

ROLE OF ADENOID AND NASOPHARYNGEAL FLORA IN THE ETIOLOGY OF SEROUS OTITIS MEDIAAkshay Jain¹, Harendra Kumar², Sandeep Kaushik³**HOW TO CITE THIS ARTICLE:**

Akshay Jain, Harendra Kumar, Sandeep Kaushik. "Role of Adenoid and Nasopharyngeal Flora in the Etiology of Serous Otitis Media". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 79, October 01; Page: 13824-13834, DOI: 10.14260/jemds/2015/1970

ABSTRACT: OBJECTIVES: To identify the common bacteria found in the nasopharynx of patients of serous otitis media, to study the prevalence of adenoiditis in patient of serous otitis media and to study the bacteria isolated from operated adenoid tissue of patients of serous otitis media. **METHOD AND MATERIALS:** Study was carried out on clinically diagnosed 40 cases of serous otitis media. Patients were operated under general anaesthesia. At the commencement of the surgery, a sterile swab was taken with an applicator from the surface of the adenoid. Prior to surgery, the adenoid tissue was palpated and confirmed. Adenoidectomy was done by curettage method using adenoid curette and the specimen was immediately transported in normal saline to the microbiology lab in a sterile bottle along with the surface swab. **RESULT:** 95% culture shows bacterial growth, males are more common in serous otitis media and most bacteria isolated from nasopharyngeal swab and adenoid are Gram positive bacteria includes Streptococcus pneumoniae, Staphylococcus aureus, Enterococcus species, Streptococcus viridians, Streptococcus pyogenes and Gram negative bacteria includes Moraxella catarrhalis, Klebsiella pneumonia. **CONCLUSION:** The nasopharyngeal and adenoid bacterial flora is polymicrobial in nature and there is no difference in the pathogens isolated from nasopharynx swab or adenoid culture in patients of serous otitis media.

KEYWORDS: Adenoid, Nasopharyngeal flora, Serous otitis media.

INTRODUCTION: Otitis media with effusion is one of the commonest chronic otological conditions of childhood. Otitis media with effusion results from alteration of the mucociliary system within the middle ear cleft where serous or mucoid fluid accumulates in association with a negative pressure. The pressure change is almost invariably caused by malfunction of the Eustachian tube.

The adenoids are part of circle of lymphoid tissue i.e., Waldeyer's ring present at the entrance of upper aerodigestive tract. Waldeyer's ring contains adenoids, palatine tonsils, lingual tonsils and some submucosal lymphoid follicles present throughout the pharynx. Adenoids are found in nasopharynx projecting from posterior pharyngeal wall. The size of the adenoids will increase during first 5 years of life and regresses from about age of 7 years to adolescence.

In some children repeated upper airway infections causes' adenoid enlargement leading to airway obstruction. Recurrent adenoiditis is known to be associated with some pathological conditions such as obstructive sleep apnoea, recurrent otitis media, otitis media with effusion (OME) and sinusitis. Adenoidectomy with tympanostomy tube insertion is effective in the treatment of recurrent or persistent otitis media. Instead of the traditional concept of obstructive effect of hyperplastic adenoids on the eustachian tube, more interest has been focused on the adenoids as bacterial reservoir leading to otitis media with effusion.

The purpose of this study was to document the current trend in the bacteriology of adenoid in children with OME.

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MATERIALS AND METHODS: The present study was carried out on clinically diagnosed 40 cases of serous otitis media.

Inclusion Criteria: Includes Age-5 to 12 years, adenoid hypertrophy, h/o nasal obstruction, snoring, mouth breathing, free from URTI for 3 weeks, persistent evidence of effusion on otoscopy and/or tympanogram with a persistent CHL, 3 months after adequate medical therapy (adequate medical therapy defined as therapy with appropriate antibiotics, systemic decongestants and NSAIDS).

Exclusion Criteria: includes perforated TM, severe DNS, nasal polyposis, food allergies, acute febrile illness, AOM, RTI, Cleft palate.

