[+]Etiology of bacterial Pathogens Caused urinary tract infections in Children of Al-Nasseria City

المسببات المرضية البكتيرية لأخماج المجاري البولية عند الاطفال في مدينة الناصرية

[*]Ghaneemah Malik AL-Geborry

Abstract:

102 urinary tract infection patient (at age 2 month to 10 years) were carried in Al-Habobii Hospital at Al-Nassiriya city during period of September 2006 to July 2007. The positive culture were obtained from 97 patient and 5 urine cultures reveal no growth of bacteria. The most common isolates from urinary tract infection in children were *Escherichia coli* (31.4%), *Enterococcus sp.* (18.6%), *Klebsiella sp.* (16.6%), *Proteus sp.* (9.8%), *staphylococcus aureus* (12.7%) and Coagulase negative Staphylococci (5.9%) respectively .

Urinary tract infection in females were higher than in males (54.9%), and infections percentage at age < 2 were higher (25.4%).

Results of 10 types of antibiotic sensitivity commonly used show the Nalidixic acid Gentamycin are the highly effective antibiotic against Gram negative and Gram Positive bacteria.

الخلاصة:

أجريت هذه الدراسة في مستشفى الحبوبي للأطفال في مدينة الناصرية، شملت الدراسة ١٠٢ مريض (بعمر من شهرين إلى عشرة سنوات) يعانون من خمج المجاري البولية خلال الفترة من أيلول ٢٠٠٦ إلى تموز ٢٠٠٧، تم عزل البكتريا المرضية من ٩٧ ولم يظهر نمو بكتيري في ٥ مرضى . أظهرت نتائج الدراسة ان البكتريا الرئيسية المسببة لمرض التهاب المجاري البولية في الأطفال كانت *Escherichia coli* (31.4%), *Enterococcus sp.* (18.6%), *Klebsiella sp.* (16.6%), *Proteus sp.* (9.8%), *staphylococcus aureus (12.7%)* و Coagulase negative Staphylococci (5.9%) .

كما أظهرت النتائج أن نسبة إصابة الإناث من الذكور كانت (٥٤,٩%) كما أظهرت النتائج ان أعلى نسبة للاصابة كانت في الاعمار اقل من سنتين (٢٥,٤%) . وظهر ان اكثر

[+] **Date received 1 / 11 / 2007 Date Accepted 5 / 8 / 2009**

[*] **Asst. Prof. Al-Nassiriya Technical Institute**

المضادات الحيوية فعالية هي الناليديكسيك اسيد Nalidixic Acid وجنتامايسين Gentamycin في تأثيرها على البكتريا السالبة لصبغة غرام والبكتريا الموجبة لصبغة غرام على التوالي.

Introduction:

Urinary tract infection (UTI) is defined by the presence of organisms in urinary tract, which is usually sterile. However asymptomatic colonization of urinary tract can occur [1] .

Ascending infection of the urinary tract is complex process that has been associated with bacterial adhesion, virulence and motility properties as well as host anatomic hormonal and genetics factors [2].

UTI are among the common bacterial infection encountered by primary care physicians, although UTI in children as in adults [3,4]. Age of one years occurs more frequently in boys than in girls, after that age both bacteria and UTI are more common in girls [5,6].

Several long-term screening studies of infant, and school-aged found UTI incidence rate 2.5% of boys, and 0.9% of girls [7].

The commonest organism which caused UTI is Gram negative bacteria 76.3% and *Escherichia Coli* is the most prevalent 42.1% while Gram positive bacteria 63.7% and *Staphylococcus aureus* is prevalent 10.1% [8,9]. Another study found *Escherichia Coli* at 85% caused UTI and Gram positive bacteria 5-10% [10,11].

UTI most commonly occurs in children between (8-10) years of age [12]. UTI occurs in females more than in males 75%,25% respectively of primary school children [13].

Infants and young children are at higher risk than are older children for in curing acute injury with UTI [14].

Aims of this study were isolation and identification of pathogenic bacteria that causing urinary tract infection in children and determine of effective antibiotics against this bacteria.

Materials and Methods:

A total of 102 specimens were collected from Al-Habobii Hospital in Al-Nassiriya city in children at age 2 months to 10 years, during the period of September 2006 to July 2007.

Mid stream samples of urine were taken for culture to confirm the diagnosis. Urine samples were cultured on blood agar and Mac-Conkey agar and incubated for 24-48 hr at 37°C. the bacterial isolates were identified by morphological, cultural

characteristics, stained of cells with Gram stain and biochemical reaction. According to [15,16,17].

