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Clinical evaluation of symptoms and microbial pattern of urinary tract infection in children from skmch Muzaffarpur

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Abstract
The risk factors of UTI depend on socioeconomic status and cultural habits like perineal cleaning methods and diaper usage. 2-4 so, it is better to analyse the risk factors in specific cultural groups of different places so that the risk factors which is differing from population to population can be identified and different strategies can be formed for population with different cultures. With this background, the present study was conducted to observe the profile of the paediatric UTI, to find out the bacterial pathogens involved and symptoms observed.
The present study was planned in the Department of Paediatrics, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar. The study was performed from Jan 2018 to July 2018. Total 25 childrens from age 1 to 10 years were included in the present study. Detailed history (about frequency of micturation, Fever, Dysuria, Abdominal Pain, Smelly Urine, Poor Feeding and vomiting) of patients and clinical examination was done in all cases with special emphasis being given to UTI Symptoms.
In conclusion, our study shows that UTI varies with age and gender and, therefore, extensive evaluation is required in boys under ten year of age with UTI. 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. Also the long term studies on a large sample of children need to be planned to understand the disease process better in terms of the interplay between the host and microbial factors.

Keywords: symptoms, microbial pattern, urinary tract infection, SKMCH, Muzaffarpur, etc

Introduction
The role of the urinary tract is to make and stores urine. Urine is one of the waste products of your body. Urine is made in the kidneys and travels down the ureters to the bladder. The bladder stores the urine until it is emptied by urinating through the urethra, a tube that connects the bladder to the skin. The opening of the urethra is at the end of the penis in a male and above the vaginal opening in a female. The kidneys are a pair of fist-sized organs in the back that filter liquid waste from the blood and remove it from the body in the form of urine. Kidneys balance the levels of many chemicals in the body (sodium, potassium, calcium, phosphorous and others) and check the blood's acidity. Certain hormones are also made in the kidneys. These hormones help control blood pressure, boost red blood cell production and help make strong bones. Normal urine has no bacteria in it, and the one-way flow helps prevent infections. Still, bacteria may get into the urine through the urethra and travel up into the bladder [1].
Urinary tract infections typically occur when bacteria enter the urinary tract through the urethra and begin to multiply in the bladder. Although the urinary system is designed to keep out such microscopic invaders, these defences sometimes fail. When that happens, bacteria may take hold and grow into a full-blown infection in the urinary tract [2].
The most common UTIs occur mainly in women and affect the bladder and urethra.

- Infection of the bladder (cystitis). This type of UTI is usually caused by Escherichia coli (E. coli), a type of bacteria commonly found in the gastrointestinal (GI) tract. Sexual intercourse may lead to cystitis, but you don't have to be sexually active to develop it. All women are at risk of cystitis because of their anatomy - specifically, the short distance from the urethra to the anus and the urethral opening to the bladder.
- Infection of the urethra (urethritis). This type of UTI can occur when GI bacteria spread from the anus to the urethra. Also, because the female urethra is close to the vagina, sexually transmitted infections, such as herpes, gonorrhea and chlamydia, can cause urethritis.

Urinary tract infection (UTI) is one of the most common pediatric infections. It distresses the child, concerns the parents, and may cause permanent kidney damage. Occurrences of a first-time symptomatic UTI are highest in boys and girls during the first year of life and markedly decrease after that. Febrile infants younger than 2 months constitute an important subset of children who may present with fever without a localizing source. The workup of fever in these infants should always include evaluation for UTI. The chart below details a treatment approach for febrile infants younger than 3 months who have a temperature higher than 38°C.
Typically, UTIs develop when uropathogens that have colonized the periurethral area ascend to the bladder via the urethra. From the bladder, pathogens can spread up the urinary tract to the kidneys (pyelonephritis) and possibly to the bloodstream (bacteremia). Poor containment of infection, including bacteremia, is more often seen in infants younger than 2 months.

Urine in the proximal urethra and urinary bladder is normally sterile. Entry of bacteria into the urinary bladder can result from turbulent flow during normal voiding, voiding dysfunction, or catheterization. In addition, sexual intercourse or genital manipulation may foster the entry of bacteria into the urinary bladder. More rarely, the urinary tract may be colonized during systemic bacteremia (sepsis); this usually happens in infancy. Pathogens can also infect the urinary tract through direct spread via the fecal-perineal-urethral route.