All patients underwent routine blood investigations including hemoglobin, Total Count, Differential Count, Erythrocyte Sedimentation Rate, Bleeding Time, Clotting Time, blood sugar and serum creatinine. A detailed ear, nose & throat examination along with otoscopy, Pure Tone Audiogram & Impedance Audiometry was done for all patients. X-ray soft tissue nasopharynx lateral view was done to confirm adenoid hypertrophy.

Patients were operated under general anaesthesia. At the commencement of the surgery, a sterile swab was taken with an applicator from the surface of the adenoid. Prior to surgery, the adenoid tissue was palpated and confirmed. Adenoidectomy was done by curettage method using adenoid curette and the specimen was immediately transported in normal saline to the microbiology lab in a sterile bottle along with the surface swab.

Methodology of Sample Processing: Culture: The samples will be inoculated on sheep blood agar & MacConkey agar, and incubated at 37°C overnight. Colonies on blood agar and will be studied for size, shape, margins, elevation, etc. On MacConkey agar lactose and non-lactose fermenting colonies will be noticed along with other characteristics.

Identification: The isolated bacteria will be identified by Gram stain, hanging drop for motility, catalase test, oxidase test, and standard biochemical test like TSI, Urea hydrolysis test, citrate utilization test, Fermentation of Glucose, Lactose, Sucrose and mannitol with the production of acid and gas or acid only and amino acid decarboxilation.

OBSERVATION:

Table 1: Present study shows that the maximum number of patients was from 7-9 years (50%) followed by 9-12 years (30%) and 5-7 years (20%).

AGE (YEARS)	NUMBER	PERCENTAGE
5-7	8	20%
7-9	20	50%
9-12	12	30%

Table 1: Age Distribution in Patients of Serous Otitis Media

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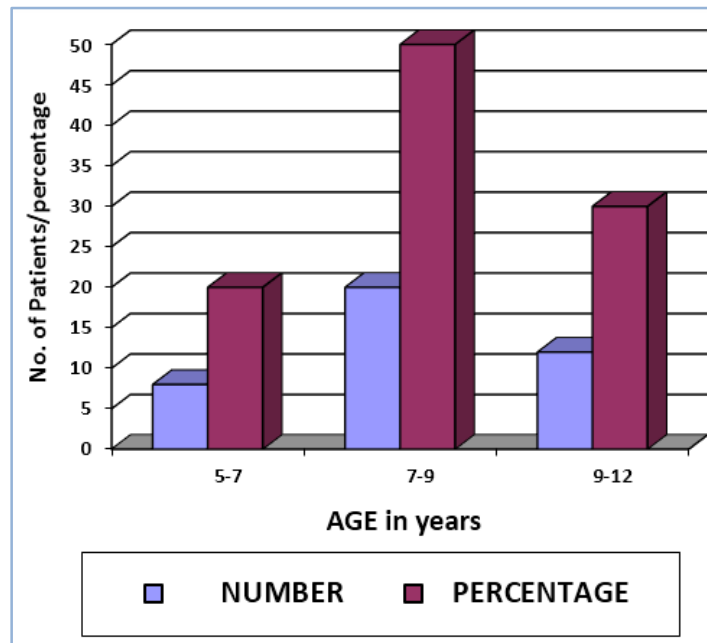


Figure 1

Table 2: Out of 40 patients, 60% were male and 40% were female giving a ratio of male to female 1.5:1.

SEX	NUMBER	PERCENTAGE
MALE	24	60%
FEMALE	16	40%

Table 2: Sex Distribution in Patients of Serious Otitis Media

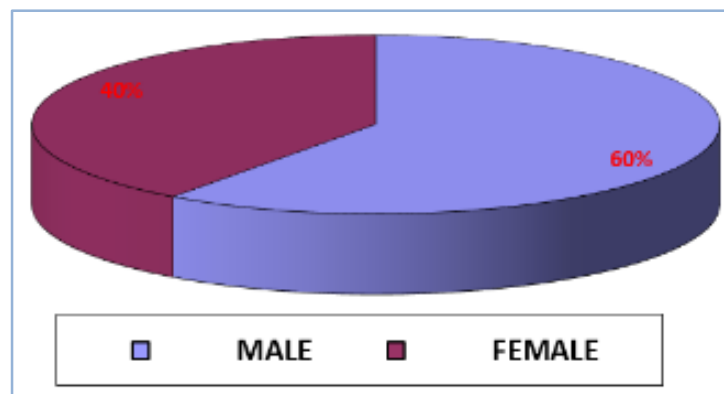


Figure 2

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Table 3: All patients present with complain of mouth breathing and snoring followed by nasal obstruction (75%), sore throat (60%), decrease hearing (30%) and 5% experienced ringing sound in the ear.

