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Detection of Urinary Tract Infection Among Children Under 12 Years in Diyala Province

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ABSTRACT

Urinary tract infections remain a significant cause of serious bacterial infections in children and can result in chronic kidney disease. Thus, prompt diagnosis and initiation of treatment of urinary tract infections. Up to 7% of girls and 2% of boys have culture-proven and symptomatic UTI by 6 years of age UTI in young children is not always easily recognised as symptoms are usually non-specific. Laboratory urinalysis is recommended for all suspected cases of UTI in children, however, collecting a urine sample can present difficulties. UTI should be considered when investigating a child with fever or any sign of infection without an obvious source. While UTI is usually simple to treat, if a diagnosis improved or the infection adequately managed, therefore our study investigates 21 pathology case 21 child with UTI symptoms. In addition analysis of the 24 literature reviews was conducted, resulted in extensive level of UTI among female than male (about 7 male and 14 female with UTI) and the infectious

agents among the cases is E.coli variety type of pathogenic bacteria.and For inclusion, reviews had to compare these cases with many studies all over the world , and measure a health outcome that there is a significant risk of complications such as UTI like renal parenchymal infections lead to renal scarring and bacteremia, which is the prelude to chronic morbidities associated with the inflammation. In the same way, we have look at the treatment of UTI for children with uncomplicated UTI are likely to respond to amoxycillin, sulphonamides, trimethoprim-sulfamethoxazole (cotrimoxazole) or cephalosporins with hygen elimination of etiologic factors,

***Keywords**:* UTI, Antibiotics , ,Urinary system pathogens, Bacterimia, Renal infections.

CONTENTS

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LIST OF SYMBOLS AND ABBREVIATIONS

Description	Symbol
Al Batool Teaching Hospital	Al BTH
WHO	World Health Organization
UTI	Urinary Tract Infection
Ab	Antibiotics

CHAPTER 1

INTRODUCTION & GENERAL INFORMATION

Urinary tract infection is acommon disease caused by variety of infectious agents all over the world,In recent years, the cliniaical value of routine urine examination in the management of children resulted in UTI with different type of infectious agents.(1)

Urinary tract infections (UTI) are a common cause of febrile illness in young children. Due to lack of overt clinical features in children less than two years, appropriate collection of urine samples and basic diagnostic tests at firstlevel health facilities in developing countries, UTI are not generally reported as a cause of childhood morbidity. UTI are not included in the current Integrated Management of Childhood Illness (IMCI) algorithm as the main focus has been preventing mortality and severe morbidity by identifying children at risk of serious diseases including malaria, measles, meningitis, pneumonia, diarrhoeal diseases and malnutrition.(2)

Urinary tract infection (UTI) is a common cause of fever in children.[1] The presence of fever in infants and young children with UTI is of significant importance.(3)

Renal parenchymal infections lead to renal scarring, which is the prelude to chronic morbidities associated with UTI, such as hypertension, reduced renal function and chronic renal failure. The relevance of UTI to childhood morbidity is more marked in under-fives amongst whom the risk of renal damage is more and diagnosis is often missed as the clinical features are seldom overt and in most cases not referable to the urinary tract.Whereas UTI episodes if appropriately diagnosed and well-managed, can be effectively controlled with antibiotics, the attendant possible complications of untreated UTI, such as end-stage renal disease, could have devastating consequences on the child, the family and the health system.(3)

Urinary tract infections (UTI) are one of the most common bacterial infections seen in children. It has been estimated that UTI are diagnosed in 1% of boys and 3-8% of girls. In the first year of life UTI is more prevalent in boys with rates of 2.7% compared with 0.7% in girls . Most infections in boys occur in the first three months of life, but by school age, the rate has decreased in boys and increased in girls. Studies have shown a 10-12 fold increased risk of uncircumcised boys. The reported rate of recurrent UTI is around 12- 30% with risk greater in infants < 6 months, severe vesico-ureteric reflux and abnormal nuclear renal scans at time of first infection.(3)

Gram negative organisms are those most commonly isolated from urine samples of children with uncomplicated UTI with *Escherichia coli* (*E. coli*) accounting for 70 to 90% of infections.(3)

