
Comparative Study of Microbial Flora and Antibiotic Sensitivity in Recurrent Tonsillitis among Children and Adults

Gangadhara Somayaji K.S.*, Muhammed Thahir**, Sabena Sam***

Author Affiliation: *Professor and Head, **Professor, *** Former Resident, Department of ENT, Yenepoya Medical College, Mangalore.

Reprint Request: Gangadhara Somayaji K.S., Professor and Head, Department of ENT, Yenepoya Medical College, Deralakatte, Mangalore 575018.
E-mail: ksgsomayaji@yahoo.co.in, ksgsomayaji@gmail.com

Abstract

Recurrent tonsillitis is one of the commonest infections seen in clinical practice. Though we have abundant literature about the bacteriology of recurrent tonsillitis, it still remains an unresolved puzzle. The infection may arise from the bacteria within the substance of the tonsil rather than bacteria identified on the surface.

This was a prospective study conducted on 80 samples, 40 each in paediatric and adult population, over a period of 12 months in a tertiary care hospital. Preoperative surface swabs and postoperative core swabs were sent for culture. The swab culture from the surface of the tonsils in adult population predominantly yielded normal flora followed by *Staphylococcus aureus* while those from the paediatric population showed an equal yield of Normal flora and *Streptococcus pyogenes*.

The core cultures from adult population were mostly of *Staphylococcus aureus* and *Klebsiella pneumoniae* while that of paediatric population was predominantly *Streptococcus pyogenes*.

Staphylococcus aureus showed good sensitivity to Cephalosporins and Azithromycin. All were sensitive to Methicillin except one strain of MRSA. *Streptococcus pneumoniae* and *Streptococcus pyogenes* were sensitive to even the basic antibiotics like Ampicillin. The Gram negative bacteria showed varied sensitivity with more of resistance to first line antibiotics and showed the need of higher antibiotics like Imipenem and Amikacin.

The study found differences in the surface and the core pathogens.

Keywords: Tonsillitis; Surface Swab Culture; Core Culture.

Introduction

Despite the availability of affordable clinical care and antibiotics, recurrent tonsillitis still remains one of the common clinical condition seen in the paediatric age group. Conservative management often fails to eradicate the pathogens and also would not prevent the recurrence of the tonsillitis. Though we have abundant literature about the bacteriology of recurrent tonsillitis, it still remains an unresolved puzzle. The reason for this could be that the

organisms found on the surface of the tonsil may not be the same as those in the tonsillar core and there might be a difference in bacteriology between children and adults. There may be geographical variations as well. Thus detecting core flora may help to plan and modify medical and post surgical antibiotic treatment.

The present study attempts to throw light on this controversial aspect so that it can aid in the appropriate management of recurrent and chronic tonsillitis in paediatric and adult population.

Materials and Methods

This was a prospective study conducted on 80 patients over a period of 12 months in a tertiary care hospital. Patients were selected from those admitted for tonsillectomy and they were divided into two groups, paediatric (<12yrs) and adult group (>12yrs). Institutional ethical committee clearance was obtained for the study.

Inclusion criteria included patients with three or more severe attacks of tonsillitis in two consecutive years. They were considered to have severe illness if at least three associated symptoms like high fever, snoring during acute attacks, unable to take normal diet, absence from school/work, and admission to hospital, are present. Those who received antimicrobial therapy within one month prior to surgery, tonsillectomy done for obstructive sleep apnoea, unilateral enlargement, Eagle's syndrome, Diabetes and immune-compromised patients were excluded from the study. Based on the above criteria 80 patients were included in the study forty each in paediatric and adult populations.

Patients who fit into these criteria underwent detailed E.N.T examination and were subjected for

tonsillectomy. The procedure was carried out by dissection and snare method. Prior to surgery all routine blood investigations were done. A swab was taken from the surface of the tonsil at the commencement of the surgery. After tonsillectomy, the tonsil specimen along with the swab was sent for microbiological examination within 30 minutes. The swab and core tissue were plated onto appropriate aerobic and anaerobic media separately. After 48 & 96 hours, the microbial growth was identified and the antibiotic sensitivity pattern of the isolate was studied. Bacteriology of tonsils in adult and children were tabulated according to the species and compared. The results were compared and statistical analysis was done using Chi-square test and SPSS program compiled for windows.