Antibiotic sensitivity test were carried on Muller-Hinton by using disc diffusion method [18]. 10 types of the available antibiotic disc (supported by Oxoid) were used in order to evaluate the sensitivity of isolated bacteria to antibiotics. The antibiotics used with concentration as following:

Nalidixic acid 30 Mg , Nitrofurantion 200 Mg, Gentamycin 10 Mg, Tobramycin 10 Mg, Carbenicillin 100 Mg, Trimethoprim 1.25 Mg, Cefotaxime 30 Mg, Ciprofloxacin 10 Mg, Ampicillin 10 Mg.

Another methods used for antibiotic sensitivity were determination of minimum inhibitory concentration of antibiotic (MIC), used the same of antibiotic in above, this depends on mechanical methods to determination turbidity of bacterial growth which contain less inhibitory concentration of antibiotic or appears growth on petri dish, this method depend on spectrophotometer to measure the MIC. By 2-fold steps method, micro titer plates which contain 96 wells were used (fig.1) [19,20].

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Evaluation Results
Test ID: Time : 10:05
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Test name: Free test 450nm Date:
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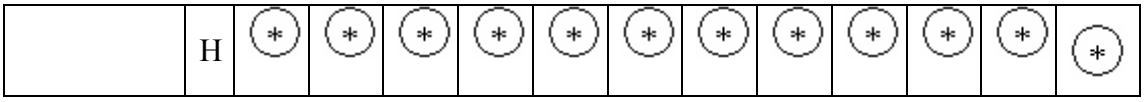
Antibiotic Concentration Microgram/mp		0.5	1	2	4	8	16	23	64	128	256	512	1024
50 Microlitter CultureMedia + 50 microlitter from Bacterial occulum	A	⊙	⊙	✓	✓	✓	✓	✓	✓	○	○	○	○
	B	⊙	⊙	✓	✓	✓	✓	✓	✓	○	○	○	○
	C	⊙	⊙	✓	✓	✓	✓	✓	✓	○	○	○	○
	D	⊙	⊙	⊙	✓	✓	✓	✓	✓	○	○	○	○
	E	⊙	⊙	⊙	✓	✓	✓	✓	✓	○	○	○	○
	F	⊙	⊙	⊙	✓	✓	✓	✓	✓	○	○	○	○
	G	⊙	⊙	⊙	✓	✓	✓	✓	✓	○	○	○	○



* Bacterial occulum killed by heat

o Prescence of Bacterial growth

✓ Inhibition bacterial growth by less Antibiobic concentration

◯ No growth of bacteria

Figure (1): Prevalence of isolates and control for concentration of antibiotic and determine the MIC in micro titter plate

Results and Discussion :

During work period studied on one hundred two children with UTI were isolated pathogenic bacteria from 97 specimen . No growth of pathogenic bacteria in 5 specimen .

Table (1) The total of pathogenic bacteria that isolated from children with UTI

Pathogenic bacteria	No.	%
Escherichia coli	32	31.4
Enterococcus sp.	19	18.6
Klebsiella sp.	17	16.6
Proteus sp.	10	9.8
Staphylococcus aureus	13	12.7
Coagulase negative Staphylococci	6	5.9
Total	97	100

The percentage of pathogenic isolates of *Escherichia coli* were 31.4% , *Enterococcus* sp 18.6% and *Klebsiella* sp . 16.6% [table 1] These isolates were formed higher percentage . Coagulase negative Staphylococci and *Staphylococcus aureus* were low percentage , (5.9%) , (12.7%) respectively, This agrees with result Brians et al [21] who found the common bacterial pathogens causes UTI in children are *Escherichia coli* , *Enterococcus* sp and *Klebsiella* sp . with highly frequencies .

Table (2) Distribution of UTI in females and males .

Gender	No.	%
Females	56	54.9
Males	41	40.1
Total	97	100

X^2_{cal}= 3.215 X^2_{tab}= 7.21

UTI in females were higher than in male at rate 54.9% in female and 40.1% in male [Table 2] . this agree with Stapleton [22] who found the percentage of infection in female was higher than in male . This is due to factors such as circumcision which has been associated with a reduction in risk of UTI in male [23]. This is disagreement with results obtained by Wennerstrom *et al* [24] who found percentage of infection in males was higher than in females .

Table (3) Distribution of UTI according ege

Age group	No.	%
< 2	26	25.4
2 - 4	22	21.5
4 - 6	20	19.6
6 - 8	17	16.6
8 - 10	14	13.7

X^2_{cal}= 2.94 X^2_{tab}= 6.84

UTI in children at age < 2 was 25.4% and at age 2 to 4 year was 21.5% .

This agree with Herr *et al* [25] and Dick [26] who found the higher percentage with UTI in children was in infant at age 2 month to 2 year . This is disagreement with results of Hoberman *et al* [27] who found infection percentage with UTI was higher in young children .

Table (4) The sensitivity of pathogenic bacteria (percentage) to (10) Antibiotic .

