URINARY TRACT INFECTION IN PEDIATRIC PATIENTS : STUDY IN TERTIARY CARE CENTRE IN BIHAR

Pediatrics

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ABSTRACT

INTRODUCTION: Urinary tract infection (UTI) is one of the most common bacterial infections seen in patient. Neonates, girls, young women, and older men are most susceptible to UTIs. Around 1% of boys and 5% of girls develop UTI during first ten years of life. Gram negative enteric bacilli, especially *Escherichia coli* and *Klebsiella* spp. are the leading pathogens though *Enterococcus* spp., yeasts and *Staphylococcus aureus* have emerged as prominent agents in recent years, many of them resistant to multiple antibiotics. The diagnosis of UTI in children possess a big challenge to the clinicians and several reasons have been responsible for the difficulties in establishing the diagnosis of UTI in children include; non-specific clinical presentation and the difficulty in getting urine sample for laboratory investigations. This study aims at finding the prevalence of UTI, describing presenting symptoms and the proportion found to have a UTI when urine samples were systematically requested from all eligible children. This study also assessed the magnitude of UTI among febrile children. **MATERIAL AND METHODS:** Present study was carried out in pediatric department of NMCH, Patna from November 2017 to October 2018. During this period 400 pediatric patients (1 month -12 years) who presented in OPD or who were admitted in ward with complaint of fever or any urinary symptom were included in this study. Microscopy was done to detect pyuria (> 10 pus cell/high power field), bacteriuria, haematuria or candidiuria of well mixed un-centrifuged urine samples. A specimen was considered positive if a single organism was isolated at a concentration greater than 10^5 CFU/mL and associated with microscopy findings of greater than 10pus cell/ high power field. **RESULT:** Out of 400 these patients, 230 were males and 170 were female children. Significant bacteriuria was found in 96 cases, 42 males and 54 females. Fever was the most common consistent symptom present in 107 (70.8%) patients with UTI. Other physical findings in our study which were predominant after fever were dysuria (40.6%), Burning micturition (26.04%) and abdominal pain (21.76%). Our study showed UTI was more common in females than male patients. The ratio of female: males in over study were 1.3:1. Prevalence of *E.coli* and *Klebsiella* was high in girls. Although *E. coli*, *Klebsiella* were the principal uropathogens in our study, there were other pathogens of our interest due to their resistance pattern like, *Pseudomonas*, *Proteus*, *Staphylococcus*, *Acinetobacter* and *Enterobacter*. Resistance in these pathogen was as high as *E.coli* and *klebsiella*. *Proteus* was the third most common isolates in our study occupying 10.41% of all isolates which was well justified by other study. [14, 15, 16] *Pseudomonas* was isolated in 8.33% of UTI cases. This high prevalence of *pseudomonas* in comparison to may be due to inclusion of admitted patients. **CONCLUSION:** UTI has significant prevalence in pediatric age group in our region. Fever along with dysuria is most common presentation of UTI. Culture sensitivity pattern must be done for efficient treatment of UTI. Resistance among organism causing UTI keeps on changing with time. In case of admitted patient *psudomonas* and other virulent organism must be taken into account before starting antibiotic therapy. It is important for clinician in order to facilitate the empiric treatment of patients and management of patients with symptoms of UTIs. Moreover, the data would also help to formulate antibiotic prescription policies.

KEYWORDS

INTRODUCTION

Urinary tract infection (UTI) is one of the most common bacterial infections seen in patient. Neonates, girls, young women, and older men are most susceptible to UTIs. In women, bacterial cystitis is the most common bacterial infection. Around 1% of boys and 5% of girls develop UTI during first ten years of life [1]. UTI may lead to renal scarring, hypertension, and end-stage renal disease. Early diagnosis is important to preserve renal function of the growing kidney. Gram negative enteric bacilli, especially *Escherichia coli* and *Klebsiella* spp. are the leading pathogens though *Enterococcus* spp., yeasts and *Staphylococcus aureus* have emerged as prominent agents in recent years, many of them resistant to multiple antibiotics [3-4]. The diagnosis of UTI in children possess a big challenge to the clinicians and several reasons have been responsible for the difficulties in establishing the diagnosis of UTI in children include; non-specific clinical presentation and the difficulty in getting urine sample for laboratory investigations. This study aims at finding the prevalence of UTI, describing presenting symptoms and the proportion found to have a UTI when urine samples were systematically requested from all eligible children. This study also assessed the magnitude of UTI among febrile children.