Results

Of the 80 patients included in this study 40 were adults and 40 were children. Out of 40 adults, females and males were 20 in number while in children it was 22 and 18 respectively.

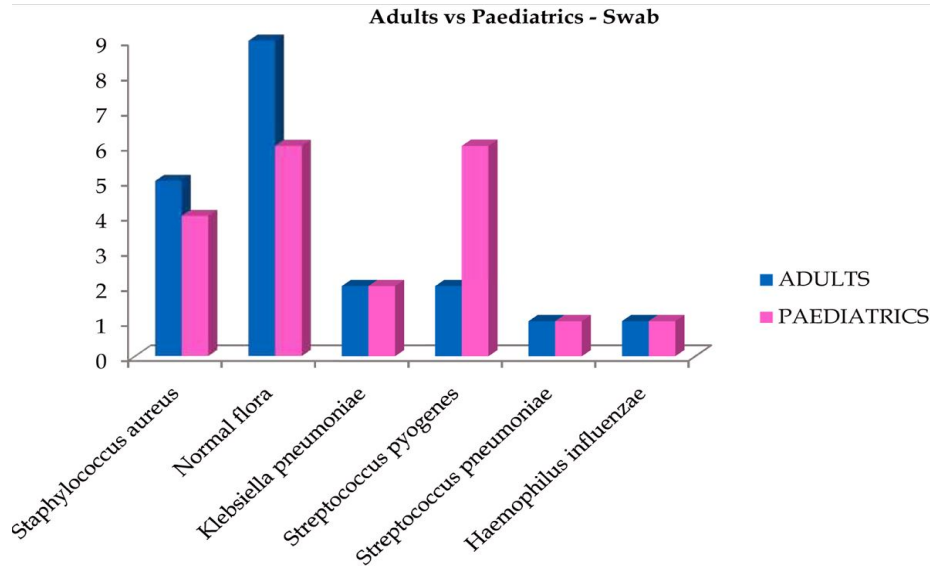
Table 1: Organisms grown in Swab (Adults & Paediatrics)

	Frequency	Percent
Normal flora	30	37.5
Staphylococcus aureus	18	22.5
Streptococcus pyogenes	16	20
Klebsiella pneumoniae	8	10
Streptococcus pneumoniae	4	5
Haemophilus influenzae	4	5
Total	80	100

Table 2: Organisms grown Tonsils core (Adults & Paediatrics)

	Frequency	Percent
Staphylococcus aureus	18	22.5
Klebsiella pneumoniae	16	20
Streptococcus pyogenes	14	17.5
No growth	10	12.5
Pseudomonas aeruginosa	10	12.5
E.coli	6	7.5
Haemophilus influenzae	2	2.5
Peptococcus (anaerobe)	2	2.5
MRSA	2	2.5
Total	80	100

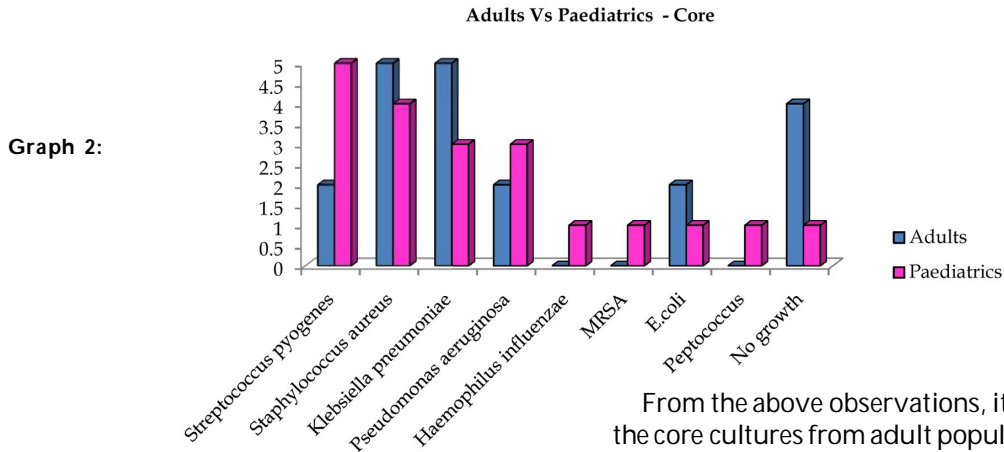
Table 2 shows that all are aerobic bacteria except for Peptococcus which is a Gram positive anaerobic coccus.



