Anti-bacterial Susceptibility Patterns of *Acinetobacter baumannii* Isolated From Urine of Pregnant Women in Baghdad.

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Received 19 March 2016 ; Accepted 29 May 2016

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/ -H2S. 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 concluc *A. baumanii* high isolates in First pregnancy and high percentage
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in third group (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 (UTIs)

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

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**الخلاصة**

هدفت هذه الدراسة إلى تحديد انتشار *A. baumannii* في النساء الحوامل بمختلف فترات الحمل الثلاثة مع الأصابات بالتهابات المسالك البولية ودراسة حساسية البكتيريا للمضادات الحيوية من 167 عينة ادرار جمعت من 167 امرأة حامل بمختلف فترات الحمل الوثاني يراجعون مستشفى ابن البلدي في الفترة من كانون الثاني إلى حزيران 2015 وقد عزلت وشخصت البكتيريا البكتيريا اعتمادا على الزرع البكتيري ونظام فايتك. وكانت عزلات هذه البكتيريا من 16 عينة ادرار ودرست حساسيتها المطلقة مضادات حيوية مختلفة باستخدام طريقة انتشار القرص (كيربي بور). العزل الكلي 16 عذلة ونسبة (51%) كان زرعا إيجابيا في الحمل الأول عاليا ونسبة 37,7% تبعها نسبة الحمل الثاني، كذلك وقد حازت المرحلة العمرية الثالثة 26-30 سنة المرضية الأولى ونسبة 40%، هذا وأنتاج الأجابية كانت بنسبة (12,3%) للكالزيد والستريز بينما سلبية لكل من فحص الأوكسيدز، الاندوز، البلاكز، الحركة وانتاجيتها للهيمولوسين، بالإضافة إلى فحص الكالزيد ایرون فقد أعطى نتيجة قاعدة بالسلامات (السطح المائل) بينما لم يعط تغييراً في الفجر ولم ينتج غاز ولا كبريتيد الهيدروجين (H2S)، وذلك فإن هذه الدراسة استنتجت أن بكتيريا عالية 50% بمرحلة الحمل الثانية بالإضافة إلى أن كل عزلات هذه البكتيريا كانت مقاومة للبربراسيلين (100%) بينما كانت حساسية للبربراسيلين (87,5%) في هذه الدراسة كانت نسبة عالية لعزلات في أول حمل وكانت نسبة عالية أيضا في المرحلة العمرية الثالثة 26-30 سنة. كذلك أظهرت الدراسة نسبة عالية في مرحلة الحمل الثانية بالإضافة إلى أن كل العزلات كانت مقاومة تماما للبربراسيلين بينما حساسة للبربراسيلين.

**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 longs duration of Hospitalization and premature contractions, also it related to chorioamnionitis. As the vaginal infections during the pregnancy and the puerperium
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Considered challenging to obstetricians and gynaecologists in therapy and management [Oteo *et al.*, 2007]. The goal of 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 (CSLI, 2011). this Antibiotics including : Ampicillin(30-µg), Piperacillin(30-µg), Amikacin(30-µg), Imipenem (10-µg), Ciprofloxacin(5-µg), Tetracycline(30-µg), Gentamicin(10-µg), Norfloxacin(10-µg) 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 (A 1 - 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).
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Table (1): Relationship between number of pregnancy and UTI in pregnant women.

<table>
<thead>
<tr>
<th>number of pregnancy</th>
<th>Positive culture for UTI</th>
<th>Negative culture for UTI</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>First pregnancy</td>
<td>49</td>
<td>37.7</td>
<td>11</td>
</tr>
<tr>
<td>Second pregnancy</td>
<td>43</td>
<td>33.1</td>
<td>8</td>
</tr>
<tr>
<td>Third and more</td>
<td>38</td>
<td>29.2</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>130</td>
<td>100</td>
<td>37</td>
</tr>
</tbody>
</table>

Table 2 shows third group (26-30) occupied first order as 40%, while 18.5% in both age groups (21-25 and 36≤) 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≤, 31-35 and 16-20) respectively. This finding is consistent with data obtained by Ali et al. (2007) who appearance high frequent of Urinary tract infection (UTI) in young age group (29-32)[Ali et al., 2007], the bacterial infection that increased in older age groups of pregnant women (31-35 years and 36 – 40 years) as (50,70)% respectively [Al-Zuharri et al., 2010].
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Table (2): Distribution of bacteria culture according to age of pregnant women.

<table>
<thead>
<tr>
<th>Age/years</th>
<th>Positive culture</th>
<th>Negative culture</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>16-20</td>
<td>15</td>
<td>11.5</td>
<td>6</td>
</tr>
<tr>
<td>21-25</td>
<td>24</td>
<td>18.5</td>
<td>9</td>
</tr>
<tr>
<td>26-30</td>
<td>52</td>
<td>40</td>
<td>11</td>
</tr>
<tr>
<td>31-35</td>
<td>15</td>
<td>11.5</td>
<td>7</td>
</tr>
<tr>
<td>36≤</td>
<td>24</td>
<td>18.5</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>130</td>
<td>100</td>
<td>37</td>
</tr>
</tbody>
</table>

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 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...
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(48 and 32.35)% respectively, whilst Ali *etal.*, (2007) isolated (3.4%) of *Acinetobacter baumannii* from urine of women.

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

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

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 finding 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,
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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].

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

<table>
<thead>
<tr>
<th>Trimester number</th>
<th>number of bacteria isolated</th>
<th>percentage of bacteria isolated</th>
</tr>
</thead>
<tbody>
<tr>
<td>First trimester (1-12 weeks)</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>Second trimester (16-24 weeks)</td>
<td>8</td>
<td>50</td>
</tr>
<tr>
<td>Third trimester (27-36 weeks)</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>9.58</td>
</tr>
</tbody>
</table>

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 sensitivity to imipenem , tobramycin and amikacin [Ochado et al, 2014]. These results combatable 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...
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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 β-lactams ( also called oxacillinases or OXAs), which genes encoding class D β-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 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.

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Resistance</th>
<th>Sensitive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>12</td>
<td>75</td>
</tr>
<tr>
<td>Piperacillin</td>
<td>2</td>
<td>12.5</td>
</tr>
<tr>
<td>Imipenem</td>
<td>6</td>
<td>37.5</td>
</tr>
<tr>
<td>Amikacin</td>
<td>8</td>
<td>50</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>10</td>
<td>62.5</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>16</td>
<td>100</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>13</td>
<td>81</td>
</tr>
<tr>
<td>Norfloxacin</td>
<td>15</td>
<td>93.7</td>
</tr>
</tbody>
</table>

### Conclusion
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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).

**References**

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