MATERIALS AND METHOD

Present study was carried out in pediatric department of NMCH, Patna from November 2017 to October 2018. During this period 400 pediatric patients (1 month -12 years) who presented in OPD or who were admitted in ward with complaint of fever or any urinary symptom were included in this study.

Two methods were used for collecting urine for microbiological analysis: clean catch midstream specimen method for children who were able to control urination, and sterile plastic bags method for

younger children who were not able to control urination. Fifty millilitres of clean-catch midstream urine specimen was collected in a sterile universal container.[4] Following collection of samples it was inoculated on blood agar and Mac Conkey Agar. Culture plates were incubated at 37°C for 18–24 hr, well-isolated bacterial colonies were processed for antibiotic sensitivity and biochemical tests. [4] Microscopy was done to detect pyuria (> 10 pus cell/high power fields), bacteriuria, haematuria or candidiuria of well mixed un-centrifuged urine samples. A specimen was considered positive if a single organism was isolated at a concentration greater than 10^5 CFU/ml and associated with microscopy findings of greater than 10pus cell/ high power fields. Susceptibility of isolates to antimicrobial agents of different classes was assessed by the disc diffusion technique on Mueller-Hinton agar as described by the National Committee for Clinical Laboratory Standards (presently called Clinical Laboratory Standard Institute). [5]

RESULT

Out of 400 these patients, 230 were males and 170 were female children. Significant bacteriuria was found in 96 cases, 42 males and 54 females. Symptomatology of patients is shown below in tabular form:

Symptoms	Culture Positive Case (n=96)	Culture Negative Case (n= 304)
Fever	68	186
Dysuria	39	35
Burning micturition	25	7
Abdominal Pain	28	90
Smelly Urine	10	9
Poor Feeding	24	47
Vomiting	18	79

Age and sex distribution of culture positive cases:

Age	Male	Female	Total No of Cases
0-5 month	7	5	12
06 month- 02years	17	9	26
2-5 years	15	30	45
5-10 years	2	5	7
10-12 years	1	5	6

Most commonly isolated pathogen was E.coli (27.08%) in both sex followed by Klebsiella (17.70%) and Proteus (10.41%) respectively. Other pathogens were isolated with lower frequency as shown below. E.coli was more common in females (61.53%) than males (38.46%). Same pattern was followed by Klebsiella 58.82 % prevalence among female patients and 41.17 % in male patients.

Isolates	Female	Male	Total Isolates (%)
E.coli	16	10	26 (27.08%)
Klebsiella	10	07	17 (17.70%)
Pseudomonas	06	2	08 (8.33%)
Proteus	06	4	10 (10.41%)
Acinetobacter	1	1	02(2.08%)
Enterobacter	1	2	03(3.12%)
Streptococcus	4	1	05 (5.20%)
S.pyogenes	1	0	01(1.04%)
S. aureus	1	3	04 (4.16%)
Enterococcus	5	4	09 (9.37%)
CoNS	3	5	08 (8.33%)
Yeast	1	2	03 (3.12%)

Analysis of culture positive isolates showed that among all antibiotics carbapenem(97.9%), ciprofloxacin (94%), ceftriaxone(88%), amikacin(87%), gentamycin(82%) were most sensitive antibiotics. Most isolates were resistant to ampicillin, co-trimoxazole and amoxy-clav respectively. Only 7% of isolates were sensitive to ampicillin whereas in case of amoxy-clav and co-trimoxazole 20% and 30% isolates were found to be sensitive.

