

## **URINARY TRACT INFECTION IN CHILDREN IN PEDIATRIC HOSPITAL OF NAJAF**

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### **Abstract**

A study of urinary tract infection in children had been planed to identify the bacterial causes ,also the color, cloudiness ,acidity of urine were registered for each sample . A urine culture was performed to detect the presence of bacteria as well as its antibiotic sensitivity test .

Pyuria was diagnosed in 100 patients( 30) males and (70) females.The number of positive urine cultures for *E .coli* were 37(66%), *Staphylococcus saprophyticus* 4(7.1%) ,*Proteus*10(18%) , *Klebsiella*3(5.4%) , *Pseudomonas*1(1.8%),and , *Enterobacter*1(1.8%) .

The antibiotics susceptibilty of *Escherichia coli* isolates was characterized by high resistance to amoxicillin 83.8%, cotrimaxazole 41%,while it was susceptible to nitrofurantoin , nalidixic acid , cefotaxime , gentamicin. The high resistance among *Klebsiella pneumoniae* 66.7% also toward amoxicillin and 100% for cefotaxime, but it was susceptible to nitrofurantoin and cotrimaxazole .

The high resistance of *proteus* sp.100%to amoxicillin was noticed while it was sensitive for nalidixic acid20% and cefotaxime40%. *Staphylococcus saprophyticus* isolates were sensitive to cefotaxime25%, nalidixic acid 25% and nitrofurantoin .

*Pseudomonas* and *Enterobacter* were sensitive to cefotaxime and nitrofurantoin .

### **\*Introduction**

The urinary tract infections (UTI) are bacterial infections of urinary tract in most of cases (kidney , ureter , bladder , and urethra ) . The UTI is defined by the presence of pure bacterial growth > 100,000 colony forming unit(CFU) /ml (1) . The pyuria mean presence of more than 5 pus cells in high power field of microscope in centrifuged urine (2), so white blood cells (leukocytes ) should be counted. The pyuria is sufficient for diagnosis of UTI in non hospitalized patient if standard symptoms or just fever in small children is also present (3) .

Recurrent UTI is relapse with the original infecting organism or reinfection with a different organism .In general, A reinfection is a UTI that occurs more than 2 weeks after antibiotic treatment of the original UTI is completed; it may be caused by the same bacteria as the original infection or a different one (4). Reinfection account for 80% of recurrent infections. A relapse is a UTI caused by the same bacteria as the original UTI that occurs within 2 weeks after the individual has completed antibiotic treatment (5).

There are three basic forms of UTI: (6). -Clinical pyelonephritis: is characterized by abdominal or flank pain, fever, malaise, nausea, vomiting, jaundice in neonates, and occasionally diarrhea .

-Cystitis: indicates that there is a bladder involvement and includes dysuria, urgency, frequency, suprapubic pain, and malodorous urine.

-Asymptomatic bacteriuria: refer to a positive urine culture in children's without any

manifestations . Urine is normally sterile, and since the urinary tract is flushed with urine every few hours,. The flora of the anterior urethra, as indicated principally by urine cultures, a consisting of *Staphylococcus epidermidis* , *Enterococcus faecalis* and some alpha-hemolytic streptococci. some enteric bacteria (7).

Almost all UTIs are ascending in origin and are caused by bacteria in the gastrointestinal tract that have colonized the periurethral area. After birth, the periurethral area, including the distal urethra, becomes colonized with aerobic and anaerobic microorganisms .

The pathophysiology of UTI reflects a complex interaction between virulence factors of the microorganism and the host defense( 8). The perineal flora are normal inhabitants of the distal urethra. Urine in the proximal urethra, the urinary bladder, and more proximal sites within the urinary tract are normally sterile. Uropathogens must gain access to the urinary bladder and proliferate if infection is to occur.. Even with normal bladder emptying, adherence to uroepithelial cells by virulent organisms such as P-fimbriated *Escherichia coli* may result in a UTI. P fimbriae (or pili) are organelles on *E coli* that mediate attachment to specific receptors on uroepithelial cells and impair washout of the bacteria (9).

Most UTI are due to normal bowel flora. *E. coli* is the causative organism in 80% of cases. Other common causative organisms are *Klebsiella* , *Pseudomonas* and other gram-negative organisms .Urinary tract infections are much more common in girls than boys (at least 10:1)- this is true for all age groups except the newborn where the higher incidence of congenital abnormalities of urinary tract in the male, makes the reverse true(10) .

