sensitive to Nitrofurantoin (84.6 %), Amikacin (80.7%), Gentamicin (73%) and Ofloxacin in (53.8%). Most commonly used drugs for the treatment of UTI like Cefixime and Ceftriaxone was sensitive only in 15% and 10% respectively. Similarly, Klebsiella was sensitive to Amikacin and Gentamicin (100%) but sensitive to Nitrofurantoin in only 66% of cases. Proteus was sensitive to Nitrofurantoin (95.4%), Amikacin (86%) and to Gentamicin (59%). High resistance rate was observed to Cefixime and Ceftriaxone, the commonly used drugs for its treatment in OPD basis.

Key Words: *UTI, Bacterial isolates, culture positivity and Pediatric practices.*

INTRODUCTION

Urinary tract infection (UTI) is one of the most common bacterial infections encountered in day to day pediatrics practices. Urinary tract disorders in Nepal are estimated to be about 7% and urinary tract infection constitutes majorities of this disorders. [1]

UTI is defined as presence of 105 or more organisms per ml of urine. The incidence varies according to age, race and sex. [2,3] It is estimated that 1% of boys 3% of girls develop UTI during the first ten years of life. [4,5] It has been a significant cause of acute morbidity and is also a significant cause of hospital attendance among children. It affects male children more than female in first year of life and female after 1 year of age. [4] Although the outcome of UTI is usually benign, renal scarring may develop in less than 1 year infants. Renal scarring is associated with complications such as hypertension, renal damage and end stage renal failure. [6] Although, UTI is mainly due to ascending infection from the urethra, [5] micro-organisms may reach the urinary tract by hematogenous or lymphatic routes as well. But, ascending route accounts for almost 95% of cases of UTI. [7] And, it is especially true for E. coli. Diagnosis of UTI cannot be made on symptomatology alone and urine routine/ microscopy and culture need to be performed in children with minimal suspension of urinary tract infection. [8,9]

There are several risk factors for pediatric urinary tract infections. Neonates and infants in their first few months of life are at higher risk for UTI. This susceptibility has been attributed to an incompletely developed immune system. [10] Breast feeding has been proposed as means of supplementing the immature neonatal immune system via the passage of maternal IgA to the child, [11] and providing the presence of lactoferrin, [12] and providing the effect of anti adhesive oligosaccharides [13] that is present in the breast milk. Several recent studies have demonstrated the protective effect of breastfeeding against urinary tract infection in the first 7 months of life. [11,14] Older children especially for girls are at higher risk, if wiping from back to front. Uncircumcised boys, fecal and perineal colonization, urinary tract anomalies like (vesico-ureteral reflux, obstructive uropathy, posterior urethral valve), functional abnormalities (neurologic bladder, voiding dysfunction, poor toilet training) constipation, pinworm infestation, tight clothing (underwear), immune compromised states and sexual activity [15] are known predisposing factors for UTI in children. Clinical presentation of UTI in infants and young children can be very subtle and atypical and a high index of suspension must be kept in order to diagnose. [16] UTI in Children should be suspected if there is presence of fever, chills and rigor, burning micturation, foul smelling of urine, pain abdomen, vomiting, facial puffiness, loose stool, seizures, hematuria, constipation, loss of appetite and failure to thrive. [17]

MATERIAL AND METHODS

This is a hospital based retrospective study performed at Gandaki Medical College Teaching Hospital and research centre, Pokhara. Aim of this study was to find out the bacterial pathogens causing UTI in different age groups and their sensitivity patterns. Children of both sexes attending in the Gandaki medical college (GMC) between first of Baisakha 2067 till end of Kartik 2068 over a period of 18 months with clinically suspected cases of urinary tract infection were included in this study. Children ranging from 2 months up to fifteen years of age of either sex seen in the OPD or Wards were taken as the study subjects. Urine samples of 1107 were collected but only 575 children were enrolled in this study.

