Bacterial isolates and antibiotic susceptibility of ear infections in Iraqi patients

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Key words: Ear swabs, bacterial infection, otitis media, Amikacin, antimicrobial sensitivity.

Abstract

This study was undertaken for review the frequency of isolation of different bacteria species from Iraqi patients reporting with ear infections and to examine their antibiotic susceptibility pattern. During the period from February 2017 to August 2017. Ear swabs samples were collected from 80 Iraqi patients and controls for bacterial species isolation of ear infection and in vitro antimicrobial sensitivity test for positive culture was done. The positive results of culturing and isolated from otitis media patients, the Pseudomonas spp. was the highest in incidence 15 (30%) , followed by Proteus spp 14 (28%) , while antimicrobial sensitivity test, the bacteria which isolated from the ear swabs was sensitive to Amikacin (AK 29%) ,while Cefotaxime (CTX 19%) was poor antibacterial drug activity than others antibacterial drugs. The present study revealed that Pseudomonas spp. was more species isolates from ear swabs from the patients with otitis media. Amikacin was more sensitive and effective antibacterial drug activity than others antibacterial drugs.

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Introduction

Ear infection is an inflammation of the ear and ear discharge is one of the most common signs of ear infection (Variya et al., 2002), it has different forms with the otitis media being the most common and occurs mostly in children.

The frequency of this infection in children is due to the shorter length of the Eustachian tube and is more horizontal in children than in adults (Weiner and Collison, 2003). About 65-330 million people be in pain from ear infections worldwide, and 60% of them suffer from hearing impairment (Woodfield and Dugdale, 2008). Otitis media, is infection of the middle ear and usually related with upper respiratory tract infection. It can occur at any age but 60-80% of children with recurrent otitis media (Kalcioglu et al., 2006).

Infections of otitis media can be asymptomatic or symptomatic or acute symptomatic, infections are characterized by symptoms such as moderate to severe pain, rashes ear discharge (pus), irritation and sometimes fever (Damoiseaux 2005). Sources of ear infections include bacteria, viruses and fungi, with bacteria being the most common cause (Bello et al., 2011). Depending on the clinical presentation otitis media can be divided into 2 types: Acute otitis media (AOM), Chronis superlative otitis media (CSOM) (Oni et al., 2002). Early diagnosis may avert the possibility of complications correlated with such infection as meningitis, brain abscess, subdural abscess and lateral sinus thrombosis (Pendido et al., 2005).

The infection was attributed to several bacterial species such as Pseudomonas aeruginosa, Proteus vulgaris, Proteus mirabilis and Staphylococcus aureus (Pajor et al., 2006; Hafidh et al., 2006). The emergence of highly resistant strains of both gram positive and gram negative bacteria can suppress the most effective antibiotics such as extended spectrum beta lactamase (ESBL) and the variable pattern of antibiotic efficacy to stimulate the concept of this action (Motayo et al., 2012).

This research was achieved to evaluate the frequency of isolation of diverse bacteria species from Iraqi patients reporting with ear infections and to examine their antibiotic susceptibility pattern.

Materials and methods

The collection of samples and processing

Ear swabs samples were collected from 50 Iraqi patients and 30 controls for bacterial species isolation of ear infection by using a sterile swab stick at medical city in Baghdad from February 2017 to August 2017. The ear swab samples were immediately inoculated on Mac Conkey and Blood agar plates on Microbiology unit of the laboratory, these plates were incubated aerobically at 37°C for 24 to 48 hours. All positive cultures were identified by their characteristic appearance on their respective media, Gram-staining reaction and confirmed by the pattern of biochemical reactions using the standard method which include; urease, catalase, coagulase, , citrate utilization, oxidase and indole test (Cheesbourgh 1991).

