ABSTRACT
To determine the bacterial etiology of acute otitis media (AOM) infections. This prospective descriptive clinical study was implemented in Alkindy Hospital between March, 2013 and October, 2013 with 30 cases, age group was ranged from 15-65 years. The diagnosis of acute otitis media infection was confirmed by an otolaryngologist following that taken the paracentesis from the patients. Bacterial culture was done, and antibacterial resistance was assessed with disk diffusion method, in our finding the most frequent etiologic agent was Pseudomonas aeruginosa 37% and followed by Staphylococcus aureus 20%, Proteus 17%, Klebsiella 10%, Escherichia coli 7%, Providencia stuartii 3%, Ewingella-Americana 3%, in order of frequency. Antibiotic susceptibility test showed that bacterial isolates was more resistant to Cephalotuin, Aztreouam and Piperacillin respectively among all our were used in this test. In this study, it was aimed to determine the bacterial etiology in the human applied to our hospital and diagnosed with AOM.

KEYWORDS: Otitis Media, Etiology of bacterial, Antibiotics.

INTRODUCTION
Acute otitis media (AOM) is infection or inflammation of the middle ear. This inflammation often begins when infections that cause sore throats, colds, or other respiratory or breathing problems spread to the middle ear. These can be viral or bacterial infections. Although otitis media is primarily a disease of infants and young children, it can also affect adults.\textsuperscript{11} The major bacterial pathogens causing AOM have not changed significantly over the last 2 decades and are similar for infants, children and adults.\textsuperscript{2,3,4,5} Although etiology varies in
different geographic regions of the world, bacterial agents are the leading causes and followed by viral agents and mixed infections.\cite{6,7} *Streptococcus pneumoniae, Haemophilus influenza*, and *Moraxella catarrhalis* are the leading bacterial agents.\cite{8}

Otitis media is a broad subject which could be classified according to:

1. Duration - acute otitis media and chronic otitis media.
3. Otitis media with effusion and Aero-otitis media.
4. Causative organism- bacterial otitis media (common) and specific otitis media e.g. Tubercular and syphilitic otitis media(less common).\cite{9}

Antibiotic prophylaxis has only minimal effects on recurrent otitis media, decreasing recurrences by approximately one episode per year.\cite{10}

The diagnosis of acute otitis media (AOM) requires the presence of inflammation and pus in the middle ear, and acute onset of symptoms and signs of ear infection, i.e., earache, fever, irritability, poor feeding or vomiting, often associated with cough and rhinitis.\cite{11} Early AOM may be diagnosed by inflammation which is seen along the handle of malleus, and in the superior pole of the tympanic membrane. At this stage, the rest of the tympanic membrane usually still has good mobility with insufflations by the pneumatic otoscope. With these findings, the child should be followed closely.\cite{12} Other less common diagnostic methods include tympanometry and acoustic reflectometry. These methods must still be used in conjunction with compatible history.\cite{13} The spread of the disease beyond the confines of the middle ear can result in extracranial or intracranial complications, Acute mastoiditis (inflammation of the mastoid air cells)/coalescent mastoiditis,\cite{14} subperiosteal abscess,\cite{15} facial nerve paralysis,\cite{16} labyrinthitis and petrositis\cite{17-18}\ are examples of such extra-cranial complications. Whereas, the intracranial ones include extradural and subdural abscesses,\cite{19} meningitis,\cite{20} otitic brain abscesses,\cite{21} otitic hydrocephalus and lateral sinus thrombosis.\cite{22,23}

**MATERIALS AND METHODS**

- **Collection of specimens**
- The study was conducted in the Al-kaindy hospital, the protocol involved in this study patients group (n= 30), who have acute otitis media (AOM), their age ranged from (15-65) years old.
Microbiologic examination

Culture methods

Etiology Reliable microbiological diagnosis of AOM requires culture of tympanocentesis fluid through an intact drum, Ear swab for discharging ears were taken for microscopy examination, The swabs from the ear canal were inoculated onto a set of standard diagnostic media plates: blood agar, MacConkey agar, Chocolate agar, and Sabouraud dextrose agar. All media were incubated in an incubator at 35 - 37°C for 24 - 48 h. The slides were prepared from culture media and evaluated with Gram staining, the bacteria with alpha hemolysis on blood agar and susceptible to optochin were identified as S. pneumoniae. The bacteria with beta hemolysis on blood agar, susceptible to bacitracin, for the final identification we used API 20E Biomerieux tests.