COMPLAINTS	No. of PATIENTS	PERCENTAGE
MOUTH BREATHING	40	100%
SNORING	40	100%
NASAL OBSTRUCTION	30	75%
SORE THROAT	24	60%
DECREASE HEARING	12	30%
RINGING SOUND	2	5%

Table 3: Presenting Symptoms in Patients of Serious Otitis Media

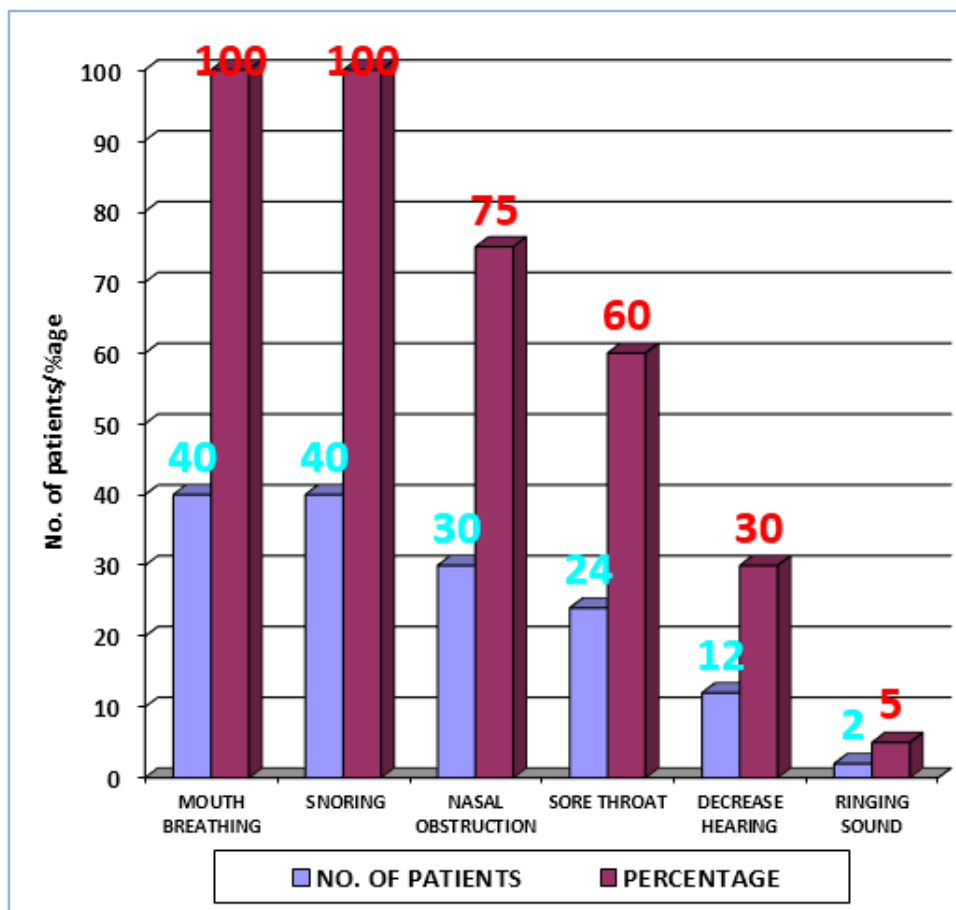


Figure 3

Table 4: Gram positive bacteria includes *Streptococcus pneumoniae* (40%), *Staphylococcus aureus* (35%), *Enterococcus species* (30%), *Streptococcus viridians* (20%), *Streptococcus pyogenes* (15%), *Staphylococcus epidermidis* (2%). Gram negative bacteria include *Moraxella catarrhalis* (13%), *Klebsiella pneumoniae* (5%), *Hemophilus influenzae* (2%), *E.coli* (2%) and *Pseudomonas aeruginosa* (2%).