Antibiotic sensitivity testing

Antimicrobial susceptibility testing was performed for all positive culture according to the criteria of the (CLSI) clinical and laboratory standards institute (CLSI 2007). Bacterial suspension was prepared and was adjusted to a McFarland solution 0.5 and inoculated onto Muller Hinton agar (HiMedia, India). Before the application of single antibiotic discs and subsequently incubated at 37°C aerobically for 18-24hrs. Antibiotic discs used were include : Amikacin (AK 30) , Cephalothin (CE 30μg), cefotaxime (CTX 10μg), ceftazoline (CZ 30μg), ciprofloxacin (CIP 5), piperacillin (PIP 30μg), Imipenem (IMP 10), Netilmicin (NET 30μg).

Statistical analysis

Data analysis was done by using SPSS version 21.0 software and Microsoft Excel 2013. Categorical data formulated as count and percentage. And Chi-square test was used to characterize the correlation of these data. A p-value of less than 0.05 was considered as statistical significance.
Results

Study population

The data that was gathered in this study was depicted in Table 1 which represent which represent the distribution of the patients according to their gender, Table 2 which represent the percentage of Bacteriological etiology isolated from the ear swabs and Table 3 which shows the sensitive and resistant of antibacterial drugs, the total of 80 samples of ear swabs collected from patients and control. A total of 50 patients were collected with 26 (52%) samples of males and 24 (48%) females.

The mean of the age of patients was 29.5 ± 12.91.

Table 1. Distribution of Patient and Healthy Control According the Gender and age.

<table>
<thead>
<tr>
<th>No.</th>
<th>%</th>
<th>No.</th>
<th>%</th>
<th>Mean of age</th>
<th>SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>26</td>
<td>52</td>
<td>15</td>
<td>31.5</td>
<td>12.33</td>
<td>P&lt;0.05 Significant</td>
</tr>
<tr>
<td>Female</td>
<td>24</td>
<td>48</td>
<td>15</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100</td>
<td>30</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bacteriological etiology isolated from the ear swabs

A total of 50 samples from the patients, the positive results of culturing and isolated from otitis media patients, the Pseudomonas spp. was the highest in incidence 15 (30%), followed by Proteus spp 14 (28%). Less common organisms are E. coli and S. aureus Enterobacteracea. While no growth 12(24%) in patients samples and no growth in healthy controls as clearly shown in Table 2, figure (1).

Table 2. The frequency and percentage of Bacteriological etiology isolated from the ear swabs.

<table>
<thead>
<tr>
<th>bacteria culture</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.coli</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Enterobacteracea</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>NO growth</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>Proteus spp</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>pseudo spp</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>S. aureus</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

Antibacterial susceptibility testing

in this study, almost the bacteria which isolated from the ear swabs were sensitive to Amikacin (AK 29%) and Ceftazoline (CZ 23%). While Cefotaxime (CTX 19%), Ciprofloxacin (Cip 17%) and Netilmicin (NET 17%) were poor antibacterial drug activity and more resistant than others antibacterial drugs (table 3). Compared to Gram-positive bacteria, Pseudomonas aeruginosa was the most predominant isolate with an occurrence 15 (30%), followed by Proteus spp 14 (28%). Similar findings have been observed in Ireland (Mukassabi 2007), Pakistan (Arshad et al., 2004) and Greece (Bardanis et al., 2003), Nigeria (Tobih et al., 2006; Wariso and Ibe, 2006), which reported that P. aeruginosa was the most common bacteria isolated types of the cases of otitis media.

Discussion

Observations

In these results it was found to be commoner among the males 52% more than females 48%, which was agreed with study done by (Afolabi et al. 2012). The observation in this study was that Gram-negative bacteria were the predominant isolates when compared to Gram-positive bacteria, Pseudomonas aeruginosa was the most predominant isolate with an occurrence 15 (30%), followed by Proteus spp 14 (28%). Similar findings have been observed in Ireland (Mukassabi 2007), Pakistan (Arshad et al., 2004) and Greece (Bardanis et al., 2003), Nigeria (Tobih et al., 2006; Wariso and Ibe, 2006), which reported that P. aeruginosa was the most common bacteria isolated types of the cases of otitis media.