The aim of the study was evaluate UTI in children admitted to Pediatric Hospital in Najaf to determine the bacterial etiology of UTI to evaluate the roles of some related factors as sex , age, and breast feeding to UTI, and, to detect the types of antibiotics which are effective to be used in UTI cases .

#### الخلاصة

ان دراسة اصابات القناة البولية للاطفال تهدف للكشف عن المسببات البكتيرية فضلا عن خواص الادرار المتمثلة باللون والعتمة والحموضة لكل عينة وايضا تم زرع ادرار المرضى المصابين لتحديد وجود البكتيريا الممرضة فضلا عن اختبار الحساسية للمضادات الحيوية.

كما شخّصت البيئة القياسية في 100 مريض (70 ) اناث و(30) ذكور وان اعداد العزلات الايجابية لـ *E.coli* كانت(66%)37, ولـ *Staphylococcus saprophyticus* كانت (7.1%)4 , ولـ *Proteus* كانت(18%)10 , ولـ *Klebsilla* كانت (5.4%)3 , ولـ *Pseudomonas* كانت (1.8)1 , ولـ *Enteropacter* كانت(1.8)1 . وفي اختبار الحساسية للمضادات الحيوية سجلت *E.coli* اعلى مقاومة للمضاد amoxicillin 83.8% , cotrimaxazole 41% بينما كانت حساسة للمضادات الاخرى المتمثلة , nalidixic acid , nitrofurantoin , cefotaxime , gentamicin .

كذلك سجلت الـ *Klebsilla pneumonia* مقاومة عاليه ضد الـ amoxicillin و100% ولـ cefotaxime في حين تحسنت للمضاد nitrofurantoin و cotrimaxazole . اما الـ *Proteus* كانت مقاومة للـ amoxicillin بنسبة 100% وتحسنت للـ nalidixic acid بنسبة 20% ولـ cefotaxime بنسبة 40% ايضا تم تسجيل حساسية البكتيريا *Staph. saprophyticus* للمضاد , cefotaxim , nalidixic acid بنسبة 25% و الـ nitrofurantoin . واخيرا كانت كلا من *Pseudomonas aeruginosa* و *Enterobacter* حساسة تجاه المضاد الحيوي nitrofurantoin و Cefotaxime .

#### \*Materials & Methods:

##### - Study population and urine collection:

Urine samples were collected from a total of 150 patients with pyuria between the one day to 5 years during the period April 2009 to August 2009 .50 persons were in patients and 100 were outpatients visiting the Pediatric Hospital of Najaf .Clean voided midstream urine samples were obtained from patients in sterile universal battles which were given to either parents for collection and transport to the laboratory immediately for urine analysis.

**-Urinalysis:**

A urinalysis involved a physical and chemical examination of urine (color, reaction and albumin). According to (11) , the urine was spun in a centrifuge at 3000 rpm for 5 minutes to allow sediments containing: Pus cells (WBC). RBC , Crystals and Casts .

- Identification of bacteria: The specimens were generally collected from patients suffering from UTIs, mid stream urine sample was collected which allowed the first drops of urine to pass; the samples of urine were collected in sterilized screw-cap container, then the urine samples had been inoculated on the culture media(MacConkey, Blood, EMB agar) and incubated aerobically at 37C° for 24 hr .then biochemical tests were done to identify the bacteria. (12).

-Sensitivity test :Disc diffusion method were done according to (13)

**\* Results& discussion:**

- Identification of bacteria : The bacteria was isolated from the patients that sever from UTI are shown in table( 1). The experimental results was agree with the standard results in (14) .

Table (1) Biochemical tests of bacteria isolated from children

Test	<i>E .coli</i>	<i>K .pneumonia</i>	<i>Proteus ps</i>	<i>Enterobacter</i>	<i>P.aeruginosa</i>	<i>Staph.spp</i>
EMB	Metallic cheen	Centrally dark	Pale	Centrally dark		—
Catalase	+	+	+	+	+	+
Oxidase	-	—	—	—	+	—
Indol	+	—		—		—
MR	+	—	+	—		—
VP	—	+		+		—
Urease	-	-	+	-	-	+_
Citrate	—	+		+	+	—
Motility	+	—	+	+	+	—
H2S	—	—	+	—		—

**\*Pyuria investigation:**

The study included 150 children who had complaints related to UTI .100 females and 50 males from birth in the Pediatric Hospital of Najaf . General urine examination was made for all of them . pyuria was diagnosed in (100 females and 50 males) as shown in table 2)

Table (2)Sex distribution of Pyuria cases .