Fever is the commonest symptom of UTI in infants and the presence of another source of fever on clinical examination does not exclude UTI. In infants and young children symptoms and signs of UTI tend to be non-specific. Older children may have symptoms including loin or abdominal pain, frequency, dysuria, urgency,hesitancy, enuresis and haematuria.(3)

Acute pyelonephritis is a UTI with systemic features including fever, vomiting, abdominal or loin pain, and lethargy. Nuclear renal scans have suggested that the majority of febrile young children with UTI will have acute pyelonephritis.(3)

Viral and yeast infections and inflammation of the external genitalia with vulvitis, and vaginitis may present with frequency and dysuria. Schistosomiasis presents with frequency, dysuria and haematuria, is more prevalent in older children > 10 years of age but heavy worm loads usually occur in younger age groups.(3)

The definitive diagnosis of UTI in young children requires semi-quantitative culture of urine obtained by SPA or catheterisation. The method of urine collection and examination should take careful attention to the techniques as it determines the number of colony forming units that are significant as the distal urethra may be colonized by the same bacteria that cause UTI.(3) (4)

Urine culture results can take 24 to 72 hours to become available. Urine screening tests have been investigated in many settings to assist the presumptive diagnosis and treatment of UTI. Urinalysis using rapid dipstick tests for leucocyte esterase and nitrite or identification of leucocytes or bacteria on urine microscopy. The method of urine sampling and centrifugation may affect the direct diagnosis of the urine tests. Urine microscopy requires more resources and may not offer benefit over the dipstick urinalysis, though could be used if available. (3)(5)

-Negative urinalysis may be defined as:
Negative dipstick where both leucocyte esterase and nitrite are negative
microscopy where both < 10 white blood cells per high power field and no bacteriuria.(6)
The treatment of UTI for children with uncomplicated UTI are likely to respond to amoxycillin, sulphonamides, trimethoprim-sulfamethoxazole (cotrimoxazole) or cephalosporins, as these antibiotics are concentrated in the lower urinary tract. Parenteral antibiotics should be considered in children who are toxic, vomiting or dehydrated, or who have an abnormal urinary tract.However, studies of UTI over 5-10 years have shown a generalized decrease in bacterial sensitivity to common oral antibiotics including cotrimoxazole and cephalexin (3)(7)(8).
The objective of the following study is to evaluate and detection the prevalence of UTI in children under 12 years of age..

-LITERATURE REVIEW

Extensive research has been conducted in developed countries on the epidemiology, risk factors, a etiology, diagnosis, prognosis and prevention of UTI in children,in addition treatment and prepared solution for this problem.(3)
Studies have shown no difference in clinical symptoms in children with bacteraemic and non-bacteraemic UTI.(3)
Up to 7 percent of girls and 2 percent of boys will have a symptomatic, culture-confirmed urinary tract infection by six years of age. Urinary tract infection may be suspected because of urinary symptoms in older children or because of fever, nonspecific symptoms.(5)
Research investigated that Urine obtained by suprapubic aspirate (SPA) or transurethral catheter in young children is unlikely to be contaminated and is the preferred specimen for documenting UTI. (3)(6)

The common uropathogens include *Escherichia coli* (accounting for approximately 85 percent of UTIs in children), *Klebsiella*, *Proteus*, *Enterobacter*, *Citrobacter*, *Staphylococcus saprophyticus*, and *Enterococcus*.(6)
The researchers explained that oral antibiotics, chosen to cover local uropathogens are as safe and effective as intravenous antibiotics in children with a clinical diagnosis of acute pyelonephritis and intravenous antibiotics should be reserved for those who are seriously ill or have persistent vomiting.(3)(7)
Long-term, low-dose trimethoprim–sulfamethoxazole was associated with a decreased number of urinary tract infections in predisposed children.(7)
It has been generally recommended to treat uncomplicated UTI in children for seven days with oral antibiotics, though short course (3-4 days) treatment has been shown in some studies to be as effective. Several studies have looked at the use of single dose gentamicin, amoxycillin, cotrimoxazole and cefotaxime. In contrast, the latter study concluded that a 2-4 day course of oral antibiotics was as effective as 7-14 days in eradicating lower tract UTI in children. (3)(8)
Many children with urinary tract infection (UTI) and urinary tract abnormality are given prophylactic antibiotic to prevent recurrence of UTI and permanent kidney damage. Occasionally, children with normal urinary tract receive prophylactic antibiotic to alleviate the patient suffering and family inconvenience associated with recurrent symptomatic UTI.(8)