Table 1: Total number of children (in groups) in this study

	2 mo-1 yr	**1-5 yr**	**5-10 yr**	**10-15 years**	**Total**
Male	31 (5.3%)	102 (17.7%)	92 (16%)	72 (12.5%)	297 (50.6%)
Female	32 (5.56%)	84 (14.6%)	82 (14.26%)	80 (13.9%)	278 (48.35%)
Total	**63** (10.95%)	**186** (32.34%)	**174** (30.26%)	**152** (26.4%)	**575**

In the remaining cases all the necessary data were not available; hence such cases were excluded from the study. Those with urinary WBC count of 5 or more were subjected to culture and sensitivity tests with all aseptic technique. Urine samples from the infants were collected by bladder aspiration or by using sterile plastic receptacles to avoid fecal contamination. Older children and adolescence were asked to collect urine samples after proper cleaning of the external urethra and perineum. Urine samples thus collected in the wide-opened mouth container were sent for microscopic examination and bacteriological culture and antibiotics sensitivity tests. Samples were processed within half an hour to one hour of collection for microscopy examination and culture. These samples were inoculated in Mac-Conkey's agar and incubated for 24-48 hours. After 48 hours, if the growth of organisms were observed then further sensitivity test were performed. The results of urine microscopy and bacterial isolates and antibiotic sensitivity were retrieved from the microbiology laboratory of Gandaki medical college and Teaching hospital (GMC).

RESULTS

Of the 575 urine samples processed for routine microscopy and culture, 110 samples were having culture positive accounting 19.13 % of the total sample studied. A study done at KCH by GK. Rai et al found 28.6% of positivity rate out of 1878 study subjects. Another study conducted by K. Gautam & BM Pokhrel revealed 28% culture positive from 205 urine samples. [18] In our present study culture positivity rate is less (19.3%) than that of study done by GK. Rai et al and K. Gautam et al and may be attributed to sample size.

Table 2: Age and Sex distribution of Culture positive cases=110

	2 mo-1 yr	**1-5 yrs**	**5-10yrs**	**> 10 yrs**	**Total**
Male	5 (4.54%)	17 (15.45%)	4 (3.6%)	8 (7.26%)	34 (30.9%)
Female	7 (6.36%)	27 (24%)	21 (19%)	21 (19%)	76 (69%)

Most common organisms isolated were E. coli 78 (70.9%), Proteus 22 (20%), Klebsiella Marbalis 6 (5.45%), Pseudomonas 2 (1.8%) Staphylococcus Saprophyticus 1 (0.9 %%) and Staph species 1 0.9%). In 66 (84.6%). E. coli was found to be sensitive to Nitrofurantoin 66 (84.6%) followed by Amikacin in 63 (80.7%) of cases. Gentamicin was sensitive only in 57 (73%) of cases.

Table 3: Bacteria causing UTI in this study

E. coli	78 (70.9%)
Proteus	22 (20%)
Klebseilla marbillis	6 (5.45%)
Pseudomonas	2 (1.8%)
Staphyloccous saprophyticus	1 (0.9%)
Staphylococcus spp	1 (0.9%)

Commonly used drugs in UTI like Ofloxacin, Cefixime and Ceftriaxone were found to be less sensitive to E. coli accounting 42 (53.8%), 12 (15.3%) and 8 (10.2%) respectively. Proteus is sensitive to Nitrofurantoin in 21 (95.4%) where as Amikacin was sensitive in 19 (86.3%) and Gentamicin in 13 (59%) of cases. Klebsiella was found to be sensitive to Amikacin and Gentamicin in 100% of cases and Nitrofurantoin and Ofloxacin are sensitive only in 66.6% of cases.

DISCUSSION

In this study, UTI is seen more frequently in girls (69.1%) than in boys (30.9%) which is consistent with the study done by A Sharma and et al at NMC teaching hospital where female (65%), male (35%) were present. Other study also showed male: female ratio 1:1.91, [19,20] and 1.2.[1] Study done by K Gautam et al. showed that UTI is more common in girls than in boys, girls (52%), boys (48%). Present study result also supports by the study conducted by F.F. from pediatric infectious research center, Iran where female children were (72%), male (28%). The reason of this disease being more common in female child is probably short urethra in females besides others factors. But this result is not consistent with the study done at Kanti children's hospital by G Rai and et al; male children (53.3%), female children (46,7%). Another study done by K K Malla et al revealed that there were male children (32.7%) and female children (67.2%) with the male female ratio 1:2. [21] This result is consistent with the present study.