Sex	Children number	Pyuria Present	Percentage of pyuria
Female	100	33	33 %
Male	50	17	34 %
Total	150	50	33.3 %

This study has covered 150 children (male and female) ending during the period of the study in the Pediatric Hospital of Najaf who had UTI . Pyuria was diagnosed in 50 of them. They were 33 female and 17 for male.. The percentage of urinary tract infection was higher in girls than in boys .These results agree with the results obtained by (15), who reported the rate of urinary tract infection in female (35.3%) higher than male (18.3%) in children . In general girls are more susceptible to urinary tract infection than boys because the urethra is shorter and nearer to the anus more in female leading to more possibility of infected with enteric bacteria (16).

- Urinary tract infection according to age.

The distribution of UTI cases according to age groups indicated that UTI was more common in

first(35.7%) and second(23%) year of life and then decrease later in the third(12.5%) ,fourth(7.1%) and fifth(12.5%) year of life .

Table (3) Distribution of positive pyuria cases according to age .

Age group	Number of cases	Percentage
Group 1(one years)	20	35.7 %
Group 2(Two years )	18	23.1 %
Group 3(2-3 years)	7	17.2 %
Group 4(3-4 years)	4	8.5 %
Group 5(4-5 years)	7	15.5 %
Total	56	100 %

This data indicate that the age group more affected was the first age group who were 20 cases from 56 (35.7%)and the second were 18 from 56 (32.1%)and the third were 7 from 56 (12.5%)and the fourth were 4 from 56 (7.1%)and the fifth were 7 from 56 (12.5%) .

These results agree with those obtained by ( 17) that show age below 1 year is more affected then decreases above one year , to fourth year , it became less above fourth year.

- Type of feeding.

This study observed the effect of breast feeding on occurrence of UTI . It was found that the number of children on bottle feeding with UTI were significantly higher in comparison with those children on breast feeding with UTI at the level of significance ( P value < 0.001) .Table (4) represent children with UTI and on breast feeding were (35.8%) and with mixed feeding (breast and bottle) were (17.9%) and with bottle feeding were (46.3%).

Table (4)Number and percentage of types of feeding for children with UTI. .

Types of feeding	Total No.	No. of patients	Percentage
Breast feeding	35	24	35.8 %
Mixed feeding	28	12	17.9%
Bottle feeding	40	31	46.3 %
Total	103	67	100 %

The breast feeding an important protective factor against most diseases of childhood. This study investigated the impact of breast feeding on the occurrence of urinary tract infection in children under two years age. The children number with urinary tract infection and on breast feeding exclusively were 24 (35.8 %). while on mixed feeding (breast and bottle feeding) 12 (17.9 %) and on bottle feeding were 31 (46.3 %) as shown in table ( 4 ) .These results show increase of urinary tract infection in children on bottle feeding if we compared with other study on types of feeding .Also the results agree with those obtained by (18) who reported that breast feeding is very effective in reducing incidence of UTI in children .

- Bacterial causes of urinary tract infection in children .

The most common bacteria causes of UTI was *E. coli* (66%) and then *P. mirabilis* (17.9%) , *Staph. saprophyticus* (7.1%) , *K. pneumoniae*(5.4 %), *P. aeruginosa*(1.8 %) and *Enterobacter* (1.8%).

Table (5) NO.and percentage of bacteria isolates in urine culture in UTI patients.

Type of bacteria		Numbers	Percentage
Gram negative	<i>E. coli</i>	37	66 %
	<i>P. mirabilis</i>	10	17.9 %
	<i>K. pneumonia</i>	3	5.4 %
	<i>P. aeruginosa</i>	1	1.8 %
	<i>Enterobacter</i>	1	1.8 %
Gram positive	<i>Staph.saprophyticus</i>	4	7.1 %
Total		56	100 %

The type of bacteria responsible for urinary tract infection were presented in table (5). *E. coli* and *P. mirabilis* was the major causative bacteria of UTI which was isolated from 37 (66.1 %) and 10(17.9%) respectively. This result agree with those found by (19) . *Staphylococcus saprophyticus* was isolated from 4 children ( 7.1% ),but *Pseudomona spp* was isolated from 1 child ( 1.8% ) This result agrees with ( 20). But the *Enterobacter* organism was isolated from 1 child ( 1.8% ) This result is less than that of (15) .