Also Atypical UTI may be due to infection from a bacterium other than E.coli, e.g.Staphylococcus spp., or from an underlying condition, such as a congenital renal tract abnormality. Atypical UTI and recurrent UTI in children is associated with an increased risk of complications, such as septicaemia or renal scarring.(9)

Risk factors for UTI in children

There are several risk factors that increase the likelihood of a diagnosis of UTI, including:

◦ History of recurrent fever (undiagnosed origin)
◦ Constipation or dehydration
◦ Congenital abnormality of the renal tract
◦ Previous history of UTI
◦ Family history of renal disease or vesicoureteric reflux (a condition where urine moves from the bladder back up the ureters).(9)

More rapid techniques include dipstick analyses for the presence of leukocyte esterase or nitrites, microscopic analysis for white blood cells or bacteria, and automated urine cell analyzer to determine bacterial and white blood cell counts in the urine.(10)

Urinary infection in the childhood is always regarded as complicated, due to the high number of associated abnormalities and to the high risks of irreversible renal lesion in cases where the treatment is delayed. Even though the treatment for urinary infection is extremely effective.(11)(15)(16)(17)(18)

There is host resistance to UTI depends for the most part on innate immune defenses, mainly during the acute phase of the dis-ease against the virulence of pathogens.(12).

There is relationship between urinary tract infections in developing country during childhood and their association with gender, season and urbanisation level, before the age of 3 months, urinary tract infections are more common in boys; thereafter the incidence is considerably higher in girls .In younger children, urinary tract infections are mainly caused by autoinfection with commensals from the intestinal tract whereas urinary tract infections in adolescent girls are often related to sexual activity.(13)

In the 1st year of life, UTIs are more common in boys than girls and 10 times higher in boys , the incidence of UTIs falls below 1% in school-aged boys and increases to 1–3% in school-aged girls. Sexual activity increases the risk of UTI in teenage girls(14)(22)

UTI may cause fever, failure to thrive, flank pain, and signs of sepsis, especially in young children.(19)(20)(21)(23)..

The causes of urinary infection in childhood . Main predisposing factors are short female urethra, vaginal discharge, related with the development of bacterial resistance to the antibiotic, insufficient dosing and period of medication, low immunity and persistence of the etiologic factor.(24)

Animal studies using components of human breast-milk have suggested that breastfeeding may provide some protection against UTI in children.(3)(24)

To prevent UTI , manage constipation ,drink enough fluid so that urine is clear and light-coloured ,for girls, wipe front to back in toileting and wear breathable fabric underwear.(24)

CHAPTER 2

Methods:

This prospective case series study was conducted from October 2021 to March2022, at a AL Batool Teaching hospital (BTH). Twenty one cases survied in this hospital. Permission of the institutional ethics committee was taken before commencement of the study. An informed written consent was taken from each patient before being included in the study.

This study compared the urinary tract infection among children under 12 years among the cases. The age, gender and type of infectious agents for every individual were noted in detail (shown in Table-1-).

Hospital-based prospective observational study was used to assess the prevalence, conditions; multiple stepwise backward analysis was done to look for predictors of the type of infectious microorganisms related problems. Written informed consent was obtained and confidentiality was secured.

Urine specimens were obtained by the health care workers and the students in Al-Batool teaching hospital-Diyala province. The urine samples were collected in sterile container bottles and used for direct urine microscopy examination , culture and sensitivity within 1 h of collection according to standard methods.

After inoculating the fresh urine sample on culture plates for urine culture, urine microscopy was then carried out on the rest of the sample. A volume of 5-10 ml of urine was centrifuged at 2000 rpm for 5 min and a wet preparation of the sediment was examined under the light microscope using ×40 objective. Presence of any bacteria per high power field (HPF) blood cells-(WBCs per HPF) was regarded as significant and suggestive of UTI.

Urine culture was done .Each un centrifuged urine sample was well-mixed and inoculated unto plates of cysteine lactose electrolyte deficient medium and blood agar, using a sterile standard wire loop, which delivers 0.001 ml of urine per loopful. The culture plates were incubated aerobically at 37°C for 24 h after which the colonies were counted with a colony counter. A pure growth of $\geq$105 colony forming units per ml from midstream urine sample or growth of any number of uro-pathogen from urine. UTI was defined as the presence of

significant bacteriuria. Subjects who had UTI were treated with appropriate antibiotics for 7 days .

