Original Article

Bacteriological profile and antibiotic susceptibility pattern (antibiogram) of urinary tract infections in paediatric patients

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ABSTRACT

Background: Urinary tract infection (UTI) is one of the most common paediatric infections.It may cause permanent kidney damage. So the knowledge on common causative organism will help in initiation of treatment of UTI.

Aim: The aim of this study was to find out the causative agents of urinary tract infections and their antibiotic sensitivity pattern in paediatric patients in S.S.G Hospital, Baroda.

Material &Methods: A study was conducted at S.S.G hospital,Barodafrom January 2012 to June 2012. Total 1263 samples collected from paediatric patients suspected of having UTI. The bacterial agents which caused UTI were isolated, characterised & identified using standard microbiological tests. Antibiogramof all the isolates were performed by the disc-diffusion (Modified-Kirby Bauer technique) according to CLSI guidelines using Amikacin, Gentamicin, Cefotaxime, Chloramphenicol, Nitrofurantoin, Piperacillin, Piperacillin+Tazobactum, Ofloxacin, Norfloxacin, Ampicillin+Sulbactum.

Results: The prevalence of UTI among paediatric patient was 29.78%. Escherichiacoli (38.42%)were the most frequent cause of UTIfollowed by Klebsiella spp. (23.89%), Acinetobacter spp.(11.33%). Maximum isolates of urinary samples were sensitive to Amikacin(63.79%) and Piperacillin+Tazobactum(63.05%).

Conclusion: The prevalence of UTI amongst paediatric patients was high and Escherichia coli were the most frequent etiologic agent followed by Klebsiella species being the second most common. Clinician should prefer Amikacin for treatment of UTI in paediatric patients. In case of Amikacin resistance, Piperacillin+Tazobactum can be used.

Keywords: UTI, paediatric patients,E. coli, Antibiogram

INTRODUCTION

In the past 30–50 years, the natural history of urinary tract infection (UTI) in children has changed as a result of the introduction of antibiotics and improvements in healthcare. This change has contributed to uncertainty about the most appropriate and effective way to manage UTI in children and whether or not investigations and follow-up are justified.UTI is a common bacterial infection causing illness in infants and children. It may be difficult to recognise UTI in children because the presenting symptoms and signs are non-specific, particularly in infants and children younger than 3 years. Collecting urine and interpreting results are not easy in this age group, so it may not always be possible to unequivocally confirm the diagnosis. Recognition of UTI in children should be made as early as possible to prevent the complications. Therefore, investigations for early diagnosis of UTI are of outmost importance. [1]

Most common cause of UTI in children is Escherichia coli followed by other organisms like Klebsiella species, Acinetobacter species, Enterococcus species, Pseudomonas species, Staphylococcus aureus, Enterobacter species, Proteus species, Coagulase negative staphylococcus, Streptococcus species, and Citrobacter species. Selection of antibiotics should be based on antibiotic susceptibility pattern. Periodic evaluation of antimicrobial activity of different antibiotics is essential as the pattern of

antibiotic sensitivity may vary over short periods.[8]Increasing antibiotic resistance among urinary pathogens, especially E coli, to commonly prescribed drugs like Cotrimoxazole has become a global reality.[2]Use of antibiotics by medical practitioners is rampant resulting in increase in resistance to available antibiotics. Isolation of organisms causing UTI and their antibiotic susceptibility is very essential for their appropriate management.[8]Therefore, this study was conducted to find out the organisms responsible for UTI and their sensitivity pattern in S.S.G Hospital, Baroda.

MATERIALSANDMETHODS

Sample size

A study was conducted to find out the causative agents of urinary tract infections and their antibiotic sensitivity pattern in children aged less than 13 years in S.S.G Hospital, Baroda for a period of six months (January to June, 2012). Total 1263 samples collected from paediatric patients suspected of having UTI.

Inclusion and Exclusion criteria

Urine samples collected from children from birth to 13 years of age were included in the study. Samples which were reported as mixture of more than two microorganisms were excluded from the study.

Sample collection

Clean catch midstream urine samples collected into a wide mouthed sterile container.

Sample processing

All the samples were inoculated on MacConkey and Blood Agar media using calibrated nichrome loop following standard bacteriological technique and incubated at 37˚C overnight. Pure bacterial colony counting 100,000 or more was considered as significant and was subjected to identification based on colony characteristics and biochemical tests.

Antibiogram

Antibiogram was performed by disc diffusion method (Kirby-Bauer's technique) according to CLSI guidelines using commercially available discs and the results were recorded following the instruction of manufacturer. These test discs used included Nitrofurantoin, Amikacin, Ofloxacin, Cefotaxime, Norfloxacin, Chloramphenicol, Gentamicin, Piperacillin, Piperacillin+Tazobactum, Ampicillin+Sulbactum.

Ethical consideration -All these samples were a part of routine diagnosis, so ethical consideration is not necessary.

RESULTS

A total of 1263 urine samples were collected from children with suspicion of UTI. Out of which 406 (32.14%) samples were identified positive as shown in **Table 1**.

Table 1: Distribution of positive and negative samples

Culture results	Samples	% (n=1263)
Positive	406	32.14
Negative	857	67.86

Table 2: Age and sex wise distribution of all cases

Variables	Tested	Positive (n=406)
Age (in years)		
< 1	258	66 (16.25%)
1-5	531	180 (44.35%)
6-10	333	108 (26.60%)
11-13	141	52 (12.80%)
Sex		
Male	772	213 (52.45%)
Female	491	193 (47.55%)

Table 3: Distribution of organisms isolated from urine samples

Isolated Organisms	Isolates no. (n=406)	%
E. coli	156	38.42
Klebsiella spp.	97	23.89
Acinetobacter spp.	46	11.33
Enterococcus spp.	34	8.37
Pseudomonas spp.	26	6.41
Staphylococcus aureus	13	3.21
Enterobacter spp.	13	3.21
Proteus spp.	11	2.71
Coagulase negative staphylococcus	7	1.72
Streptococci spp.	2	0.49
Citrobacter spp.	1	0.24

The age and sex distribution of children from whom the urine samples were collected is shown in **Table 2**.Majority of the cases was in the age group of less than 6 years. There was no significant difference in growth positive rate in two genders (M: 52.45 % and F: 47.55 %).