Antibiotic sensitivity among culture positive isolates:

Drug	Percentage sensitivity
Meropenem	97.9%
Ciprofoxacin	94%
Ceftriaxone	88%
Amikacin	87%
Gentamycin	82%
Cotrimoxazole	30%
Ampicillin	07%
Amoxyclav	20%

E.coli was most common isolate among culture positive cases. It was highly sensitive to carbapenem(100%), ciprofloxacin(92%), ceftriaxone(84%), cefexime(78%), nitrofurantoin(68%) and resistant to co-trimoxazole, amoxyclav and ampicillin respectively in majority of cases.

DISCUSSION

Out of 400 febrile patients, 96 had UTI an overall prevalence of 24%. The reason behind the high prevalence of UTI among paediatrics patients in over study was probable inclusion of outpatient and inpatient in our study. This prevalence was comparable to other studies conducted worldwide. [2, 3] Various studies [17-21] showed the incidence of UTI among febrile children which ranges from 1.5% to 10%. Such variations might be due to differences in sample size, inclusion of only pyuria cases in the study, lower nutritional status and other socio economic factors etc.

Our study showed UTI was more common in females than male patients. The ratio of female: males in over study were 1.3:1. Several studies in paediatrics reported female predominance, with a variable ratio ranging from 6:1 to 1.33:1, depending upon the different sample size, and difference in age groups being studied. [6-11]. The reason behind low percentage of UTI among males was longer course of urethra and bacteriostatic secretion by prostate gland as mentioned by Malla KK et al[12] UTI is more common in females because female children have short urethra which is in close proximity to the anus, thus facilitates easy ascent of bacterial pathogens from the gastro intestinal tract to the urinary tract. During infancy prevalence of UTI was more in males as compared to female. This is a classical textbook finding which

is supported by many studies as well.

Fever was the most common consistent symptom present in 107 (70.8%) patients with UTI. Other study also reported fever as most common symptoms in 54.9% UTI cases[13]. Other physical findings in our study which were predominant after fever were dysuria (40.6%), burning micturition (26.04%) and abdominal pain (21.76%). In comparison to culture negative case, fever, dysuria and burning micturition were far more common in culture confirmed UTI cases which highly suggest urine culture may be beneficial in the patient with fever and dysuria as they showed good co-relation with positivity.

Although E. coli, Klebsiella were the principal uropathogens in our study, there were other pathogens of our interest due to their resistance pattern like, Pseudomonas, Proteus, Staphylococcus, Acinetobacter and Enterobacter. Resistance in these pathogens was as high as E.coli and klebsiella. Proteus was the third most common isolates in our study occupying 10.41% of all isolates which was well justified by other study. [14, 15, 16] Pseudomonas was isolated in 8.33% of UTI cases. This high prevalence of pseudomonas in comparison to may be due to inclusion of admitted patients.

There was a high sensitivity among E.coli isolates to imipenam (100%), ciprofloxacin (92%), ceftriaxone (84%), cefixime (78%) and nitrofurantoin (68%). The most important finding in this study was increased frequency of resistance to the common urinary tract antibiotics like ampicillin (7%), amoxy-clavulanic acid (20%) and cotrimoxazole (30%). E.coli sensitivity rate was <50% to ampicillin, amoxy-clavulanic acid, co-trimoxazole and cephalixin and this is comparable with the studies done by Schlager TA et al[22] and Kot B et al.[23]

CONCLUSION

UTI has significant prevalence in pediatric age group in our region. Fever along with dysuria is most common presentation of UTI. Culture sensitivity pattern must be done for efficient treatment of UTI. Resistance among organism causing UTI keeps on changing with time. In case of admitted patient pseudomonas and other virulent organism must be taken into account before starting antibiotic therapy. It is important for clinician in order to facilitate the empiric treatment of patients and management of patients with symptoms of UTIs. Moreover, the data would also help to formulate antibiotic prescription policies.

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