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ETIOLOGICAL BACTERIA OF URINARY TRACT INFECTIONS AMONG THE PEDIATRICS IN KHARTOUM PROVINCE, SUDAN

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ABSTRACT

Urinary tract infections (UTIs) are serious health problems affecting millions of people each year. They are considered as the second most common type of infection in the body. This study was conducted to determine the bacterial load of urinary tract infections (UTIs) among pediatrics in Khartoum province. Two hundred urine specimens were collected from suspected patients for urine culture, from three hospitals namely; Khartoum pediatrics hospital (Jaafar bin Oaf Hospital), Turkey Hospital, and Bashair Hospital. The study included isolation and identification of bacteria from urine specimens and their susceptibility testing for anti-microbial agents. A 76/200 (38%) specimens of urine culture showed bacterial growth while 124/200 (62%) showed no bacterial growth. The isolated bacteria were *E.coli* (13.5%), *Staphylococcus aureus* (7.5%), *Klebsiella pneumoniae* (5.5%), *Candida albicans* (4%), *Enterococcus fecaellis* (3.5%), *Proteus vulgaris* (2.5%), *Citrobacter* (0.5%), *Proteus mirabilis* (0.5%), and *Provedncia* (0.5%). The isolated bacteria showed different patterns of susceptibility and resistance to the available antibiotics. Higher resistant levels were detected in Amoxicillin, Gentamicin, and Amoxyclav respectively.

KEY WORDS: Etiology, UTIs, Susceptibility, Antimicrobial, Resistance.

INTRODUCTION

Urinary tract infections (UTIs) are serious health problems affecting millions of people each year. They are considered as the second most common type of infection in the body. They were defined as the presence of significant quantity of bacteria in the urine along with signs

and symptoms of infection. [1] Prompt diagnosis and management of UTIs will reduce the incidence of morbidity and life threatening bacteraemia. [2] Approximately 3-5% of the girls and 1% of the boys acquire UTIs. [3] Pediatrics UTI account for 0.7% of physician office visits and 5–14% of emergency department visits by children annually. Accurate diagnosis of UTI has important clinical implications; most febrile infants with UTI show evidence of renal parenchymal involvement (pyelonephritis). Nevertheless, the presenting signs and symptoms of UTI in childhood are often nonspecific and, among infants, definitive testing for UTI involves bladder catheterization. [4]

Accordingly, clinicians caring for young children are frequently faced with the decision of whether or not to obtain a urine sample for urine analysis and culture. Knowledge of the prevalence of UTIs among different subgroups of children can assist clinicians in selecting children who would benefit from further diagnostic testing. In children with a very low pretest probability of disease, routine diagnostic testing is not necessary. In fact, in such children, an indiscriminate approach to diagnostic testing might lead to more harm than benefit. In contrast, in children with high pretest probability of disease, routine diagnostic testing would be appropriate. [1]

There is currently no pooled data available stratifying prevalence based on age, gender, race, or circumcision status, all of which can affect UTI risk. [5] Every child with a proven UTI deserves investigation after first attack. However, care must be taken not to expose the child to excessive investigations. [6] Normally, urine is sterile it is usually free of bacteria, viruses, and fungi but does contain fluids, salts, and waste products. Most infections arise from one type of bacteria, *Escherichia coli* (*E. coli*), which normally lives in the colon. [7] Several bacterial species and genera were reported to be the major causes of UTIs of which *Escherichia coli* was the most common organism isolated constituting about 71.0%, followed by *Klebsiella* (13%), *Proteus* (11%), *Staphylococcus* (4%), and *Pseudomonas* (1%). [8, 9, 10]

UTIs are common in childhood and nearly all of them are caused by bacteria that enter the urethral opening and move upward to the urinary bladder and sometimes the kidneys. Rarely, in severe infections, bacteria may enter the bloodstream from the kidneys and cause infection of the bloodstream (sepsis) and/or other organs. [11] During infancy, boys are more likely to develop UTIs. After infancy, girls are much more likely to develop them. UTIs are more common in girls because their short urethras make it easier for bacteria to move up the

urinary tract. Uncircumcised infant boys (because bacteria tend to accumulate under the foreskin) and young children with severe constipation also are more prone to UTIs.

Surveys indicates that apparently 1% of children under the age of one year, about 1% of the school girls, 0.03% of school boys and men, about 3% of pregnant women having bacteriuria and there is no evidence that, this bacteriuria will cause chronic interstitial nephritis (chronic pyelonephritis). [12] Also about 10-35% of infants and children with asymptomatic bacteriuria have vescouretal reflux and 3-37% has renal scarring or other abnormalities such as structural, chronic pyelonephritis, obstructive renal atrophy, urinary tract malformation which may lead to renal failure. [12]

The risk factors that associated with UTIs include diabetics, sickle-cell disease or anatomical malformations of the urinary tract such as prostate enlargement. While ascending infections are generally the rule for lower urinary tract infections and cystitis, the same is not necessarily true for upper urinary tract infections like pyelonephritis which may originate from a blood born infection. [13]

MATERIALS AND METHODS

In this study a two hundred specimens of urine were collected in sterile urine containers under aseptic conditions from suspected patients of UTIs suffering from fever, burning micturation and loin pain, attending Khartoum pediatrics hospital (Jaafar bin oaf hospital), Turkey hospital, and Bashair hospital at the Khartoum province. All urine specimens were cultured on sterile Cystine Lactose Electrolyte deficiency (CLED) agar medium under a septic condition, then incubated aerobically at 37 ºC for 24 hrs and then observed for the presence of bacterial growth. The identification of bacteria was carried out using different tests as described by Cowan.