Data Analysis

Antibiotic susceptibility was done on all isolates using the most commonly prescribed antibiotics, almost the bacteria which isolated from the ear swabs were sensitive to Amikacin (AK 29%) and Ceftazoline (CZ
While Cefotaxime (CTX 19%), Ciprofloxacin (Cip 17%) and Netilmicin (NET 17%) were poor antibacterial drug activity and more resistant than others antibacterial drugs. This susceptibility to isolated bacteria provides evidence of the bacterial resistance of many antimicrobial agents by means of multiple drug resistance (MDR), this difference in the sensitivity profile may be due to frequency of usage of these drugs for the therapy of ear infections in different geographic locations (Elmanama et al., 2014).

Table 3. The sensitive and resistant of antibacterial drugs.

<table>
<thead>
<tr>
<th>Antibacterial drugs</th>
<th>R</th>
<th></th>
<th>S</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Amikacin (AK)</td>
<td>9</td>
<td>23.6</td>
<td>29</td>
<td>76.3</td>
</tr>
<tr>
<td>Cephalothin (CE)</td>
<td>16</td>
<td>42.1</td>
<td>22</td>
<td>57.9</td>
</tr>
<tr>
<td>Cefotaxime (CTX)</td>
<td>19</td>
<td>50</td>
<td>19</td>
<td>50</td>
</tr>
<tr>
<td>Ceftazoline (CZ)</td>
<td>15</td>
<td>39.5</td>
<td>23</td>
<td>60.5</td>
</tr>
<tr>
<td>Ciprofloxacin (Cip)</td>
<td>17</td>
<td>44.7</td>
<td>21</td>
<td>55.3</td>
</tr>
<tr>
<td>Piperacillin (PIP)</td>
<td>16</td>
<td>42.1</td>
<td>22</td>
<td>57.9</td>
</tr>
<tr>
<td>Imipenem (IMP)</td>
<td>16</td>
<td>42.1</td>
<td>22</td>
<td>57.9</td>
</tr>
<tr>
<td>Netilmicin (NET)</td>
<td>17</td>
<td>44.7</td>
<td>21</td>
<td>55.3</td>
</tr>
</tbody>
</table>

Socio-economic factors

Otitis media is a serious concern for health care around the world, not only because of the distress caused by the patient and his family, but because of the great economic occurrence depending on the component and socio-economic factors (Ologe and Nwawolo, 2002).

A high prevalence has been reported among the, American Indians, Eskimos, Australian aboriginal children and black in South Africans. Poor living conditions, poor hygiene, nutrition and overcrowding have been suggested as a basis for the widespread spread of CSOM of developing countries (Ologe and Nwawolo, 2002). Pseudomonas aeruginosa was the most common bacterial organism found in the middle ear of the respondents with chronic suppurative otitis media which is similar to findings elsewhere (Brook and Frazier, 1996). Proteus spp was predominant (28%) based on results of the middle ear culture of the respondents compared to some other studies where it was found to be the most common in Egypt and second most common in other studies in Ibadan (Bluestone 1996; Oni et al., 2001). In other studies, S. aureus and Proteus spp. were the predominant pathogens of CSOM (Brobby and Zadik, 1987).

This Study

This study disagree with another study in Gaza that indicated the ceftriaxone and ciprofloxacin were the most effective drugs when compared to other drugs tested against the Gram-positive and Gram-negative bacteria (Elmanama et al., 2014). Sharma et al indicated that Amikacin is an effective antibiotic against Gram-negative organisms (Sharma et al., 2004). Afolabi et al., 2002 indicated that ciprofloxacin can serve as a first line of therapy, in contrast to Oni et al 2001 who recommended penicillin as first line of therapy and quinolone as second line. Previous workers have established gentamicin as the most sensitive agent (John, 1991; Ibekwe et al., 1997). In 2013 (Ahmad 2013) proved behavioral change of microorganisms, showing more sensitivity to quinolones, gentamicin and cephalosporin.

Finally, the difference in the results of antibiotics in many researches is due to the bad use of antibiotics, which led to the emergence of resistance strains of antibiotics.

References

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