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GRAM +VE	NO.	%	GRA GRAM -VE	NO.	%
STREPTOCOCCUS PNEUMONIAE	16	40%	MORAXELLA CATARRHALIS	5	13%
STAPHYLOCOCCUS AUREUS	14	35%	KLEBSIELLA PNEUMONIAE	2	5%
ENTEROCOCCUS SPECIES	12	30%	HEMOPHILUS INFLUENZAE	1	2%
STREPTOCOCCUS PYOGENES	6	15%	E.COLI	1	2%
STREPTOCOCCUS VIRIDANS	8	20%	PSEUDOMONAS AERUGINOSA	1	2%
STAPHYLOCOCCUS EPIDERMIDIS	1	2%			

Table 4: Nasopharyngeal Flora in Patients of Serous Otitis Media

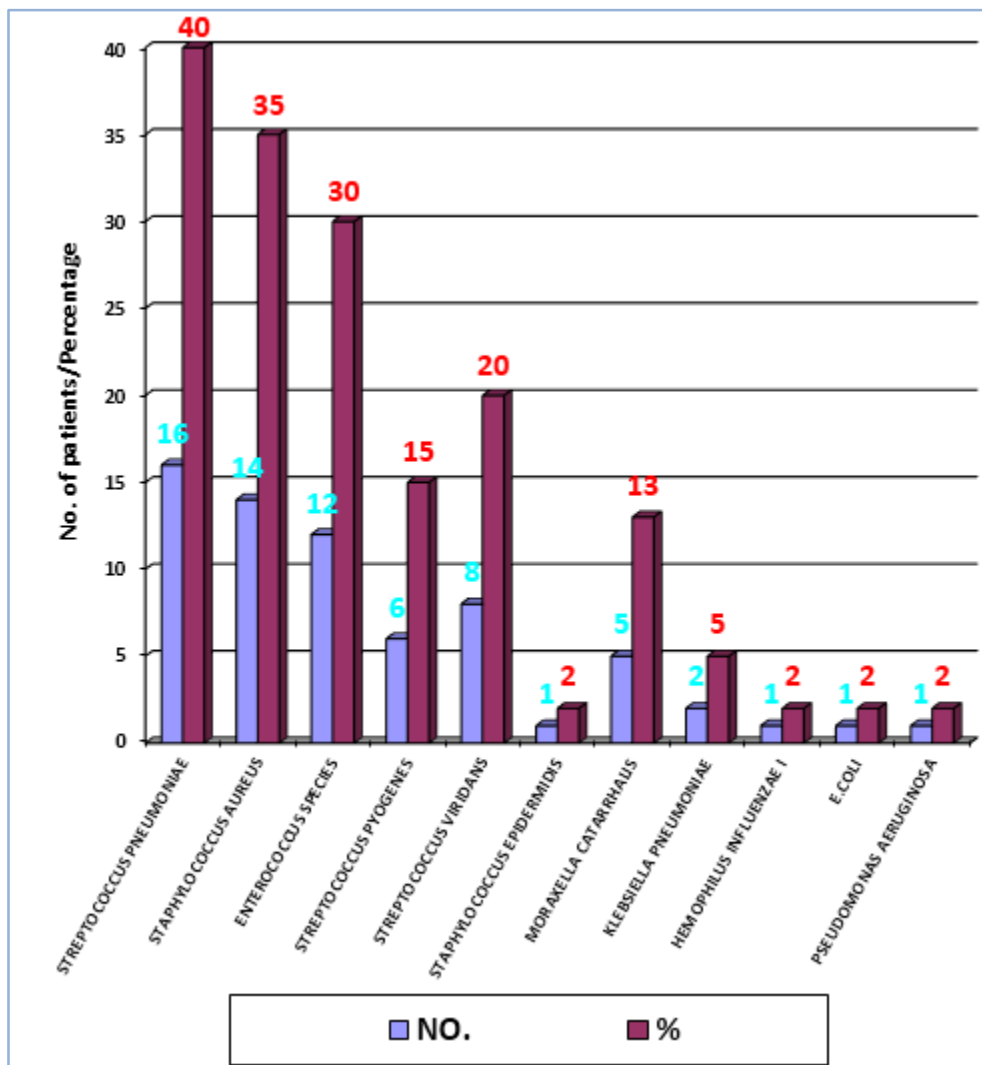


Figure 4

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Table 5: Overall prevalence is 95%, 55% in male and 40% in female.

	NUMBER	PERCENTAGE
MALE	22	55
FEMALE	16	40
OVERALL	38	95

Table 5: Prevalence of Adenoiditis in Patients of Serous Otitis Media