\*Antibiotic sensitivity results: The antibiotic which was more sensitive on bacterial causes of UTI was Nitrofuratoin then Fotaxime ,Nalidixic acid, gentamicin, Trimethoprim-Sulphamethaxazole and Amoxicillin.

Table ( 6 ) Show the resistance of bacterial causes of urinary tract infection.

The antibiotic resistance present of specific type of bacteria is shown in table (6) . Regarding Amoxicillin, 100% of *P. aeruginosa* , *Enterobacter* , *P. mirabilis* were resistant .. In addition 83.8% of *E.coli*, 66.7% of *Klebsiella* were resistant to Amoxicillin. Generally 84.9% of bacteria were resistant to Amoxicillin . These results correlate well with the results obtained by( 21) , who observed that these bacteria had high resistance to Amoxicillin.

Regarding Nitrofurantoin , 100% of *P. aeruginosa*, 60% of *P. mirabilis* ,22.5 % of *E .coli* , 33.3% of *Klebsiella* were resist. However no *Staph. sp.* or *Enterobacter* were resistant (22)

Generally 26.8% of the isolated bacteria from children in this study were resistant to

Type of bacteria	AMX	TF	GM	TMX	CE	NA
<i>E .coli</i> (37)	31 (83.8 %)	7(22.5 %)	14(37.8)	23(41.1%)	9(16.1%)	13(23.2 %)
<i>P .mirabilis</i> (10)	10(100%)	6 (60 %)	4(40%)	8 (80%)	4(40%)	2 (20 %)
<i>K .pneumonia</i> (3)	2(66.7%)	1 (33.3 %)	1(33.3%)	3(100%)	2(66.7%)	1(33.3 %)
<i>Staph .sp</i> (4)	2(50%)	0	2(50 %)	1(25 %)	1( 25 % )	1 (25 %)
<i>P. aeruginosa</i> (1)	1 (100%)	1(100%)	0	1(100%)	1(100%)	1 (100 %)
<i>Enterobacter</i> (1)	1 (100%)	0	0	1(100%)	0	1 (100 %)
Total	47(84.9 %)	15(26.8 %)	21(37.5%)	37(66.1%)	17(30.4%)	19(33.9%)

Nitrofurantoin. These results are in agreement with the results obtained by (23) who reported that about 20.9% of isolated bacteria were resistant to nitrofurantoin.

Regarding Cefotaxime , 16.1 % of *E .coli*, 40 % of *proteus* , 66.7% of *Klebsiella* and 100 % of *P. aeruginosa* and 25% of *Staph. saprophyticus* were resistant but no *Enterobacter* resistance .

Generally 30.4% of the isolated bacteria were resistant to cefotaxime. This result is in agreement with those obtained by (23) who found that about 24.7% of bacterial causes of UTI were resistant to cefotaxime.

Regarding Trimethoprim sulfamethoxazole , 41% of *E .coli* , 40% of *proteus* , 66.7 % of *Klebsiella* , 25% of *Staph saprophyticus* and 100% of *P. aeruginosa* and *Enterobacter* were resistant .

Generally 66.1% of bacteria isolated from children in this study were resistant to Trimethoprim sulfamethoxazole . These results agree with results obtained by ,(23) who reported that about 70.9% of bacteria were resistant to Trimethoprim sulfamethoxazole.

Regarding Gentamicin 37.8 of *E. coli* , 40% of *proteus mirabilis* , 33.3% of *Klebsiella pneumonia* 50% of *Staph. Saprophyticus* were resistant and no resistance of *P. aeruginosa* and *Enterobacter* bacteria.

Generally 37.5% of isolated bacteria from children in this study were resistance to gentamicin. These results are in agreement with results obtained by ,(23) who reported that about 26.4% of bacteria were resistant to Gentamicin.

Regarding nalidixic acid .23.2% of *E .coli* and 20% of *Proteus mirabilis* , 25% of *staphylococcus saprophyticus* , 33.3 % of *Klebsiella pneumonia* and 100 % of *Pseudomonas aeruginosa* and *Enterobacter* were resistant .

Generally 33.7% of isolated bacteria in this study were resistant to nalidixic acid. This result is similar to the result obtained by ,(23) who reported 20.9% of isolated bacteria were resistant to nalidixic acid.

The results were varied according to the types of bacteria that used in the test ,some species of bacteria have capsule which resistance to some antibiotics action as well as its have resistance plasmids .Also ,some bacteria were produced B- lactamase enzyme that destroy antibiotics activity. On other hand, antibiotics were differ in effect on bacterial growth (12).

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