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Comparative study in Bacteriological findings between the surface and the core of chronic infected Tonsils

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ABSTRACT:

Background: This study was conducted to elucidate the tonsil surface swabs versus core swabs bacterial cultures in relation to some selected variables in patients group with recurrent chronic tonsillitis of different age and sex groups in Basrah General Hospital.

Aims of the study: The study was designed to determine if the surface swab is of benefit in prediction of the core bacteria in chronically infected tonsillitis, to identify the commonest causative organisms in the studied patients, to determine the prevalent bacterial etiology of chronic tonsillitis among both children and adults.

Patients and Methods : A prospective study was carried out during the period from March 2012 till April 2013 at Basrah General Hospital ,Iraq. The total numbers of tonsillectomies specimen were 100 tonsils. Surface swabs and core swabs were sent for microbiological study and culture.

Results: The overall proportion of surface swabs revealed pathogenic organisms was 40% of studied cases while core swabs detected pathogenic organisms was 58% of cases. *Staphylococcus aureus* was the commonest pathogen isolated from both surface and core of tonsils. *Group A β hemolytic streptococcus* was more common in children than in adults.

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CONCLUSION: The role of throat swab in management of chronic tonsillitis is doubtful.

Introduction:

Chronic tonsillitis is the most common disease in throat that occurs predominantly in the younger age group[1]. Much has been written about the bacteriology of recurrent tonsillitis but it remains a controversial topic[2]. Organisms grown from surface tonsillar swabs may not be the same as those obtained from the tonsillar core, and there is almost certainly a difference between children and adults[3,4]. Throat swabs have little value in the diagnosis of the causative organism compared to deep tissue culture in recurrent tonsillitis[5,3,6,7]. There is strong anatomical evidence for the presence of bacterial biofilms in chronically-diseased tonsils. Because sessile bacteria within biofilms are resistant to host defenses and antibiotics, bacterial biofilms within tonsils may explain the chronicity and recurrent nature of some forms of tonsillitis[8,9]. The range of organisms cultured from the tonsils both in health and disease is extremely variable, with recognized differences in bacterial flora retrieved from surface and from core sample[10,11]. The organism most commonly identified from the surface of the tonsil in disease is the group A beta haemolytic streptococcus *(GAβHS).* Up to 40 percent of asymptomatic individuals will also have a culture positive for this organism[12,13]. In recurrent tonsillitis the samples grew a range of pathogens but the predominant organisms were *Haemophilus*

*influenzae*and S. *aureus.* A mixed flora was also common. Beta haemolytic streptococci were less common[12].

Patients & methods: This is a prospective study carried out during the period from March 2012 till April 2013 at Basrah General Hospital, Iraq. The study included 50 patients of different ages and sex groups whom clinically diagnosed to have recurrent tonsillitis (with or without adenoiditis). The total numbers of tonsillectomy specimens were 100 tonsils. Patients who had antimicrobial therapy two weeks prior to surgery, acute infection like peritonsillar abscess or suspected neoplasm were excluded from this study.Complete otorhinolaryngological examinations were done for all patients in this study. Each individual had a questionnaire form and was informed about the study and an agreement was taken with confirmed The questionnaire was filled .consent with the information which was obtained directly from the persons or from relative interviewees. At theater and after endotracheal intubation of the patient, a swab was obtained from the tonsillar surface by rotating a sterile cotton wool swab over the surface of the tonsil not touching other part of the oropharynx. Following this maneuver tonsillectomy was performed by cold steel dissection technique. Immediately after excision, the tonsil was dipped in povidine – Iodine solution for 30 second, then it was rinsed in sterile saline solution and put on sterile gauze, section in to two pieces by sterile surgical blade, then the second swab was taken from the excised tonsil core by rubbing to the interior surface of the tonsils avoiding its outer surface. All of this procedure was done by the researchers. These swabs were then

transferred to the bacteriology laboratory within 30 minutes to one hour.Tonsil surface swabs and tonsil core specimens were cultured on the following media, blood agar, MacConkey's agar and chocolate agar. These three media were incubated overnight at 37C^{o}. Colony identification was accomplished using the standard techniques which involve Gram's stain, catalase test, oxidase test, coagulase test, urease test and tests based on the presence of metabolic pathway.