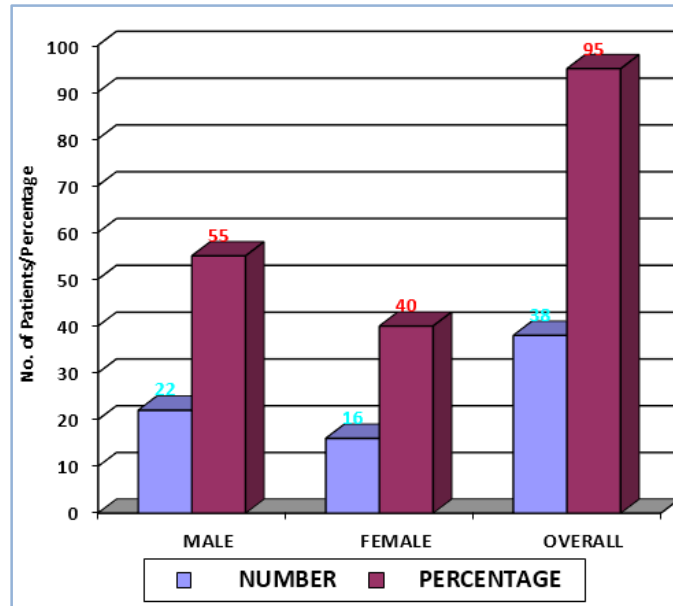


Figure 5

TABLE 6: Gram positive bacteria include *Streptococcus pneumoniae* (40%), *Staphylococcus aureus* (35%), *Enterococcus species* (30%), *Streptococcus viridians* (20%), *Streptococcus pyogenes* (15%), *Staphylococcus epidermidis* (2%). Gram negative bacteria include *Moraxella catarrhalis* (13%), *Klebsiella pneumoniae* (5%), *Hemophilus influenzae* (2%), *E.coli* (2%) and *Pseudomonas aeruginosa* (2%).

GRAM +VE	NO.	%	GRAM -VE	NO.	%
STREPTOCOCCUS PNEUMONIAE	16	40%	MORAXELLA CATARRHALIS	5	13%
STAPHYLOCOCCUS AUREUS	14	35%	KLEBSIELLA PNEUMONIAE	2	5%
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STREPTOCOCCUS PYOGENES	6	15%	E.COLI	1	2%
STREPTOCOCCUS VIRIDANS	8	20%	PSEUDOMONAS AERUGINOSA	1	2%
STAPHYLOCOCCUS EPIDERMIDIS	1	2%			