CHAPTER 3

RESULTS AND DISCUSSIONS

A total of 21 patients in Al Batool Teaching Hospital studied, with gender ratio of males 7 & females 14 and age with a range of was 1month--11 years old. Types of urinary tract infections are shown in Table (1).
All cases were further categorized as sever or acute of infection, Table (1) also shows the various infectious microorganisms prescribed in the infection for various categories of infectious agents .

Table -1- Types of urinary tract infection M.Os

Caseno.	Gender	Age	Type of M.Os
1	Male	3 years	Staphylococcus spp.
2	Male	5 years	Staphylococcus spp.
3	Male	1 month	Pseudomonas spp.
4	Male	4 years	Klebseilla spp.
5	Male	11 months	Staphylococcus epidermidis
6	Male	2 months	Streptococcus agalacticae
7	Male	8 months	Klebseilla spp.
8	Female	11 year	Klebseilla spp.
9	Female	5 years	Proteus spp.
10	Female	3 years	Pseudomonas spp.
11	Female	2 years	Pseudomonas spp
12	Female	7 years	Acinetobacter spp.
13	Female	5 years	Streptococcus spp.
14	Female	2 years	Staphylococcus spp.+ E. coli
15	Female	11 years	E. coli
16	Female	3 years	E. coli
17	Female	9 years	E.coli + Klebseilla
18	Female	2 years	Proteus spp.
19	Female	6 years	E. coli
20	Female	11 years	Staphylococcus epidermidis
21	Female	6 years	Staphylococcus spp.

There were 7 males out of 21 children enrolled in the study, their age ranging from 1 month to 4 years most of them with Staphylococcus spp. is the infectious agent of UTI. In contrast, there were 14 female out of the total number their age (2-11years) had significant bacterial infection by E.col, Staphylococcus spp., Pseudomonas, Klebsiella, Proteus and Acinetobacter spp.) respectively responsible for UTI.

-Disscution//

Urinary infection in the childhood is always regarded as complicated, due to the high number of associated abnormalities and to the high risks of irreversible renal lesion in cases where the treatment is delayed,(11).UTI is an important cause of childhood morbidity.
Of the 21 subjects studied, significant bacteria by direct microscopic examination and bacterial culture occurred in 7 male and 14 female related sample giving an overall UTI prevalence significantly higher rate in female than male (Table 1).

Our results showed that UTI occurred more in females than in males it is affecting 2% of boys and 7% of girls by the age of by seven years of age.(7,8).
A possible explanation suggest the UTI affecting over 1% of schoolgirls(5).

Researches shows that Urinary tract infections (UTIs) commonly occur in children. An estimated 8% of girls and 2% of boys will have at least one episode by seven years of age .(3, 5,6 ,14).
The organisms isolated from the 22 positive urine cultures were *Escherichia coli* ,*Staphylococcus spp*, *Klebsiella* spp., *Streptococcus spp.* Proteus spp. , *Pseudomonas* spp., Acinetobacter spp. There were no mixed infections. Other studies investigated that most UTIs are caused by Gram-negative bacteria, of which Escherichia coli is the most common . Other bacteria also causing UTIs.(3,14).

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

Urinary tract infection (UTI) is a common pediatric problem. study to determine UTI prevalence in our country have been conducted predominantly in hospital settings and particularly in children, by using a range of urine specimens. UTI was present in association with other conditions including acute respiratory infection, acute diarrhoea and malnutrition and malnourished children, • Children with possible UTI who require antibiotic treatment immediately for other indications, such as suspected bacteremia, should have urine collected for urinalysis, microscopy and culture. Gram negative organisms, particularly *E. coli* are commonly associated with UTI in children, in addition the gonococcal urethritis. It is important to prevent renal damage by eradicating the pathogen;identify and consider administering prophylactic treatment to children at risk of recurrent UTI, to prevent renal damage. UTI should be treated with antibiotics for seven to 10 days. Oral antibiotics can be administered as initial treatment with diminishing the etiology factors of UTI in children and increasing the researches related with this subject.

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