RESULTS: The total numbers of male and female patients were 29 and 21 respectively. The numbers of male and female patients among children were 21 and 13 respectively. The male: female ratio among children was 1.6:1, the number of male and female patients among adult were 8 for each one, hence the male: female ratio was 1:1, this is clearly shown in table 1. **Figure 1** displays the comparison between the tonsillar surface culture and the core culture. Surface swabs revealed pathogenic organisms in 40% of studied specimens while core swabs detected pathogenic organisms in 58% of specimens. Surface swabs revealed growth of normal flora in 44% of cases versus 32 % in tonsil cores. No growth was detected in 16% and 10% of tonsillar surfaces and cores respectively.**Figure 2** shows the distribution of isolated bacteria in relation to surface and core region The highest percentage of .swabs bacterial growth was *Staphylococcus aureus* followed by *Streptococcus Viridans*, 27% and 22% respectively. The least frequency, 2% were *E.Coli, Klebsiela Pneumonia, Pseudomonas*

and Neisseria Catarahlis. In 13% of cases no bacteria was isolated.**Figure 3** shows the highest culture growth for adult was the ***Staphylococcus aureus***, 41% while the *GAβHS* was predominantly expressed among children, 26.53%.Table 3.3 compares between tonsil surface and core swabs as regards similarity in detected pathogen. The highest percentage (34%) of cases revealed no pathogenic growth / no growth for the both surface and core swabs. In 18% of cases there were same pathogens in both tonsils.

There were 26% of cases who had no pathogen / no growth in the surface swabs with pathogen in the core swabs while those with pathogen(s) in the surface and no pathogen / no growth in the core were 10 %. Only 8 % of cases had same the pathogen for both swabs in addition to different pathogens in the tonsil core culture. On other hand the lowest percent noted (2%) of cases whose had different pathogens in both core and surface swab ,the same percentage shows a different pathogen with same pathogen in the surface and same pathogen in the core swabs.

Table 1: the distribution of cases in the study according to sex

Sex	No. M:F *	M:F ratio*
Among children	21:13	1.6:1
Among adult	8:8	1:1
Total	29:21	1.4:1

**M: F male to female*

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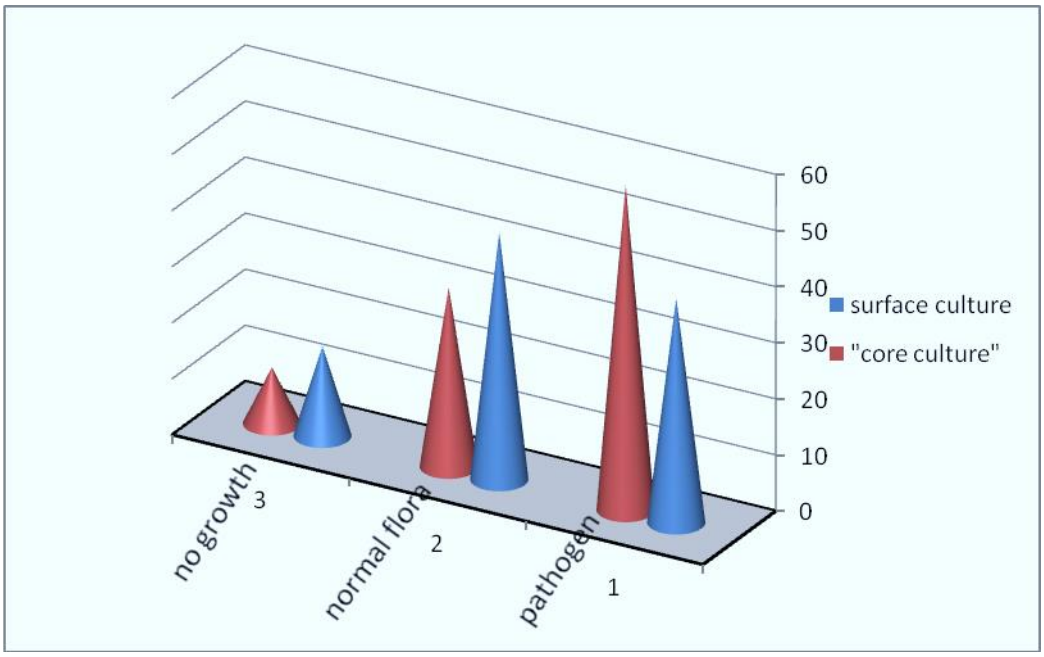
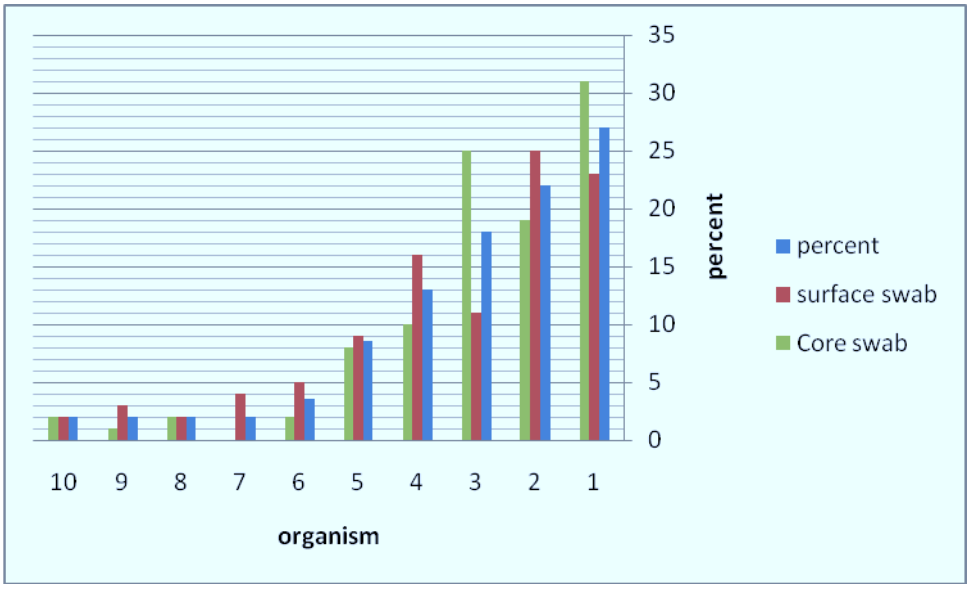