Graph 1: Shows the comparison of the organisms in swab in both groups.

From the above observations, it can be seen that swab culture from the surface of the tonsils in adult population predominantly yielded normal flora

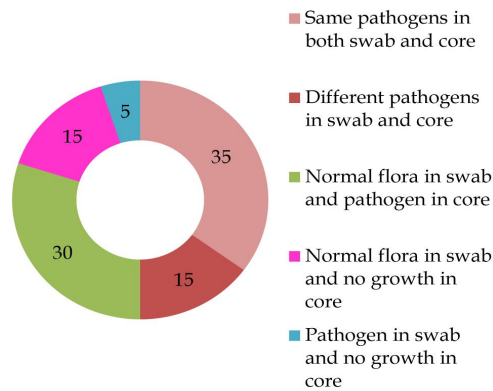
followed by *Staphylococcus aureus* while those from the paediatric population showed an equal yield of Normal flora and *Streptococcus pyogenes*.



Graph 2:

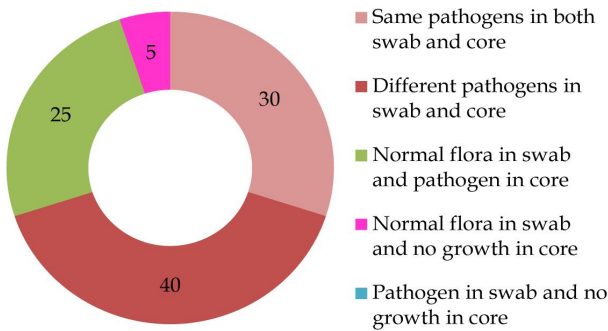
From the above observations, it can be noted that the core cultures from adult population were mostly of *Staphylococcus aureus* and *Klebsiella pneumoniae* while that of paediatric population was predominantly *Streptococcus pyogenes*.

Comparison between Organisms grown in Swab vs Core--Adult (Percentage%)



Graph 3:

Comparison between Organisms grown in Swab vs Core--Paediatrics (Percentage%)



Antibiotic Sensitivity

Staphylococcus aureus showed good sensitivity to Cephalosporins and Azithromycin. All were sensitive to Methicillin except one strain of MRSA. *Streptococcus pneumoniae* and *Streptococcus pyogenes* were sensitive to even the basic antibiotics like Ampicillin. The Gram negative bacteria showed varied sensitivity with more of resistance to first line antibiotics and showed the need of higher antibiotics like Imipenem and Amikacin.

Discussion

Tonsils are important components of the immune system and infection of the tonsils and adenoids is one of the most frequently seen condition in humans, especially in childhood. Although antibiotic therapy may be sufficient in the treatment of acute tonsillitis, tonsillectomy remains the treatment of choice in the management of recurrent and chronic tonsillitis. The probable causes of recurrence in chronic tonsillitis are; penicillin resistance due to the variations of the oropharyngeal flora, nonspecific antibiotic treatments, reinfection from the environment and suppression of the antibody response due to the previous inappropriate antibiotic therapies [1,2]. Inappropriate and interrupted antibiotic therapy, suppression of host immunity due to unnecessary antibiotic therapy, penicillin resistant L-form production of beta-haemolytic Streptococci, inactivation of antibiotics by beta lactamase producing organisms found in oropharyngeal and tonsillar flora such as *S. aureus*, *H. influenzae*, *Bacteroides* spp. and therefore protection of GABHS [1,3].