In vitro antimicrobial susceptibility test

Antimicrobial sensitivity test was carried out by the standard disk diffusion method. The isolated bacteria were cultivated in Muller Hinton agar medium, commercially prepared antibiotic disks were placed in the agar surface using sterile forceps, and pressed gently to ensure full contact with the surface of the culture medium. A suitable distance was left between the disks; inoculated plates were incubated aerobically at 37°C over night. After overnight incubation, the results were scored. The whole diameter of inhibition zone around the disk was measured using a ruler in mm.

RESULTS

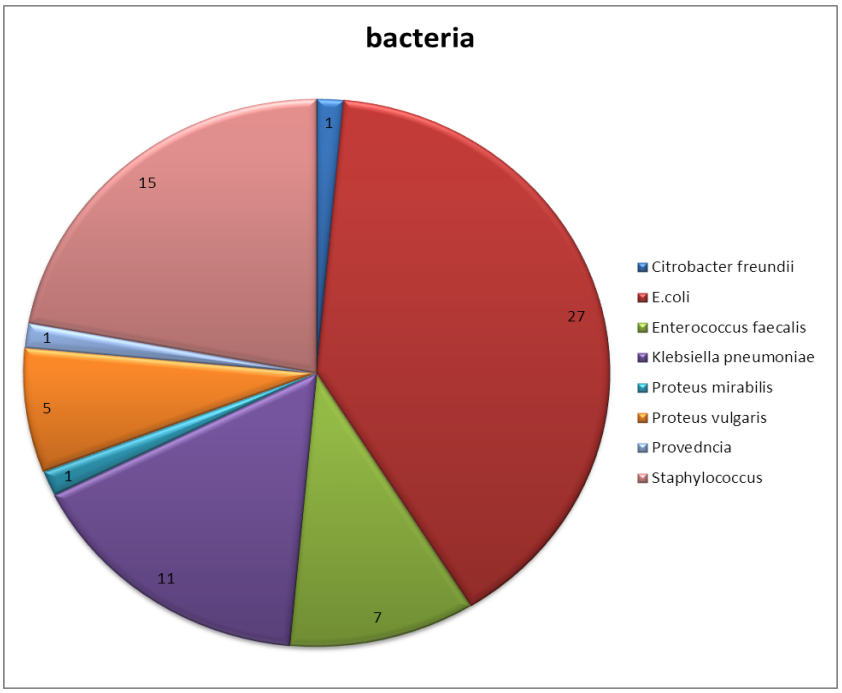

Figure 1. Distribution of isolated bacteria from pediatrics patients with UTIs.

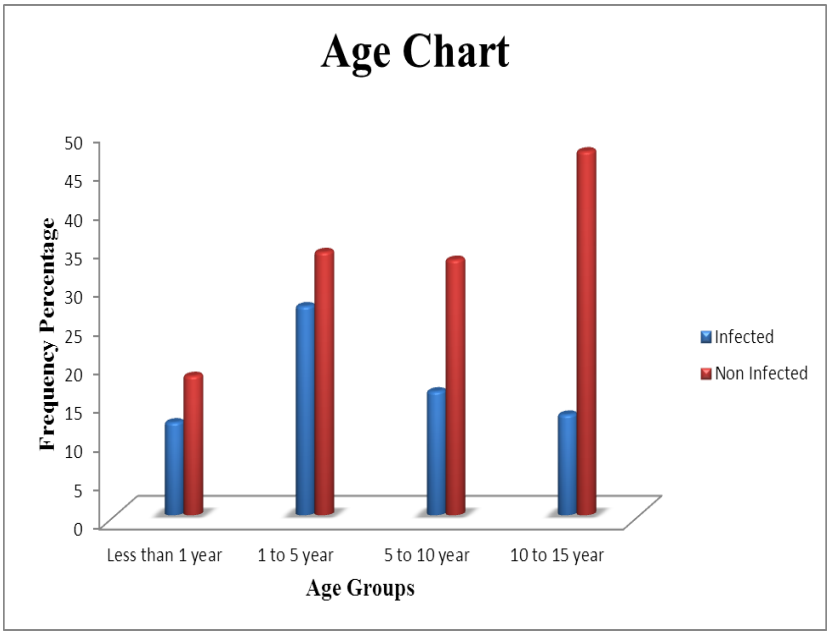

Figure 2. Distribution of UTIs among different age groups.

