

**Anti-Bacterial Susceptibility Patterns of *Acinetobacter baumannii*  
Isolated from Urine of Pregnant Women in Baghdad**

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**Abstract**

This study was aimed to determining prevalence of *A. baumannii* in pregnant women of different trimester with urinary tract infection (UTIs) and their antibiotics susceptibility patterns. The total of 167 samples which include; the specimens of urine, collected from 167 pregnant women in different trimester who admitted at Ibn Al baladi Hospital in period from January – June, 2015 were isolation and identification bacteria depending on bacterial culture and Vitek system, *A.baumannii* isolated from 16 samples. Antimicrobial susceptibility testing was performed for eight different antibiotics by disk diffusion method (Kirby Bauer). A total of 16 isolated (9.0%) were Positive culture for UTI was high percentage in First pregnancy 37.7% , followed identified as in second pregnancy, so third group (26- 30 year) occupied first order as 40%. *A. baumannii* has 12.3% percentage were positive results to catalase and citrate, while negative for each of Oxidase ,Indole ,Urease ,Lactose ,Motility and Hemolysin production , as well as Kliglar iron agar test gave Alkaline slant / bottom no change / no gas/ -H<sub>2</sub>S. So *A. baumannii* higher percentage 50% in the second trimester, As well as all isolated were resistant to Tetracycline (100%), but sensitivity for Piperacillin (87.5%). This study concluded *A. baumannii* high isolates in First pregnancy and high percentage in third group

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(26- 30) years, So these pathogenic bacteria higher percentage in second trimester ,As well as all isolated were resistant to Tetracycline, but sensitivity for Piperacillin .

**Key words :** *Acinetobacter baumannii* , antibiotics resistant , urinary tract infection ( UTI<sub>s</sub>)

**أنماط حساسية بكتريا الراكدة بومانية المعزولة من بول النساء الحوامل في بغداد من المضادات  
البكتيرية**

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**الخلاصة**

هدفت هذه الدراسة الى تحديد إنتشار *A. baumannii* في النساء الحوامل بمختلف فترات الحمل الثلاثة مع الإصابة بالتهابات المسالك البولية ودراسة حساسية البكتريا للمضادات الحيوية من 167 عينة ادرار جمعت من 167 امرأة حامل بمختلف فترات الحمل اللواتي يراجعن مستشفى ابن البلدي في الفترة من كانون الثاني الى حزيران 2015 وقد عزلت وشخصت البكتريا البكتريا اعتمادا على الزرع البكتيري ونظام فايتك. وكانت عزلت هذه البكتريا من 16 عينة ادرار. ودرست حساسيتها لثمانى مضادات حيوية مختلفة باستخدام طريقة انتشار القرص ( كيربي بور). العزل الكلي 16 عزلة وبنسبة (90%) كان زرع ايجابي في الحمل الأول عالية وبنسبة 37,7% تتبعها نسبة الحمل الثاني ، كذلك وقد حازت المرحلة العمرية الثالثة 30-26 سنة المرتبة الأولى وبنسبة 40% . هذا وان النتائج الايجابية كانت بنسبة (3,12%) للكنايز والستريز بينما سلبية لكل من فحص الأوكسيديز، الاندول، اليوريز، اللاكتوز، الحركة وانتاجيتها للهيمولاسين، بالإضافة الى فحص الكلكر ايرون فقد أعطى نتيجة قاعدية بالسلانت (السطح المائل) بينما لم يعطي تغييراً في القعر ولم ينتج غاز ولا كبريتيت الهيدروجين(H<sub>2</sub>S)، كذلك فإن هذه الدراسة استنتجت أن بكتيريا *A. baumannii* أعطت نسبة عالية 50% بمرحلة الحمل الثانية بالإضافة الى ان كل عزلت هذه البكتيريا كانت مقاومة للتتراسايكلين (100%) بينما كانت حساسة للبيراسيلين (87,5%) في هذه الدراسة كانت نسبة عالية لعزلت *A. baumannii* في أول حمل وكانت نسبتها عالية أيضا في المرحلة العمرية الثالثة 30-26 سنة. كذلك أظهرت الدراسة النسبة العالية في مرحلة الحمل الثانية بالإضافة الى أن كل العزلت كانت مقاومة تماما للتتراسايكلين بينما حساسة للبيراسيلين.