Table 6: Adenoid Flora In Patients Of Serous Otitis Media

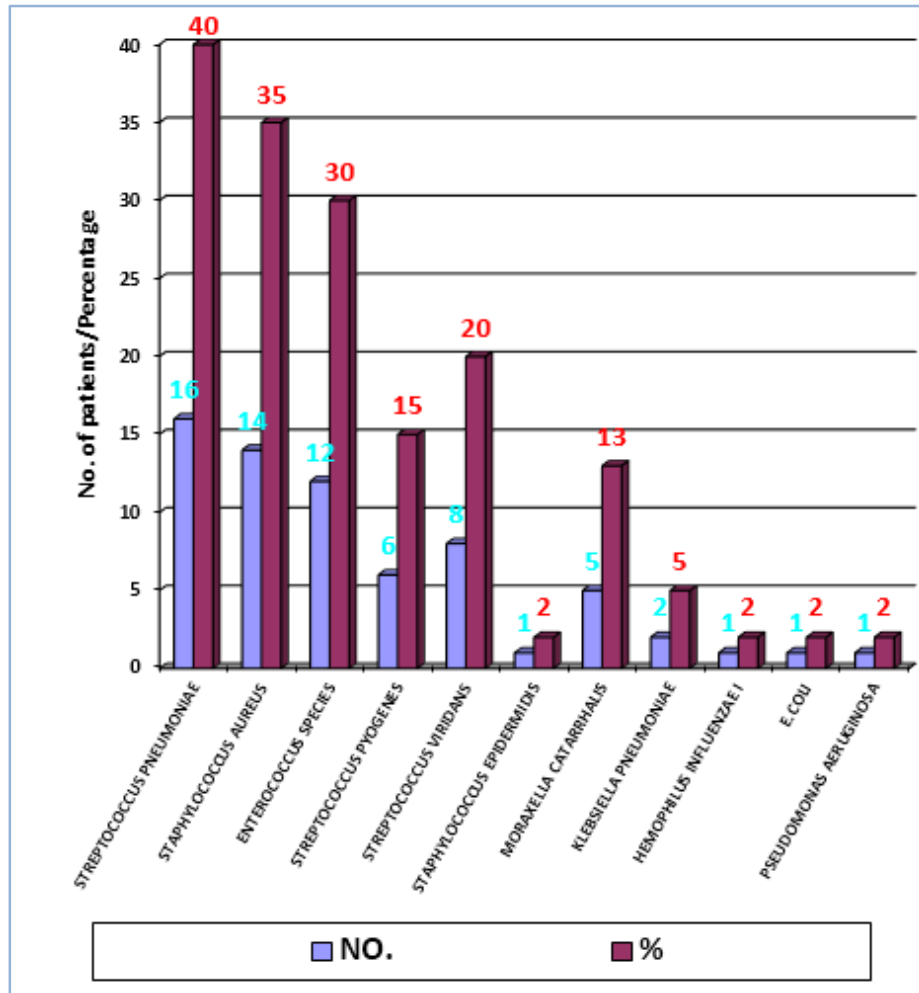


Figure 6



Fig. 7: Colony of Staphylococcus Aureus



Fig. 8: Colony of Klebsiella

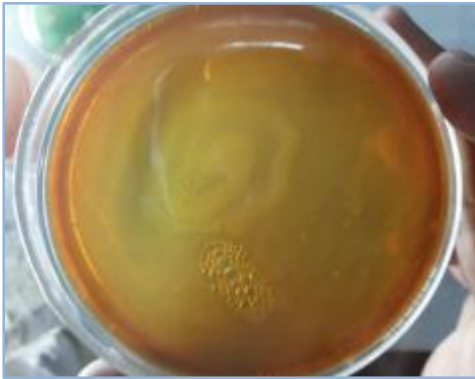


Fig. 9: Colony of Proteus



Fig. 10: Colony of Pseudomonas

DISCUSSION: Otitis media with effusion is one of the commonest chronic otological conditions of childhood. An effusion frequently remains in the middle ear following acute suppurative otitis media, but usually spontaneous clearance occurs within a few weeks. Recurrent adenoiditis or hyperplasia of the adenoids is also known to be associated with common diseases of its neighboring structures, such as obstructive sleep apnea, recurrent otitis media, otitis media with effusion (OME) and sinusitis.

Removal of the adenoids, as it is a reservoir of pathogenic bacteria, has been hypothesized as a treatment for childhood otitis media. The purpose of this study was to document the current trend in the bacteriology of adenoid in children with OME and its relation to adenoid hypertrophy.

Lee Dennis and Rosenfeld Richard et al¹ (1997) in their study 56% children present with hearing loss, 69% with ear discharge, 94% with snoring, 89% with mouth breathing, 86% with nasal obstruction and 6% had documented inhalant allergies. In our study all children had snoring and mouth breathing problem, while 30% children have hearing problem.