Antibiotic susceptibility testing

Antibiotic susceptibility were assessed with disk diffusion method and according to National Committee of Clinical Laboratory Standards (NCCLS) with following concentration: {Cephalothin(30µg), Imipenem(10µg), Amoxcillin-Clavulanic acid(20/10µg), Piperacillin(100µg), Ceftazidime(30µg), Aztreonam(30µg), Imipenem(10µg), Aztreonam(30µg), Imipenem(10µg), Gentamicin(10µg), Tobramycin(10µg), Ciprofloxacin(5µg), Chloramphenicol(30µg), Ceftazidime(30µg), Amikacin(30µg), Vancomycin (30µg), Erythromycin (15µg), Clindamycin (2µg)}per disk content.

RESULT

In this study, we can isolation and diagnosis different type of bacterial, including (Pseudomonas aeruginosa, Staphylococcus aureus, Proteus, Klebsiella, Escherichia coli, Providenciastuartii, Ewingella Americana), The high percentage of pathogenic causes or bacterial causes of AOM is Pseudomonas aeruginosa 37%, Staphylococcus aureus 20%, Proteus 17%, Klebsiella 10%, Escherichia coli 7%, Providenciastuartii 3%, Ewingella Americana 3%, as show in figure (1).

![The pathogenic causes infection percentage](image)

Figure (1): results of the pathogenic cause's infection percentage
The scientific names of bacterial causes were:

1- Pseudomonas aeruginosa
2- Staphylococcus aureus
3- Proteus
4- Klebsiella
5- Escherichia coli
6- Providenciastuartii
7- Ewingella Americana
8- Others (may be the pathogenic causes of AOM is a viral)

The resistance percentage among all bacterial causes infection toward Ciprofloxacin (Cip) and Gentamicin(GM) was 20.8% and 41.7% respectively.

The resistance percentage among G-ve  bacterial causes infection toward Imipenem IPM, Amikacin AK, Ceftazidime CAZ, Tobramycin TB, Piperacillin pip, Aztreonam AT and Cephalothin Cep was 10.5%, 21.1%, 26.3%, 47.4%, 52.6%, 84.2% and 100% respectively. The resistance percentage among G+ve  bacterial causes infection toward Vancomycin Va, Amoxicillin- clavulanic acid (Amc), Erythromycin E and Clindamycin CD were 0%, 20%, 40%, 40% and 40% respectively, in as show table (1).
Table 1: Result of sensitive test of bacterial causes of AOM to different Antibiotics

<table>
<thead>
<tr>
<th>Bacterial Isolates</th>
<th>CAZ 30µg/disk content</th>
<th>Cep 30µg/dish content</th>
<th>Pip 100µg/disk content</th>
<th>Ipm 10µg/disk content</th>
<th>TB 10µg/disk content</th>
<th>AK 30µg/disk content</th>
<th>AT 30µg/disk content</th>
<th>Cip 5µg/disk content</th>
<th>GM 10µg/disk content</th>
<th>Amc 20–10µg/disk content</th>
<th>Va 30µg/disk content</th>
<th>C 30µg/disk content</th>
<th>E 15µg/disk content</th>
<th>CD 2µg/disk content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ps.aeruginosa1</td>
<td>R 36.4% 90% 9% 18.8% 45.5% 18.8% 81.8% 36.3% 54.5% - - - -</td>
<td>S 63.6% - - 81.2% 45.5% 81.8% 18.8% 63.6% 45.4% - - - -</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. aureus</td>
<td>R - - - - - - - - - - 20% 40% 40% 40%</td>
<td>I - - - - - - - - - - 20% 63.6% 45.4% - - - -</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proteus</td>
<td>R - 100% 33.3% - 33.3% 33.3% - - - 100% 100% 60% 80% 60% 60% 60%</td>
<td>S 100% - 66.6% 100% 66.6% 66.6% 100% 100% - - - -</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Klebsiella 1</td>
<td>R 50% 100% 100% - - 100% - - - - - -</td>
<td>S 50% - 100% 100% 100% - 100% 100% - - - -</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. coli 1</td>
<td>R - 100% 100% - - - 100% - - - - - -</td>
<td>S 100% - 100% 100% 100% - 100% - - - -</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pr. stuartii 1</td>
<td>R - 100% - - 100% - - - 100% 100% 100% 100% - I I</td>
<td>S 100% - 100% 100% 100% - 100% - - - -</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ew.americana1</td>
<td>R - 100% - - 100% 100% 100% 100% 100%</td>
<td>I - - - - 100% - - - - - -</td>
<td>S 100% - 100% - - - - - - - -</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cephalothin Cep (30µg), Imipenem IPM(10µg), Amoxicillin-Clavulanic acid AMC (20/10µg), Piperacillin PIP (100µg), Ceftazaidime CAZ (30µg), Aztreonam AT(30µg), Imipenem IMP(10µg), Gentamicin GM (10µg), Tobramycin TB (10µg), Ciprofloxcin CIP (5µg), Chloramphenicol C (30µg), C, Amikacin AK(30µg), Vancomycin VA(30µg), Erythromycin E(15µg), Clindamycin CD(2µg) per disk content.
R= Resistant; S=Sensitive; I = Intermediate.
DISCUSSION