Table. 1: Antimicrobial susceptibility test results for isolated gram positive bacteria

Isolates	CEFTRIAXONE		CEPHALAXIN		AMOXICILLIN		GENTAMICIN		AMOXY CLAV		CO TRIMOXAZLOE		KANAMICIN	
	S	R	S	R	S	R	S	R	S	R	S	R	S	R
Staphylococcus aureus	8	7	12	3	1	14	3	12	9	6	10	5	9	6
Enterococcus faecalis	3	4	6	1	6	1	0	7	5	2	3	4	5	2

S: Sensitive

R: Resistant

Table. 2: Antimicrobial susceptibility test results for isolated gram negative bacteria

Isolates	CEFTRIAXONE		CEPHALEXIN		AMOXICILLIN		GENTAMICIN		NALIDIXIC ACID		AMOXY CLAV		CO TRIMOXAZLOE	
	S	R	S	R	S	R	S	R	S	R	S	R	S	R
Escherichia coli	17	10	19	8	10	17	12	15	22	5	8	19	18	9
Klebsiella pneumonia	8	3	2	9	0	11	4	7	9	2	8	3	5	8
Proteus vulgaris	4	1	5	0	2	3	1	4	4	1	5	0	3	2
Provedncia	1	0	1	0	1	0	0	1	1	0	1	0	1	0
Citrobacter freundii	1	0	0	1	0	1	1	0	1	0	1	0	1	0
Proteus mirabilis	1	0	0	1	0	1	1	0	1	0	1	0	0	1

S: Sensitive

R: Resistant

In this study a two hundred patients were included 89 (44.5%) were males, 111 (55.5%) were females. Out of the 89 males, 29 (32.6%) showed bacterial growth, while 39/111 (35.1%) of the females showed bacterial growth. Patients were grouped into four age groups (less than 1 year, 1-5, 5-10 and 10-15 years of age). 68/200 (34%) patients showed bacterial growth. 12 patients (17.6%) were from group one (less than 1 year), 27 (39.7%) from group two (1-5), 16 (23.5%) from group three (5-10), and 13 (19.2%) from group four (10-15) [Fig.2].

Out of the 200 sampled examined 68 (34%) showed bacterial growth. The isolated bacteria were identified as follows: 22/68 (32%) were Gram's positive cocci they contain: *Staphylococcus aureus* 15 (7%), *Enterococcus faecalis* 7 (3%), and 46/68 (67%) were found to be Gram's negative bacilli which contain: *E.coli* 27 (13.5%), *Klebsiella pneumoniae* 11 (5.5%), *Proteus vulgaris* 5 (2.5%), *Citrobacter freundii* 1 (0.5%), *Proteus mirabilis* 1 (0.5%) and *Provedncia* 1 (0.5%), [Fig.1].

The isolated bacteria showed different patterns of susceptibility and resistance to the available antibiotics. Higher resistant levels were detected in Amoxicillin, Gentamicin, and Amoxy clav respectively (Tables 1 and 2).

DISCUSSION

The present study was designed to study the role of bacteria as causative agent of urinary tract infections among pediatric in Khartoum province. The study of the antibiotic susceptibility patterns of the isolated bacteria was also considered in order to generate information that might help in better management of the problem.

The isolated bacteria during this study were: *E.coli* 27 (13.5%), *Staphylococcus aureus* 15 (7%), *Klebsiella pneumoniae* 11 (5.5%), *Enterococcus faecalis* 7 (3%), *Proteus vulgaris* 5 (2.5%), *Citrobacter freundii* 1 (0.5%), *Proteus mirabilis* 1 (0.5%) and *Provedncia* 1 (0.5%), in their descending order of percentage.

These results were in agreement with those reported by Othman (2007), Elder (2004), Waisman *et al*., (1999), and Modarres and Nassiri (1997). The same bacteria were reported by the above mentioned authors, and they all agreed that *E.coli* was the most predominant causative organisms. The higher percentage of *E.coli* infection compared with the other organisms could be explained on the basis of their normal habitat in the intestinal tract that is why it is the most common organism founded.

The gender difference should also be considered, since the urine orifice was so close to the anal opening. Most of the infections were observed in the second and third groups of age (1-10yrs) and this can be explained by their improper cleaning of themselves in the toilets and the bad hygiene status of their families. That is why they are more susceptible to the infection at this stage of life. Increased UTIs among in-patients (17%) may be due to hospital acquired infections.

All the isolated bacteria showed different patterns of susceptibility and resistance to the available antibiotics. Higher resistant levels were detected in Amoxicillin, Gentamicin, and Amoxy clav respectively. These findings require careful selection of the drug for the treatment and management of UTIs among pediatrics.

CONCLUSION

In conclusion, this study showed that bacteria have a great role in urinary tract infections (UTIs) among pediatrics constituting (34%) of the problem in Khartoum Province.

RECOMMENDATIONS

In reference to the generated data from this study, it is recommended that; Carryout more studies of urinary tract infections UTIs among paediatrics on the same area from time to time and other areas to ensure continuous updating of the epidemiology of the problem. Immediate contact with physician when suffering from problems in the urinary tract and avoid having any medication before getting the results of urine analysis and urine culture.

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