Figure 1: Overall bacterial growth in the studied specimens



1 *Staphylococcus aureus* **2** *Streptococcus Viridans* **3** *GAβHS* **4** no growth **5** *Streptococcus Pneumonia* **6** *Diphtheroid* **7** *E.Coli* **8** *Klebsiela Pnemonia* **9** *Pseudomonus* **10** *Neisseria Catarahlis*

Figure 2: Organisms isolated from surface swab and tonsil core

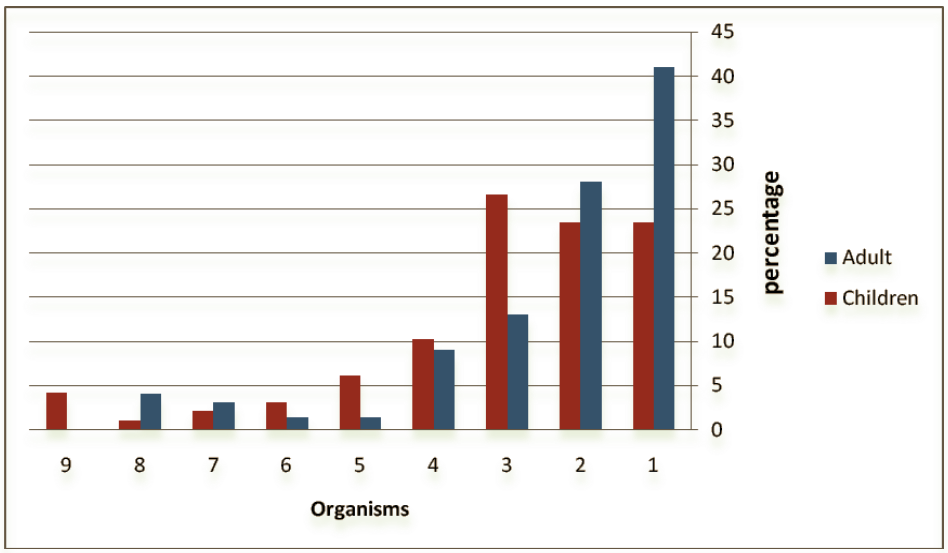


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Figure 3: Distribution of bacteria in relation to age group

Table :3 Comparison between surface swabs and tonsil core as regards similarity in detected pathogens

Surface swab	Tonsil core	Number of tonsils
No pathogen/ no growth	No pathogen / no growth	34
No pathogen / no growth	Pathogen	26
Same pathogen	Same Pathogen	18
Pathogen	No pathogen / no growth	10
Same pathogen	Same pathogen+ different pathogen	8
different pathogen	different pathogen	2
different pathogen + Same pathogen	Same pathogen	2
	Total	100

Discussion:

It is of interest to improve local epidemiological knowledge of tonsillitis among adults and pediatric groups focusing on its bacteriological aspect. The current study revealed that 40% of tonsil surface cultures grew a pathogenic bacterium versus 58% in tonsil cores. The results of

throat swabs were near to the Kurien et al[5] and Abdulrahman et al[14] which revealed pathogens in 55% and 44.4% respectively. However the results of core swabs were slightly lower than those of Kurien et al[2] and Abdulrahman et al[14] which revealed pathogens in 72.5% and 81.5% respectively. The normal flora was seen in 76% of the total cultures this elevated percent may be attributed to a wider use of antimicrobials in our region. The composition of normal commensal bacteria of oropharynx and nose may be disrupted by frequent use of broad-spectrum antimicrobials, by inhibiting sensitive organisms and allowing overgrowth of the resistant ones, this may cause serious infection by the normal commensals[2].In this study 26% of cultures had no growth on the media even after 48 hours of incubation. This may be due to the shortcomings of this study whereby no anaerobic cultures were done in all samples, due to the difficulties and errors arising from delay in delivery time, exposure of sample to air and longer culture time, in addition to the probable role of viral infection in causation of tonsillitis. Determination of the core bacteriology is important for several reasons, failure to eradicate pathogens in the core, whether it is from inappropriate antibiotic choice or from insufficient penetration into the core, will allow persistence of core infection or reinoculation of initially sterilized surface. Failure to achieve bactericidal level of the antibiotic inside the tonsil results in bacterial survival[14]. Organisms isolated from the tonsil surface in the current study did

