Antibiotics sensitivity of bacteria isolated from children with septicemia

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Abstract
This study aimed to determine the frequency of microorganisms isolated from blood samples of patients with septicemia admitted to pediatric protection teaching hospital in Baghdad city, the most frequently isolates were gram+ve cocci (Staphylococcus aureus 7 strain and S.epidermidis 11 strain), followed by, Klebsiella pneumoniae 9 strain, Escherichia coli 5 strain and Enterobacter 2 strain. There was a significant difference between Staphylococcus aureus and S.epidermidis in Antibiotic sensitivity P value ≤ 0.05. S. aureus 7 strain were resistant to ampicillin, erythromycin and sensitive to vancomycin, cloxacillin, Gentamicin, Ciprofloxacin While S.epidermidis 11 strain were resistant to ampicillin, gentamicin and sensitive to erythromycin, vancomycin, cloxacillin, Ciprofloxacin.

Keywords: Bacteria, Resistance to Antibiotics, septicemia

دراسة حساسية المضادات للبكتريا المعزولة من الأطفال المصابين بسمم الدم
ميسام عدنان مزهر

الدراسة الحالية ركزت على تحديد تردد العزلات المسببة لتسمم الدم من المرضى الراحدين في الأطفال دون السنتين في مركز حماية الأطفال في محافظة بغداد، البكتريا الأكثر ترددًا هي البكتريا الموجبة لصيغة كرام 7 عزلات من المكورات العنقودية الذهبية و 11 عزلة من المكورات العنقودية البشروية تتبغعها العزلات التابعة لنوع الكليبسيلا الزهاوي أيضًا بلغ عددها 9 عزلة ضمن الدراسة الحالية، الأشريكة الزئلي 5 عزلات و الامامان الزئليتين. هنالك فروقات معنوية بين بين مقاومة المكورات العنقودية الذهبية والمكورات العنقودية البشروية في مقاومة المضادات الحيوية المستخدمة في الدراسة المكورات العنقودية الذهبية 7 عزلات أظهرت مقاومتها لمضادات الأمبليسيل والازتراميسين وحساسيتها تجاه الفانكوماسين، كوكساسلين، جنتاماسين والسيرفلاتسين بينما المكورات العنقودية البشروية 11 عزله أظهرت مقاومتها للامبليسيل والجنتاماسين وحساسيتها للازتراميسين، الفانكوماسين، كوكساسلين والسيرفلاتسين.
Introduction
Septicemia refers to generalized infection with positive blood culture in the early 28 days of neonates [1]. Advances in early diagnosis and treatment have led to better prognosis of new borns, various diseases of new born including septicemia, meningitis, arthritis, pneumonia, osteomyelitis and urinary tract infection [2]. Septicemia can be classified into two subtypes: Early onset neonatal sepsis (EONS) depending on the onset of symptoms before 72 hours and after 72 hours up to 28 days of life it is considered as late-onset neonatal sepsis (LONS) [3]. Risk factors for early onset sepsis includes prolonged ruptured membranes (> 18 hours) [4], fetal distress, preterm delivery, history of Group B Streptococcus (GBS) infection in previous infant, GBS bacteriuria in this pregnancy [5]. Late onset sepsis occurs due to prolonged hospitalization. This retrospective study was undertaken to evaluate major bacterial isolates causing neonatal septicemia and their antibiogram pattern [6].

Aims of the study
To study the spectrum of the significant bacterial isolates from positive blood culture causing septicemia in children under 2 years and to determine the antimicrobial sensitivity pattern of the bacterial isolates obtained from positive blood culture causing septicemia in children.

Material and Methods
Sample Collections
Forty five samples were collected from children under 2 years, Blood was collected under complete aseptic precautions .Blood was inoculated directly into blood -culture bottles . The ratio of blood to media brain heart infusion broth was 1:5 thoroughly mixed to prevent clotting, therefore, no anticoagulant was needed [7] and incubated at 37°C for 1 week and examined by subculture on selective media (mannitol salt agar) and routine culture media nutrient agar and MacConkey agar .All colonies appeared on different media were further identified both morphological and by biochemical reactions [8]. Susceptibility to antibiotics were determined for all bacterial isolates by standard disk diffusion method [9, 10], using 6 commercially available disks (Al-Raze Center Disks). The following antibiotics were tested: ampicillin Ciprofloxacin gentamicin, vancomycin, erythromycin, cloxacillin (Oxoid, UK).
The test was performed according to the Kirby–Bauer technique [11].