Isolates	Co-	AMI	SXT	NA	FT	CTX	GM	TOB	AK	KF
Escherichia coli 32	100	25	55	60	90	26	95	48	35	85
Enterococcus sp. 19	80	20	60	55	80	20	83	59	60	80

Klebsiella sp. 17	85	35	45	77	82	35	100	65	69	82
Proteus sp. 10	92	52	40	70	71	37	90	65	67	55
Staphylococcus aureus 13	100	59	70	47	65	31	87	80	82	60
Coagulase negative Staphylococci 6	88	58	60	39	60	30	80	60	78	50

CO - : co-Trimoxazole CTX : Cefotaxime

AMI : Amoxicillin GM : Gentamicin

SXT : Trime thoprim TOB : Tobramycin

NA : Nalidixic acid AK : Amikacin

FT : Nitrofurantoin Kf : Cephalosporin

One the other hand it appears from the results , that Nalidixic acid and Gentamycin are the most suitable antimicrobial agents for the treatment of serious Gram – negative and Gram positive pathogens [Table 4], this is agreement with results obtained who found the common Gram – negative isolate and *Staphylococcus aureus* pathogens are highly sensitive to Nalidixic acid and Gentamycin .

Table (5) MIC against isolates from patients .

Isolates	Antibiotics	Range MIC	%
Escherichia coli 32	AMP	1024-2	65.7
	N	3.84-0.06	3.1
	CTX	256-4	73.3
	CAR	3.84-0.06	28.5
	W	156-1	40.9
	GN	256-16	26.6
	F	3.84-0.06	5.5
	TM	156-1	60.3
	C	128-0.5	40
	CIP	1.92-0.05	21.1
Enterococcus sp. 19	AMP	512-32	50
	N	3.84-0.06	13.3
	CTX	512-4	77.1
	CAR	156-1	40
	W	18-0.5	27.7
	GN	256-16	26.6
	F	512-64	14.2
	TM	156-1	42.1
	C	128-1	27.7

	CIP	1.92-0.05	22.2
Klebsiella sp . 17	AMP	512-4	74.2
	N	1.92-0.05	21.1
	CTX	512-32	50
	CAR	156-1	40.9
	W	512-32	50
	GN	128-0.5	27.1
	F	3.84-0.06	28.2
	TM	128-0.5	40
	C	156-1	40.9
	CIP	3.84-0.06	28.5

Isolates	Antibiotics	Range MIC	%
Proteus sp . 10	AMP	128-0.5	40
	N	3.84-0.06	13.3
	CTX	1024-32	68.8
	CAR	128-0.5	40
	W	128-0.5	38
	GN	512-64	14.2
	F	128-1	27.5
	TM	256-16	26.2
	C	512-32	50
	CIP	128-0.5	16.4
Staphylococcus aureus 13	AMP	3.84-0.06	28.4
	N	256-1	71
	CTX	256-8	54
	CAR	156-1	42
	W	512-2	22
	GN	3.84-0.06	5.4
	F	128-0.5	38.4
	TM	1.9-0.05	21.2
	C	512-2	22.2
	CIP	7.68-0.06	11.7
Coagulase negative staphylococci 6	AMP	3.84-0.06	28.4
	N	7.68-0.06	31.3
	CTX	512-16	80
	CAR	512-32	50
	W	3.84-0.06	28.4
	GN	512-64	13.3
	F	7.68-0.06	31.3

	TM	128-1	27.9
	C	3.84-0.06	28
	CIP	17.68-0.12	16

Table (5) Shows that the high value for MIC to Cefotaxim against *Escherichia coli* , MIC for this antibiotic to *Escherichia coli* was (256-4) Microgram / ml (73.3%) , *Enterococcus* sp . (512-4) Microgram / ml (77.1%) , while Nalidixicacid was low value for MIC to this antibiotic, mean isolates appear high sensitivity to this antibiotics . MIC concentration to *Escherichia coli* for Nalidixicacid was (3.84-0.06) Microgram / ml (3.1%) , while Gram positive bacteria appear high sensitive to Gentamycin, MIC concentration was low value (3.84-0.06) Microgram/ml (5.4%) and (512-64) Microgram/ml (13.3%) to *Staphylococcus aureus* and Coagulase negative Staphylococci. MIC value determine the resistance and sensitivity of antibiotic to many pathogenic bacteria for that antibiotics[29]

MIC method is more sensitive than disc diffusion method for antibiotic sensitivity, its detection the low level resistance of bacterial strain , because it is a qualitative method. But disc diffusion method considered a quantities method , to determine the different characterize such as resistance , intermediate and sensitivity to antibiotic drugs . [30] .

Conclusion:

1- UTI most commonly occurs in children at age < 2 years of age.
2- The commonest organism Escherichia coli
3- The most effective antibacterial agents were Nalidixic acid for Gram-negative bacteria and Gentamycin for Gram-Positive bacteria.

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