Isolation and identification of the bacteria causing acute tonsillitis

Daoud S. Allos*, Ramzia H.A. Rahaman**, Wahda A. AL-Kharofa**
* Dept. of Surgery, College of Medicine, Mosul University
** Class of Medical Biology, Dept. of Anatomy, College of Medicine, Mosul University

Abstract
Acute infection of the pharynx tonsil, has received a lot of attention and large number of papers dealing with different aspects of problem appear in literatures. A couple of tonsils swabs was taken from the following groups sixty five patients suffering from attack of acute tonsillitis, twenty tonsillectomized and thirty with normal tonsils (were subjected to the same study and served as control group) for aerobic and anaerobic inoculation study. The isolation rate of Streptococcus pyogenes was highest among acute tonsillitis (81.53 %) than among either the tonsillectomized patients (10 %) or those with normal tonsils (13.33 %) followed by Haemophilus influenzae was much higher among AT (60 %) than among and Staphylococcus aureus (44.6 %) which was higher in the patients with acute tonsillitis as compared with tonsillectomized patients (5 %) or control groups which was (3.33 %). Remarkably high tonsillar swabs isolation rates of group A Streptococci, Haemophilus influenzae and Staphylococcus aureus among patient with acute tonsillitis as compared with both normal tonsils and tonsillectomized the study conclude these three types of pathogens ply role in the acute tonsillitis infection in lower ratio of patients who underwent tonsillectomy. The aim of the study is to compare the type of different microorganisms between three groups (normal tonsil , tonsillectomized and acute tonsillitis.

Introduction
Being one of the most common condition encountered in medicine, acute infection of the pharynx tonsil, has received a lot of attention and large number of papers dealing with different aspects of problem appear in literatures (1,2), and a matter of great controversy (1).

High tonsillar isolation rates of Streptococcus pyogenes, Haemophilus influenzae and Staphylococcus aureus among cases of recurrent acute tonsillitis and tonsillar hypertrophy have been reported from several studies and the isolation rates of these species have been found to be much higher in tonsillar core tissue than in ordinary throat culture (3).

Materials and Methods
Study population: Two tonsillar swabs were collected from each of 65 patients with acute tonsillitis over two months period (July-August /2001) with an age range from 1 to 59 years (median age 14 years), the patients were attending ENT Department at AL-Zahrawy Teaching Hospital in Mosul Questionnaire was filled for every patient about name, age, sex, residency, occupation and frequency of the acute tonsillitis.

A second group, used consist of 20 tonsillectomized patients, ranging in age (3 to 38) years (median 6 years) and 30 subjects with normal tonsil ranging in age (4 to 65 years) (median 20 years) the three groups had not treated with antibiotics prior to bacterial sampling and none of them suffered from recurrent acute tonsillitis.

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Microbial Examination: The two swabs from each patient were inoculated onto Nutrient agar, (Oxoid), sheep blood agar, Chocolate agar and MacConkey's agar (Oxoid), and then incubated aerobically at 37°C for 24 h. The other group were incubated anaerobically (with 10% CO₂) at 37°C for 24 h.

Identification: Gram Stain was used as an initial step in determination of the type of the microorganism that may be found in tonsillar swabs. Biochemical tests differentiation using catalase, oxidase and urease, also *Staphylococcus aureus* were identified by coagulase positive, form smooth golden pigmented colonies, *Streptococcus pyogenes* were identified by β-haemolysis usually causing a clear zone of haemolysis on fresh blood agar, *Haemophilus influenzae* identified by growth requirement of X & V factors.

Statistical analysis of the results was performed using chi-square tests.

**Results**

The main characteristic of the 3 groups are compared in table (1) as shown in fig. (1) the percentage of infection in age group ranging between (1-10) years is much higher than other age group possibly it is due to acute tonsillitis is most frequent childhood.

The bacterial isolation rates from tonsillar swabs are given in table (2), *Streptococcus pyogenes* was isolated from 53/65 (81.53%) patients with recurrent acute tonsillitis as compared with 4/30 (13.33%) of the normal tonsils (p<0.05) and 2/20 (10%) of the tonsillectomized patients (p<0.05). *Haemophilus influenzae* which isolated from 39/65 (60%) as compared with 2/30 (6.66%) of the normal tonsils (p<0.05) and 1/20 (5%) of the tonsillectomized patients while *Staphylococcus aureus* was recovered in 29/65 (44.6%) from patients with acute tonsillitis while recovered in 1/30 (3.33%) of normal tonsils (p>0.05) and 1/20 (5%) of the tonsillectomized patients (p>0.05).