The determination of the pathogenic agent is important in antibiotic selection for the medical treatment of tonsillitis. Presently the antibiotic selection for the treatment of tonsillitis is based on

tonsillar swab culture. Surow et al., (1989) noted that tonsillar disease may arise from the bacteria within the substance of the tonsil rather than bacteria identified on the surface [4]. Due to the constant contact of tonsil surface with the bacterial flora of oral secretions, the organisms isolated from the surface swabs may be the surface colonized bacteria rather than the actual pathogenic agents. It is the tonsil core pathogens that are responsible for the pathological changes in the tonsils [4]. The antibiotic therapy chosen according to surface swabs become insufficient to eradicate the pathogenic agent and cause chronic infections with tonsillectomy indication.

Many other studies have shown differences between the isolates from tonsillar surface and core and thereby the non-reliability of throat swabs in the diagnosis of recurrent tonsillitis [5,6].

In contrast to this, Almadori et al stated that surface swab cultures did reflect organisms present in the core. They studied the surface and core tonsillar specimens collected from 60 children and observed the same mixed aerobic and anaerobic flora in both samples, thus demonstrating the reliability of the surface swabbing technique. They relied on the assumption that there is a certain degree of homogeneity in the bacterial flora of the tonsils, so sampling of any single area may be reflective of the entire tonsil [7,8].

The present study showed the growth of same organisms in the surface and core in adults and paediatrics in 30% and 40% of the cases only (Graph 3 & 4).

The microbiological study of tonsil core in the present study revealed that *Staphylococcus aureus* (22.5%) was the most common pathogen isolated. This finding is in agreement with the studies done by Ozek et al. 1967 (33%) [2], Kumar et al. in 2005 (22%) [5] and Loganathan et al. in 2006 (41%) [9]. In contrary to this, Uppal et al. and Kurien et al. found GABHS as the most common isolate with 39% and 33% respectively followed by *Staph aureus* [7,10].

Tonsil core bacteriology changed with age and it was observed in the present study, that predominant organism in the tonsil core of paediatric population was *Streptococcus pyogenes* (25%) followed by *Staphylococcus aureus* (20%) According to Loganathan A, Arumainathan UD, Raman R (2006) *Streptococcus* was predominantly cultured from the core of the tonsil in children and it was 39.3% [9]. According to study by Mostafa Hammouda (2009) *Staphylococcus aureus* was the organism that was predominantly isolated from swab and core of the

tonsils from Egyptian children [11].

In our study normal flora constituted only in the surface swabs in adults and paediatrics. In a study by Gaffney normal flora was seen mostly in surface swabs and very rarely in core tissue [12].

One MRSA was isolated in the core tissue of the tonsil in children. Similar finding was noted in a study done by Hossein Rekabi (2008), In their study the number of isolated MRSA from the core culture was quite low (3.3%) [1,7].

However, in the study conducted by Brook et al, MRSA was isolated from 16% of the tonsils [1]. MRSA may serve as a potential source for the spread of the potential hidden pathogens to other body sites as well to other individuals. Isolation of MRSA from cases of chronic tonsillitis calls for a relook at the conservative management of chronic tonsillitis and the antibiotics chosen for the treatment.

In another study by Hadi U et al (2005), more than one pathogen was grown in the culture sample from the core tissue. H. influenza was the most common isolate in the paediatric population [13]. However, our study did not yield multiple pathogens and H influenza was not the common organism.

In our study only one anaerobe (Peptococcus) was isolated from the tonsil. This was in agreement with a study done by Brook and Yokum [3] and another study done by Mitchelmore [14]. But it was contrary to the study done by Reilly et al in the year 1981, which reported that *B. melanninogenicus* was the most frequently isolated anaerobe [15]. No anaerobe was found in a study by Almadori G [8].

As against a study by Uppal et al [10] wherein the surface and the core tissue of the tonsil had similar pathogens, our present study suggests that the surface pathogen may not be the real pathogen and that it might be different inside the core tissue of the tonsil. Several other studies also showed that tonsil surface cultures do not reflect tonsil core microbiology in 30–70% of patients [5,7,16].

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