**كلمات مفتاحية :** الراكدة بومانية، مضادات حيوية، التهاب المسالك البولية.

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### Introduction

*Acinetobacter* spp. are gram-negative aerobic bacteria short rod-shaped (coccobacillus) widely distributed in the water and soil of natural environments, so in human as an opportunistic pathogen, increased affecting in compromised immune patients, as nosocomial infection as well as causing mortality and morbidity in the patients with severe disease, in both community and hospital [Yeom *et al.*, 2013 and Han Ming *et al.*, 2012].

*Acinetobacter* spp. are opportunistic pathogen in healthcare settings, and colonizing in any site of human body by transiently or as microbiota, so it significant important pathology in the clinical culture, especially in the immunocompromised patients. Pathogenicity which including a history of chronic lung disease, alcoholism, and smoking [Talbot *et al.*, 2006], and invasive mechanical as well as catheters (urinary and bloodstream), and ventilation. *Acinetobacter* causing suppurative infections in lung, and any tissue and so associating with cavitation, pleural effusion and multilobar infection [Urban and Rahal , 2003]. In War of Iraq, more than seven h. of soldiers U.S. have *Acinetobacter baumannii* [Wilson *et al.*, 2002]. Isolated of *Acinetobacter* from natural surface water as percent ( 97%) and numbers near to 100/ml, and in drinking-water samples as a heterotrophic plate count (HPC) flora was 1.0-5.5% and 5–92% from distribution water samples [6].

In the health care setting it is a rapidly emerging pathogen as multidrug-resistant *Acinetobacter baumannii* and it causing infections including urinary tract infection, bacteremia, wound infection, meningitis, and pneumonia. Under a wide ranges of the environmental conditions these bacteria can survive and may be causing endemic in health care–associated pathogen [Bifulco *et al.*, 1989; Fournier and Richet ,2006].

One or more than epidemic clone of *Acinetobacter* often coexist with the endemic strains and causing that difficult detection with control transmissions [Playford *et al.*, 2007].

In pregnancy *Acinetobacter baumannii* causing the septic in puerperium associating with long duration of Hospitalization and premature contractions ,also it related to chorioamnionitis. As the vaginal infections during the pregnancy and the puerperium Considered challenging to obstetricians and gynaecologists in therapy and management [Oteo *et al.*, 2007]. The goal of

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this study was determining prevalence of *A. baumannii* in pregnant women of different trimester with urinary tract infection (UTIs) and their antibiotics susceptibility patterns.

**Methods:**

From total of 167 specimens of urine, collected from 167 pregnant women of different trimester who admitted at Ibin Al baladi Hospital from a period January – June, 2015 and isolation and identification bacteria depending on bacterial culture by using blood agar and MacConkey agar and vitality index of traditional environmental knowledge (Vitek) systems. Antimicrobial resistance testing was performed for eight different antibiotics by Kirby Bauer (disk diffusion method) according to the clinical laboratory standards institute (CLSI, 2011). this Antibiotics including : Ampicillin(30- $\mu$ g), Piperacillin(30- $\mu$ g), Amikacin(30- $\mu$ g), Imipenem (10- $\mu$ g), Ciprofloxacin(5- $\mu$ g), Tetracycline(30- $\mu$ g), Gentamicin(10- $\mu$ g), Norfloxacin(10- $\mu$ g) which were obtained from Bioanalyse ,Turkey .

**Results and Discussion**

Result in Table 1 shows positive culture for UTI was high percentage in First pregnancy 37.7% , followed by 33.1% in second pregnancy and the percentage in third and more as (29.2%) , whilst negative culture appearance in three group study ( First , second , third and more pregnancy ) as 29.7, 21.6 , 48.6 % respectively. Al-Dorri,2003 found that 31.72% of UTIs during pregnancy (Al-Dorri ,2003).

The bacterial infection usually associated the Pregnancy by changing in hormonal, immunologic and physiologic state that may increasing infections (Dolgushina *et al.*,2000).