Table 4: Antibiotic sensitivity pattern of common isolates

Antibiotics	E.coli (n=156)	Klebsiella spp.(n=97)	Acineto-bacter spp. (n=46)
Amikacin	106 (67.94%)	56 (57.73%)	35 (76.08%)
Gentamicin	93 (59.61%)	45 (46.39%)	27 (58.69%)
Cefotaxime	50 (32.05%)	21 (21.64%)	32 (69.56%)
Chloramphenicol	47 (30.12%)	22 (22.68%)	20 (43.47%)
Nitrofurantoin	64 (41.02%)	46 (47.42%)	29 (63.04%)
Piperacillin	65 (41.66%)	35 (36.08%)	30 (65.21%)
Piperacillin+ Tazobactum	94 (60.25%)	54 (55.67%)	39 (84.78%)
Ofloxacin	76 (48.71%)	59 (60.82%)	32 (69.56%)
Norfloxacin	64 (41.02%)	37 (38.14%)	36 (78.26%)
Ampicillin+ Sulbactum	51 (32.69%)	22 (22.68%)	20 (43.47%)

The types of organisms isolated are shown in **Table 3**. Escherichia coli were isolated in 38.42% of the positive samples. This was followed by Klebsiella spp. and others as shown in **Table 3**.

E. coli was found to be most sensitive to Amikacin, Piperacillin+Tazobactum and Gentamicin.Klebsiella spp. was found to be most sensitive to Ofloxacin, Amikacin and Piperacillin+Tazobactum. Acinetobacter spp. was found to be most sensitive to Piperacillin+Tazobactum, Ofloxacin and Amikacin. **(Table 4)**

DISCUSSION

The 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 practitioners but the antibiotics are also purchased directly from the chemists (medicine shop keepers) without prescription.[3] It has been advised that paediatricians should be aware of the rising resistance of urinary pathogens to commonly prescribed antibiotics as well as the profile of antibiotic resistance within their community.[4] Therefore, periodic evaluation of sensitivity pattern is essential for rational and appropriate use of antibiotics [8].

UTI is a common problem in children [5] but the prevalence varies with the age and sex of children.[6] It occurs in about one percent of boys and three to five percent of girls.[7] However, in contrast to this, present study showed marginally higher positive rate among male children compared with female children(Male 52.45% vs. Female 47.55%). This could be due to the relatively more number of male children coming to the hospital and might have been attributed to the preference given to the male children in the Indian society. Similarly, GK Rai et al also observed higher positive rate among male children compared with female children (M: 51.7% and F: 48.3%) [8].

Majority of growth positive cases were in the age group of less than six years. Present study is showing same result. In our study it is also common below 6 years of age as shown in Table 2. This could be because younger children are not well toilet trained and likelihood of ascending infection with faecal flora is more common in this age group [7,9].

E. coli was the most common organism isolated and constituted 38.42% of all positive samples. This is the common finding in UTI. This was followed by Klebsiellaspp. and others, as shown in Table 3. This was less than the finding observed by GK Rai et al (93.3%) among children [8].

With regard to the antibiotic sensitivity pattern of isolates, E coli were found to be most sensitive to Amikacin, Piperacillin+Tazobactum and Gentamicin. Rajbhandari et al[10]earlier have reported Nitrofurantoin as most sensitive antibiotic (68.8%) followed by Gentamicin, Norfloxacin and Ciprofloxacin. However, there may be non-compliance to Nitrofurantoin due to its bitterness. Another study done by Das et al[11] in western part of Nepal found E. coli to be most sensitive to Amikacin (98.0%) followed by Gentamicin (87.9%), Ceftazidime (80.8%), Norfloxacin (78.4%) and Cotrimoxazole (77.9%).

Klebsiella spp., the second most common organism, was found to be most sensitive to Ofloxacin, Amikacin and Piperacillin+Tazobactum. Acinetobacter spp. constituted the third most common agent for UTI and

was found to be most sensitive to Piperacillin+Tazobactum, Ofloxacin and Amikacin.

CONCLUSION

A study was conducted at S.S.G hospital, Baroda, from January 2012 to June 2012. Of the total 1263 paediatric patients suspected of having UTI, 406 were positive. E. coli was the most common organism isolated and constituted 38.42% of all positive samples. This was followed by Klebsiella spp. and others. E. coli were found to be most sensitive to Amikacin, Piperacillin+Tazobactum and Gentamicin. Klebsiella spp., the second most common organism, was found to be most sensitive to Ofloxacin, Amikacin and Piperacillin+Tazobactum. Acinetobacter spp. constituted the third most common agent for UTI and was found to be most sensitive to Piperacillin+Tazobactum, Ofloxacin and Amikacin. Clinician should prefer Amikacin for treatment of UTI in paediatric patients. In case of Amikacin resistance, Piperacillin+Tazobactum can be used.

Present findings together with previous ones are suggestive of need of periodic monitoring of antibiotic sensitivity pattern of the bacterial isolates to provide effective treatment and thereby to make it more cost effective particularly in the impoverished countries like elsewhere and ours.

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