Culture finding in patient over 20 years old: As shown in table (2) of the 65 patients with recurrent acute tonsillitis, 16 were over 20 years of age, *Streptococcus pyogenes* was recovered in 7/16 (43.75%) of the patients with recurrent acute tonsillitis compare with *Haemophilus influenzae* which recovered from 3/16 (18.75%), while *Staphylococcus aureus* recovered from 1/16 (6.25%).

**Discussion**

The defense mechanisms operating on the tonsillar surfaces are extremely complex and not very well understood. The mucus covering the palatine tonsils is a mixture of saliva produced by the Minor & Major salivary glands secretions, produced by the secretary cells of the nasal cavities & pharynx, transudation from the mucosa, ingested liquids & food (2). The present study showed, that *Streptococcus pyogenes* group A (β-haemolytic) Streptococci is the major cause of acute bacteria pharyngotonsillitis (AT) responsible roughly for (81.53%) of all AT cases which was significantly higher in acute tonsillitis than among those with normal tonsils and tonsillectomized patients. One of the first events in the aetipathogenesis of acute tonsillitis is the attachment of the pathogens to epithelial cells, mediated by lipoteichoic acid forming complexes with bacterial cells surface proteins, possibly under the influence of streptolysin O (4,5), these pathogens are also capable of penetrating the epithelial cell wall & invading the epithelial cells (5).

The results obtained were in harmony with a study a study carried out by (Stjernquist-Desatuik et al 1991) who indicated that roughly 30%- 40% of all acute tonsillitis caused by *Streptococcus pyogenes* group A (β-haemolytic). We found also as shown in table (2) the
isolation rates of *Haemophilus influenzae* (60%) to be higher among recurrent tonsillitis or tonsillar hypertrophy patients than among controls, none of the isolation rates differed significantly between normal tonsils tonsillectomized though there were some what higher concentration of most of the anaerobs isolated in children with recurrent tonsillitis, and may be play a role in the secondary infection after primary viral infection(6).

This finding (Stjernquist-Desatuiik *et al* 1991) who indicated that in addition to group A streptococci, *Haemophilus influenzae* may be involved in recurrent acute tonsillitis. We found also the isolation rates of *Staphylococcus aureus* to be higher (44.6%) as shown in table (2) among recurrent tonsillitis patients than among normal tonsils or tonsillectomized, the results obtained support the study carried out by (Stjernquist-Desatuiik *et al* 1991) who found a high level of spontaneous lymphocyte proliferation response in tonsils yielding *Staphylococcus aureus*, moreover, a possible immunosuppressive effect due to the presence of bacteria in tonsillar core (bacteria probably originating from the tonsillar crypts) was shown by Druker *et al* (1979) who showed than the tonsillar tissue lymphocytes from patients with tonsillar presence of *Staphylococcus aureus* to manifest a decreased response to in vitro stimulation with mitogens or antigens.

### References

### Table (1) Study groups

<table>
<thead>
<tr>
<th>Study groups</th>
<th>Acute tonsillitis</th>
<th>Tonsillectomized</th>
<th>Normal tonsils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>65</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Male</td>
<td>63</td>
<td>9</td>
<td>23</td>
</tr>
<tr>
<td>Female</td>
<td>29</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>Average age</td>
<td>14 years</td>
<td>6 years</td>
<td>20 years</td>
</tr>
<tr>
<td>Range</td>
<td>(1-59) years</td>
<td>(3-38) years</td>
<td>(4-65) years</td>
</tr>
</tbody>
</table>

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Table (2) Cultured organisms

<table>
<thead>
<tr>
<th>Organisms</th>
<th>Acute tonsillitis</th>
<th>Tonsillectomized</th>
<th>Normal tonsils %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(% ) All patients</td>
<td>( % ) patients &gt;20 years</td>
<td></td>
</tr>
<tr>
<td>*Streptococcus pyogenes</td>
<td>81.53</td>
<td>43.75</td>
<td>10</td>
</tr>
<tr>
<td>**Haemophilus influenzae</td>
<td>60</td>
<td>18.75</td>
<td>5</td>
</tr>
<tr>
<td>***Staphylococcus aureus</td>
<td>44.6</td>
<td>6.25</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>16</td>
<td>20</td>
</tr>
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</table>

Fig (1) the percentage of infection according to the age group.