A midstream, clean-catch specimen may be obtained from children who have urinary control. In the infant or child unable to void on request, the specimen for culture should be obtained by suprapubic aspiration or urethral catheterization. Suprapubic aspiration is also the method of choice for obtaining urine from uncircumcised boys with a redundant or tight foreskin, from girls with tight labial adhesions, and from children of either sex with clinically significant periurethral irritation. Culture of a urine specimen from a sterile bag attached to the perineal area has a false-positive rate so high that this method of urine collection is not suitable for diagnosing UTI. However, a culture of a urine specimen from a sterile bag that shows no growth is strong evidence that UTI is absent [3].

Mortality related to UTI is exceedingly rare in otherwise healthy children in developed countries. Cystitis may cause voiding symptoms and require antibiotics, but it is not associated with long-term, deleterious kidney damage. The voiding symptoms are usually transient, clearing within 24-48 hours of effective treatment. Morbidity associated with pyelonephritis is characterized by systemic symptoms, such as fever, abdominal pain, vomiting, and dehydration. Bacteremia and clinical sepsis may occur [4].

Children with pyelonephritis may develop focal inflammation of the kidney (focal pyelonephritis) or renal abscess. Any inflammation of the renal parenchyma may lead to scar formation. Approximately 10-30% of children with UTI develop some renal scarring; however, the degree of scarring required for the development of long-term sequelae is unknown. Long-term complications of pyelonephritis are hypertension, impaired renal function, and end-stage renal disease. Dehydration is the most common acute complication of UTI in the pediatric population. Intravenous fluid replacement is necessary in more severe cases.

In developed countries, kidney damage with long-term complications as a consequence of UTI has become less common than it was in the early 20th century, when pyelonephritis was a frequent cause of hypertension and end-stage renal disease in young women. This change is probably a result of improved overall healthcare and close follow-up of children after an episode of pyelonephritis. Currently, these complications are most commonly encountered in infants with congenital renal damage [5, 6].

The risk factors of UTI depend on socioeconomic status and cultural habits like perineal cleaning methods and diaper usage. [2, 4] so, it is better to analyse the risk factors in specific cultural groups of different places so that the risk factors which is differing from population to population can be identified and different strategies can be formed for population with different cultures. With this background, the present study was conducted to observe the profile of the paediatric UTI, to find out the bacterial pathogens involved and symptoms observed.

Methodology

The present study was planned in the Department of Paediatrics, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar. The study was performed from Jan 2018 to July 2018. Total 25 childrens from age 1 to 10 years were included in the present study. Detailed history (about frequency of micturation, Fever, Dysuria, Abdominal Pain, Smelly Urine, Poor Feeding and vomiting) of patients and clinical examination was done in all cases with special emphasis being given to UTI Symptoms.

Fifty millilitres of clean-catch midstream urine specimen was collected in a sterile universal container [7]. Bacteria were identified by Gram's stain and standard biochemical procedures. Susceptibility of isolates to antimicrobial agents of different classes was assessed by the disk diffusion technique on Mueller-Hinton agar as described by the National Committee for Clinical Laboratory Standards (presently called Clinical Laboratory Standard Institute) [8].

All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study. Following was the inclusion and exclusion criteria for the present study.

Inclusion criteria: Children between 1 years and 18 years of age with the first episode of confirmed diagnosis of UTI during the study period and Children who are followed up for a minimum period of 6 months after diagnosis and starting the treatment.

Exclusion criteria: The following criteria were excluded from the study: 1. Children with previously known urinary tract anomalies. 2. Children with comorbid medical renal diseases.

Results & Discussion

Urinary tract infection (UTI) is the most common nosocomial infection worldwide. It is one of the most common infections encountered by clinicians in developing countries and is of major public health importance. UTI is the third most common bacterial infection in children in developing countries after those of the gastrointestinal and respiratory tract [9]. Unlike occult bacteremia or severe bacterial illness (in infants and children) little attention has been focused on the identification of UTI in children, despite recent information that suggests a high prevalence of UTIs and significant associated morbidity in these patients. Quite often, child receives antibiotics empirically, without adequate evaluation for UTI. UTIs are often difficult to diagnose in young children because of nonspecific signs and vague symptoms. It is very important to diagnose the condition timely and accurately as it could be the first presentation of an underlying urological anomaly or it may in itself lead to significant morbidity from renal scarring, hypertension and eventually end-stage renal disease. Approximately 13%-15% of end-stage renal disease is thought to be related to UTI in childhood that was often unrecognized and therefore undertreated [10].