not always correspond with the organisms isolated from the deep tissue specimens, while the surface cultures commonly showed entirely normal flora, the tonsil core cultures yielded pathogenic microorganisms in 26%. In addition, two cases showed a different pathogen in the surface and different pathogen in the core, this was in agreement with Surow et al who noted that a small group of patients showed pathogen on the surface and a different pathogen in the core[10]. Accordingly, the surface swab cultures do not reliably reflect the presence of pathogens in the tonsil core. This finding was with agreement with studies done by Brook et al [11] and Rosen et al [15] who recorded that determination of surface flora was not useful in predicting core bacteria .

Microbiological study of both surface and core of the tonsils in the current study revealed that Staphylococcus aureus was the commonest pathogenic isolate, this was in agreement with the finding of Abdulrahman et al[14], Surow et al[10], Endo et al. [16], Abbas et al [17], Loganathan et al [18] and Yildirim et al [19] whom recorded the same finding .Several other studies noted that Group A β hemolytic streptococci was the commonest organism like Brook et al[20,] Kurien et al[5]and Cowan & Hibbert[2]. E-coli and Klebsiella species were isolated in a low percent in the current study, this similar to finding recorded by Abdulrahman et al [14].Unexpectedly, the results failed to recognize the presence of *Haemophilus* species in all cases .This inconsistent with other studies by

Gaffney et al[4], Surow et al[10] and Lidroos [21]. They found that *Haemophilus influenza* was the most common organism cultured , this finding probably because that *Haemophilus influenza* is fastidious organism need factor v and x for its growth in media [22] so special precaution is needed during media preparation, or probably because it sensitive to many antibiotic thus the hazard used of antibiotic obstacle its growth on media , this is consistent with Kurien et al[5] who mention that the use of superficial swabs failed to recognize the presence of *Haemophilus* species in a significant number of patients. Bacteriology of the tonsil may change with age, and it was found that *Staphylococcus aureus* was the most commonly-isolated bacterium and accounted for 41% of the total cultures isolated in adult; Brook et al[23] observed a similar prevalence. Current study revealed that β-*haemolytic Streptococci* were more common in children than in adults, it was isolated in 26.53% of cases. This is consistent with studies by Brook and Foote[24], and Ramirez et al[25] however it inconsistent with Gaffney et al [4] who found it more prevalent in adult.

CONCLUSIONS AND RECOMMENDATIONS:

The study indicates that tonsillar surface swab cultures do not reliably reflect the presence of pathogens in the tonsil core, so the role of throat swab in management of chronic tonsillitis is doubtful and in patients with tonsillitis not responding to initial penicillin therapy the role of fine needle aspiration of the tonsil core under

local anesthesia is advisable for the identification of causative bacterium and its worthy to evaluate in further studies. ***Staphylococcus aureus*** was the commonest pathogen isolate from both surface and core of tonsils. ***GAβHS*** was more common in children than in adults.

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الخلاصة

أجريت هذه الدراسة المقارنة المسبقة للفترة من أذار 2012 حتى نيسان 2013 , حيث أجريت عملية استئصال اللوزتين لخمسين مريض في قسم الأنف والاذن و الحنجرة في مستشفى البصرة العام في العراق .تهدف الدراسة إلى تحديد فيما إذا كانت مسحة الحلق ذات فائدة في تشخيص الميكروبات المسببة للالتهاب لب اللوزتين .وقد تضمن البحث 50 حالة في أعمار وأجناس مختلفة يعانون من التهاب اللوزتين(مرافقة او غير مرافقة لالتهاب الغدانيات) كان المجموع الكلي لحالات استئصال اللوزتين هو 100 لوزة. لقد تم فصل البكتيريا الممرضة من مسحة الحلق بما يعادل 40 %, و 58 % من عينات لب اللوزتين . وقد أشارت نتائج المزرعة إلى أن ال Staphylococcus aureus هو أكثر الميكروبات التي تم عزلها فى حالات الدراسة سواء من مسحة الحلق او لب اللوزتين . وان ال GAβHS هو الأكثر إصابة عند الأطفال من الكبار . استخلصت الدراسة أنة لا يمكن الاعتماد على مسحة الحلق لتشخيص الميكروبات المسببة للالتهاب المزمن باللوزتين, ولذا فان مسحة الحلق لا يعتمد عليها في علاج هذه الحالات .