The most common agent in the bacterial etiology of acute otitis media (AOM) is reported to be S. pneumoniae, untyped H. influenzae and M. catarrhalis are reported in the second and third places, respectively in study of Rovers, et al, 2006.[26] In other study, the order of frequency of the bacteria out of S. pneumonia and H. influenzae was different from that reported in the literature. S. aureus, which is reported among rare agents, was determined to be in the 2rd place. Evaluating in terms of the level of development of the countries, S. aureus has been reported in lower rates (1-2%) in developed countries and in slightly higher rates (4%) in developing countries in etiology of AOM according to the studies as referred to Güven M, et al, 2006.[27]

In a study by Jacobs, H.et al, 1998 influenzae was determined to be in the first place.[28] But, in our study the percentage of microbiological factors for the bacteria causes was different from the other countries such as Pseudomonas aeruginosa 37%, Staphylococcus aureus 20%, Proteus 17%, Klebsiella 10%, Escherichia coli 7%, Providencia stuartii 3%, Ewingella Americana 3%, which were the most frequently isolated bacteria in AOM in this study. In addition, about 3% have no bacterial pathogens (no growth bacterial) identified and presumably are viral in etiology. Our study shown that 84% of bacterial causes of AOM were resistance to antibiotic cephaltiun, 52% to aztreouam, 47.7% to pipracollin, and 40% to amoxiollin, clindamycin and eryllrmycin. The order of frequency of the bacteria can vary according to the geographic region and has being changed over years with increased use of antibiotics and has a dynamic character.[29-30]

Although a high school of thought precludes antibiotics therapy for acute otitis media, since most are associated with viral infections,[31-32] however, The etiology of AOM varies with age, the most frequently implicated agents being viruses such as rhinoviruses, influenza viruses, or respiratory syncytial viruses and bacteria, such as non-encapsulated Haemophilus influenzae, Streptococcus pneumoniae, and Moraxella catarrhalis,[33] there for the experience within the developing world has suggested that most of the cases are either mixed (bacterial + viral) or bacterial infections.[34-35] Some native cultural practices and the humid environment of the tropics encourage secondary bacterial infections.[36] Antibiotic therapy is recommended for AOM in children under 24 months.[37] Some studies have suggested that routine use of antibiotics, especially in children 2 years and older, is not indicated because of the high rate of spontaneous resolution.[38-39] and given the high risk of developing antibiotic resistance associated with prolonged use of antibiotics, antibiotic prophylaxis is no longer recommended in the management of recurrent otitis media, therefore in this study we found some bacterial resistance for more antibiotic.
CONCLUSION
In conclusion, the bacteriology of acute otitis media has been studied in several parts of the world; however, Our finding that the disease gets increased in winter seasons. It is encountered for times higher than in the other seasons. Bacteria were responsible in more than half of the AOM cases in adult in our study Pseudomonas aeruginosa, Staphylococcus aureus and Proteus were placed in the first three. Cephalotuinin, Aztreouam, and Piperacillin are the higher resistance rate among all the bacteria isolated.

REFERENCE