**Table (1): Relationship between number of pregnancy and UTI in pregnant women.**

number of pregnancy	Positive culture for UTI		Negative culture for UTI		Total	
	No.	%	No.	%	No.	%
First pregnancy	49	37.7	11	29.7	60	35.9
Second pregnancy	43	33.1	8	21.6	51	30.5
Third and more	38	29.2	18	48.6	56	33.5
Total	130	100	37	100	167	100

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Table 2 shows third group (26- 30) occupied first order as 40% ,while 18.5% in both age groups ( 21-25 and  $36 \leq$  )years respectively , so 11.5% in both age groups ( 16-20 and 31-35) years respectively, While ( 37.7 , 19.8 ,16.8, 13.2 and 12.6)% percentage as negative culture in age groups ( 26-30 , 21-25 ,  $36 \leq$ , 31-35 and 16-20 ) respectively, This finding is consistent with data obtained by Ali *etal.*(2007) *who appearance* high frequent of Urinary tract infection (UTI) in young age group (29-32)[ Ali *etal.*,2007],the bacterial infection that increased in older age groups of pregnant women (31- 35years and 36 – 40years) as (50,70)%respectively [Al-Zuharri *etal.*,2010].

**Table (2): Distribution of bacteria culture according to age of pregnant women.**

Age/years	Positive culture		Negative culture		Total	
	No.	%	No.	%	No.	%
16-20	15	11.5	6	16	21	12.6
21-25	24	18.5	9	24	33	19.8
26-30	52	40	11	30	63	37.7
31-35	15	11.5	7	19	22	13.2
$36 \leq$	24	18.5	4	11	28	16.8
Total	130	100	37	100	167	100

The results which obtained from bacterial culture and Vitek system that showed the types of bacteria which isolated from urine pregnant women are explain in Table- 3.

*Escherichia.coli* was the more isolate isolated from study group as (16.9%) , which supports the findings of others studies which indicating predominance of *E. coli* UTIs among pregnant women because its consider part of the microbiota that invading urinary tract and remain in it [Ejrnæs K. 2011] so In agreement with others studies of Al-kubasiy (2013) and Ali *etal.*,(2007) results showed *E. coli* has (32.6 and 55.17)% in urinary tract infected pregnant women[Al-kubasiy,2013 and Ali *etal.*,2007] as well as Schaechter,1999 showed most UTIs are caused by Enterobacteriaceae especially *E.coli* (Schaechter,1999).

So in present *Klebsiella* was the next most common bacteria isolated whilst *Staph. saprophyticus* and *Serratia marcescens* have low percentage as (1.5%),but ( 12.3%) percentage for *Acinetobacter baumannii*. because this bacteria multidrug resistance and high spread in hospital population as well as consider an important opportunistic bacteria causing

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different nosocomial infections as including urinary tract infections in pregnant women (Wang *et al.*, 2007). This is not consistent with results study of Sadeghifard *et al.* (2010) so Al-Khafaji (2006) who founded that highest percentage of *A.baumannii* isolated from urine as (48 and 32.35)% respectively, whilst Ali *et al.*, (2007) isolated (3.4%) of *Acinetobacter baumannii* from urine of women.

**Table (3): Number &percentage of bacterial isolated from pregnant urine women.**

Type of bacteria	No.	%
<i>E.coli</i>	22	16.9
<i>Klebsiella</i>	20	15.3
<i>pseudomonas aeruginosa</i>	17	13.0
<i>Staphylococcus aureus</i>	17	13.0
<i>Acinetobacter baumannii</i>	16	12.3
<i>Burkholderia spp.</i>	14	10.7
<i>Staphylococcus epidermidis</i>	9	6.9
<i>Proteus spp.</i>	8	6.1
<i>Staphylococcus agalactiae</i>	3	2.3
<i>Serratia marcescens</i>	2	1.5
<i>Staphylococcus saprophyticus</i>	2	1.5
<b>Total</b>	<b>130</b>	<b>100</b>