Statistical analysis
Complete Randomized Design (C.R.D.) was used as an experimental design. Data were analyzed using SAS [12] to study the effect of different factors on the diameters of inhibition zones. Least significant difference (LSD) was used to compare the significant difference between means at P≤ 0.05.

Results and Discussion
Isolation and Identification of bacterial strains
Suspected bacterial colonies were picked up from blood agar and MacConkey's plates and identified by microscopic examination and biochemical tests. The gram-positive cocci were identified by microscopic examination and catalase and coagulase tests. Thirty four samples were found positive by bacterial infection and 11 were negative. The most frequently isolates were gram+ve cocci ( Staphylococcus aureus 7 strain and S.epidermidis 11strain ) , followed by , Klebsiella pneumonia 9 strain, Escherichia coli 5 strain and Enterobacter 2 strain as show in Table (1).
Table (1): Percentage of bacterial species isolated from septicemia infections.

<table>
<thead>
<tr>
<th>Bacterial species</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - <em>Staphylococcus aureus</em></td>
<td>7</td>
<td>21%</td>
</tr>
<tr>
<td>2 - <em>S.epidermidis</em></td>
<td>11</td>
<td>32%</td>
</tr>
<tr>
<td>3 - <em>Klebsiella pneumonia</em></td>
<td>9</td>
<td>26%</td>
</tr>
<tr>
<td>4 - <em>Escherichia coli</em></td>
<td>5</td>
<td>15%</td>
</tr>
<tr>
<td>5 - <em>Enterobacter</em></td>
<td>2</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>34</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

**Antibiotic sensitivity pattern**

The standard disk diffusion method was used to determine the sensitivity of all gram positive cocci bacterial isolates *Staphylococcus aureus* and *S.epidermidis* to several antibiotics. Results are shown in (Table-2) and (Table-3). It is obvious that a high percentage of all isolates were resistant to most used antibiotics and sensitive some of subjected antibiotics, there is significant difference between *Staphylococcus aureus* and *S.epidermidis* in Antibiotic sensitivity P value ≤ 0.05. *S.aureus* 7 strain Resistant to ampicillin, erythromycin and sensitive to vancomycin, cloxacillin, gentamicin, Ciprofloxacin as show in table 2. Whil *S.epidermidis* 11 strain resistance toampicillin, gentamicin and sensitive to erythromycin, vancomycin, cloxacillin, ciprofloxacin as show in table 3.

Table (2):-Antibiotic sensitivity Percentage of *S.aureus* isolated from septicemia infection to different type of antibiotics.

<table>
<thead>
<tr>
<th><em>S.aureus</em> (no. 7)</th>
<th>Antibiotics (Bioanalyse/Turkey)</th>
<th>Concentration µg / ml</th>
<th>Resistance</th>
<th>Sensitive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ampicillin</td>
<td>10</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Erythromycin</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Vancomycin</td>
<td>30</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Cloxacillin</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Gentamicin</td>
<td>10</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Ciprofloxacin</td>
<td>5</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

P value ≤ 0.05
P value ≤ 0.05
Neonatal sepsis is a life threatening emerging infection in the developing countries and it is estimated about million neonatal death occur every year worldwide. Therefore, differences in the ethnicity and socioeconomic status may contribute to the varying incidence of setic infection among neonates in different populations [13, 14]. Antibiotics are known to be effective in the treatment of septicemia worldwide [15, 16]. Generally speaking the percentages of resistance to antibiotics reported in this study are higher than those reported in some other part of the world [17, 18, 2]. This is a reflection for the misuse of antibiotics. Many of the antibiotics resistance genes were found to be carried on self-transmissible or mobilizable plasmids, and the transfer of such plasmids from one strain to another via conjugation was one of the major reasons for spreading the antibiotics resistance between bacterial population specially those belong to the S.epidermidis And S.aureus which represent the major causative agents for septicemia [19,20,3,5,13].

**Conclusion**
Development of more effective and less invasive procedures in the postnatal period and inadequate hand washing before and after handling babies also contributes to the neonatal sepsis in intensive care units.

**Acknowledgements**
The authors wish to thank who helps in the arrangement this paper and made the work possible.

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