E. coli is the most common bacterial pathogen isolated in this study (70.9%), followed by Proteus (20%) and Klebsiella (5.45%).This finding is similar to the study done by A Sharma, S Shrestha et al (67.5%) for E. coli. In a study by Yuksel et al and Chakupurakal et al E. coli was isolated high percentage (87%) and (92%) respectively. Study done by GK Rai et al at Kanti Children Hospital showed that E. Coli was isolated in (93.3%) of the culture positive samples and does not match with present study. Another study by K Gautam et al E. coli was isolated in (57%) of cases. [18] In this study Proteus and Klebsiella found to be positive in (20%) and (5.45%) respectively. In that same study by A Sharma et al, Klebsiella was isolated in (20%) cases. [5] Where as, in our study, Klebsiella was isolated in only (5.45%) and Proteus was isolated in (20%) cases. Different studies have shown the growth of Proteus in urine varies from (5.8%) to (12.4%) [19,22,23] which do not match with this study.

Antibiotic sensitivity pattern of organisms changes rapidly over a short period. It is especially true for developing countries where antibiotics are prescribed irrationally not only by the medical practitioner but the antibiotics are also purchased directly from the chemists (medical shop keepers) without prescription. [24]

Table 4: Antibiotics sensitivity pattern of E. Coli (n=78)

Antibiotics	Sensitivity
Amikacin	63 (80.7%)
Gentamicin	57 (73%)
Ciprofloxacin	33 (42.3%)
Nitrofurantoin	66 (84.6%
Ofloxacin	42 (53.8%)
Cefixime	12 (15.3%)
Ceftriaxone	8 (10.2%)

In the present study, E. coli was most sensitive to Nitrofurantoin (84.6%), Amikacin (80.7%), Gentamicin (73%) and Ofloxacin in (53.8%) of cases. Antibiotics sensitivity patterns done in various centers in different times are almost similar to this study. A study done by A Sharma et al showed that E. coli was sensitive to Nitrofurantoin in (100%), Amikacin (94.7%), Ofloxacin (94.4%), Cefotaxime (94.7%) and Ciprofloxacin in (84.2%). Another study by GK Rai et al at KCH has shown that E. coli was most sensitive to Amikacin, Chloromphenicol and Nitrofurantoin. These findings are not consistent to our present study. In the same study at KCH by GK Rai et al showed, E. coli was sensitive to Nitrofurantoin (47%), Amikacin (62.2%), Ofloxacin (45.5%), Gentamicin (30.4%), Cefotaxime and Ceftriaxone to (38.3%) and (36.3%) respectively and is not consistent to our present study.

Table 5: Antibiotics sensitivity pattern of Proteus n=22 and Klebsiella n=6, spp.

Antibiotics	Proteus =22	Klebsiella =6
Amikacin	19 (86.3%)	6 (100%)
Gentamicin	13 (59%)	6 (100%)
Ciprofloxacin	9 (40.9%)	2 (33.3%)
Nitrofurantoin	21 (95.4%)	4 (66.6%)
Ofloxacin	9 (40.9%)	4 (66.6%)
Cefixime	5 (22.7%)	1 (16.6%)
Ceftriaxone	2 (9%)	None

Similarly, in our present study, Klebsiella was found to be sensitive to Amikacin and Gentamicin in (100%) cases where as Proteus was sensitive to Amikacin (86%) and Gentamicin to (59%). Study by GK Rai et al showed that Klebsiella sp. most sensitive to Ofloxacin followed by Ceftriaxone and least to Amikacin and Nitrofurantoin. A study at NMC by A Sharma et al showed Klebsiella was (100%) sensitivity to Ciprofloxacin and Amikacin, and (83%) sensitive to Ofloxacin.

Cefixime and Ceftriaxone are least sensitive to all 3 common organisms isolated in this study. So, use of these drugs for the treatment of UTI is found to be of not much helpful.

CONCLUSION

Infection of urinary tract is one of the commonest infections occurring in pediatric population. If not treated promptly, adequately and efficiently, it may lead to significant morbidity and renal scarring leading to hypertension and end stage renal disease when they grow older, So, all Pediatricians must aim to diagnose the disease early and treat with appropriate antibiotics adequately. Identification of underlying anatomical anomalies if any must be done without delay and referral to higher centre should not be delayed if required investigations to reach the diagnosis are not available in the health facility presently working.

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