In Table 4 the *Acinetobacter baumannii* isolated from urine of pregnant women according to gestation represents higher percentage was 50% in the second trimester more than first and third trimester was 25% for each one, women in first and third trimester show low percentage of bacteria isolated and low UTI, this shows that incidence of the Urinary Tract Infections (UTI) in pregnant women could be contributed by trimester. These findings are consistent with data obtained by Sabahat and Perween, 2011 who showed the third and second trimester were associated with highest rate of UTIs as (11.9, 7.5) % respectively but (5.7%) in first trimester, because diagnostic of UTIs occur in third trimester when the starting uterine contraction that due to preterm or labour, whilst in > 40 weeks founded lower rate of infection in urinary tract infection (14%) [Salman, *et al.*, 2013].

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**Table (4): Distribution of *Acinetobacter baumannii* isolated from urine of pregnant women according to gestation.**

Trimester number	number of bacteria isolated	percentage of bacteria isolated
First trimester ( 1-12 weeks)	4	25
Second trimester ( 16-24 weeks)	8	50
Third trimester ( 27-36 weeks)	4	25
Total	16	9.58

Table 5 explain the results of antimicrobial resistance test it has been found that all isolates (n = 16) were resistant to Tetracycline (100%), while the resistance for Ciprofloxacin and Norfloxacin were (n = 13, 15 strains) as percentage (81 and 93.7) % but high sensitivity for Piperacillin (87.5) % so some isolates moderate sensitivity to both antibiotics (Imipenem and Amikacin) as percentage (62.5 and 50)% while results study of Nwadike *et al.*, showed *Acinetobacter baumannii* resistance to Ciprofloxacin (100%) and Amikacin (50%) [Nwadike *et al.*, 2014] and in the same time Ochado *et al.* showed in his study the *Acinetobacter baumannii* was highly sensitive to imipenem, tobramycin and amikacin [Ochado *et al.* 2014]. These results comparable with Aoife results who revealed that the *Acinetobacter baumannii* susceptible (69.8%) to imipenem whilst very low susceptibility to other antibiotics as (34.0 and 47.6) to both ciprofloxacin and gentamicin respectively [Aoife, 2012], Contradictory findings with Sofia's results in Romania who expand 16.6% of strains were sensitive to ampicillin, 25% and all antibiotics as ceftazidime, kanamycin, ceftriaxone, and gentamicin. Whilst most of these isolates were sensitivity to ciprofloxacin and to imipenem (83.3 and 91.6) % respectively [Sofia 2004] whilst in Sulaimani hospital reported (90, 85.71) % were resistance to carbapenem and cefotaxim, as well as 57.1% of the strains showed resistant to imipenem [Shali, 2012].

During the last decade increasing resistance of the gram-negative bacteria rods as the *Acinetobacter baumannii* so *Pseudomonas aeruginosa* to class D  $\beta$ -lactams (also called oxacillinases or OXAs), which genes encoding class D  $\beta$ -lactamases, but its play important role in the natural resistance of phenotypes (Niel *et al.*, 2006).

Developing *Acinetobacter baumannii* resistance to multiple of Antibiotics agents, can be

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explain that bacteria has ability or propensity to developed resistance to multiple Antibiotics agents so that can survive in environmental of hospital for long periods (Boo *et al.*, 2009).

**Table (5): Resistance of *Acinetobacter baumannii* to Antibiotics.**

Antibiotic	Resistance		Sensitive	
	No.	%	No.	%
Ampicillin	12	75	4	25
Piperacillin	2	12.5	14	87.5
Imipenem	6	37.5	10	62.5
Amikacin	8	50	8	50
Gentamicin	10	62.5	6	37.5
Tetracycline	16	100	0	0
Ciprofloxacin	13	81	3	19
Norfloxacin	15	93.7	1	6.25

### Conclusion

This study concluded to highest percentage of UTI were in First pregnancy, and this infection (UTI) was recorded more frequently in young age group. Also the UTIs by *E. coli* was Predominant among pregnant women were (16.9%), whilst (12.3%) percentage for *Acinetobacter baumannii*. The last concluded it is the all strains were resistant to Tetracycline, while high sensitivity for Piperacillin and Some isolates moderate sensitivity to both antibiotics (Imipenem and Amikacin).

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