In this study urinary tract infection occurred more in male children than in female children. Studies done elsewhere, and literature do not support this. The probable reason for this difference is that the study being hospital based the proportion of male and female children attending our hospital may be different. In this study majority of children

belonged to low socioeconomic status and were from urban area and the analysis is targeted to this group of the community.

On analysing the clinical profile of the study group fever was the most common presenting symptom with 17 cases of the children presenting with it. This is followed by increased frequency of urination which was seen in 22 cases. The third common symptom was chills which constituted in 21 cases. This is similar to other study by Sharma A *et al* which included children from two months to fifteen years conducted in Nepal except that the second common presentation was abdominal pain [5].

The fever, dysuria and burning micturition was far more common in culture confirmed UTI cases which highly suggest Routine urine culture may be beneficial in the patient with fever and dysuria as they showed good co-relation with positivity. Routine culture in the patient with poor feeding and vomiting is not justified.

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.

Table 1: Age & Sex of the child's

Age	Number of Cases
Below 3 years	6
4 - 7 years	12
Above 7 years	7
Total	25
Sex	
Girl	7
Boys	18
Total	25

Table 2: Symptoms observed

Symptoms	Total Cases
Fever	17
Chills and rigor	21
Burning micturition	22
Increased frequency	19
High coloured urine	1
Cloudy urine	1
Abdominal pain	11
Vomiting	7
Preputial bulging (males)	3
Enuresis	2

Table 3: Microorganism Patterns of Isolates

Isolates	Total Cases
E. coli	6
Klebsiella	4
Pseudomonas	3
Proteus	2
Acinetobacter	3
Enterobacter	1
Streptococcus	1
S. pyogenes	1
Staphylococcus aureus	1
Enterococcus	1
CoNS	1
Yeast	1
Total	25

In a study done by the authors between May 1972 and September 1973, it was noted that E. coli were responsible for only 30% of all recurrent urinary infections [11]. Klebsiella, Pseudomonas aeruginosa and Proteus organisms were responsible for 18.8%, 15.4% and 14.4% of all urinary infections respectively. Other gram negative organisms caused 15.3% and gram positive organisms 6.2% of urinary infections, on a yearly break up of six years' data (1973-1978), it was revealed that there was a gradual change in the bacterial flora [12]. It was noted that Klebsiella group of organisms (28.9%) have become the leading urinary pathogen as a whole. Statistically significant difference was observed amongst all urinary pathogens except for Pseudomonas aeruginosa and Proteus groups which remained constant at about 10% and 15% respectively. In contrast to these observations the percentage incidence of E. coli and Klebsiella groups was reported by another Indian Centre as 68.69% and 13.04% respectively [13]. This may be so because of difference in the group of the patients studied. It was noted in our previous report that E. coli was the predominant urinary pathogen in outpatient group while Klebsiella was the predominant urinary pathogen amongst hospitalised group [14].

Studies by Mantadakis E *et al* and Islam M *et al* showed E. coli as most common organism but with varying proportions [15, 16]. In the risk factors analysis worm infestation, constipation, voluntary withholding of urine and reduced water intake had statistically significant difference from the controls. This is comparable with literature stating Drink plenty and don't hold on.

It is also comparable with Mazzola BL *et al* in which withholding urine, reduced fluid intake, constipation was found to be predisposing UTI in girls aged between 3.8- 18 years. Study also suggested that poor genital hygiene and toilet habits were almost always associated with other factors and so not necessarily predispose UTI [17]. In studies by Loening-Baucke V *et al* and Koff SA *et al* constipation and infrequent voiding were found to be risk factors for UTI [18, 19]. Cleaning back to front was not demonstrated as a risk factor.

Conclusion

In conclusion, our study shows that UTI varies with age and gender and, therefore, extensive evaluation is required in boys under ten year of age with UTI. 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. Also the long term studies on a large sample of children need to be planned to understand the disease process better in terms of the interplay between the host and microbial factors.

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