Tomonaga K et al.² (1989) investigated the nasopharyngeal bacterial flora in 259 children with OME. The patients were divided into two groups: group A (43 patients) underwent adenoidectomy, and group B (216 patients) had no adenoidectomy. Hemophilus influenzae, Streptococcus pneumoniae, Branhamella catarrhalis, and Staphylococcus aureus were cultured in 66.7% of nasopharyngeal smears from group B, and in 46.5% from group A.

Adenoid specimens for bacteriologic investigation were obtained from 38 adenoidectomy patients at the surgery. Of these, H influenzae was cultured from adenoid specimens taken from 16 of the 26 patients with OME (group C), while only three of the 12 adenoidectomy patients without OME (group D) were found to have H influenzae in their adenoid specimens. The findings of this study suggest that adenoid vegetation plays an important role in the etiology of OME.

Brook I et al.³ (1981) obtained the predominant anaerobes isolate from adenoid were: Bacteroides Sp. (including B. melaninogenicus and B. oralis), Fusobacterium Sp., Gram-positive anaerobic cocci, and Veillonella Sp. The predominant aerobes isolate were: alpha and gamma hemolytic streptococci, beta hemolytic streptococci (Group A, B, C, and F), S. aureus, S. pneumoniae, and Hemophilus Sp.

Brook I et al.⁴ (2000) found that the predominant aerobes in adenoids of his all groups (recurrent otitis media (ROM), recurrent adenotonsillitis (RAT), obstructive adenoid hypertrophy (OAH)) were alpha-hemolytic and gamma-hemolytic streptococci, Haemophilus influenzae, Staphy-

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lococcus aureus, group A beta-hemolytic streptococci, and Moraxella catarrhalis. The prominent anaerobes were Peptostreptococcus, Prevotella, and Fusobacterium species.

In our study we found gram positive bacteria more than gram negative bacteria includes Streptococcus pneumoniae (40%), Staphylococcus aureus (35%), Enterococcus (30%), Streptococcus pyogenes (15%), Streptococcus viridians (20%), Moraxella (13%), Klebsiella (5%), Hemophilus influenzae (2%).

Similar to Brook I et al (1981) findings about the polymicrobial nature of deep adenoid flora, we found that the deep adenoid flora are polymicrobial in nature. In our study we found that core and surface pathogens were corresponding. Nasopharyngeal and adenoid culture is similar.

Pillsbury HC et al.⁵ (1981) states that adenoid size measured radiographically did not correlate with the presence of infection. So in our study we supplement our study with tympanometry for more reliable results.

Fujita A et al.⁶ (1988) states that adenoids were found to exert no influence upon tubal opening pressure, nor patency of the eustachian tube in a static condition. However, active function of the tube during swallowing was improved significantly by the adenoidectomy.

Buchman CA et al.⁷ (1994) trials have shown modest but significant reductions in morbidity from otitis media with effusion following adenoidectomy and presented a single case of a pediatric patient with otitis media with effusion and manometrically proven active and passive Eustachian tube obstruction which was relieved by adenoidectomy.

Lacosta JL et al.⁸ (1997) states that the group with effusive otitis media had a larger adenoidal volume, smaller nasopharyngeal cavity, and greater nasopharyngeal airway obstruction (all significant differences) than children without ear disease.

All the children had an increase in the nasopharyngeal cavity with age and a decrease in adenoidal volume and nasopharyngeal obstruction after the age of seven years.

In our study we included diagnosed cases of serous otitis media, all patients complain of mouth breathing and snoring but only 75% complain of nasal obstruction even during day time. X-rays of these patients, complaining nasal obstruction, show adenoid hypertrophy and also abnormal eustachian tube function on tympanometry. So, adenoid hypertrophy may be a factor in the etiology of serous otitis media. For further correlation a wider and more statistically significant case control study is required.

CONCLUSION:

From this study, we conclude the following:

1. The commonest age group having serous otitis media is from 7-9 years (50%). The commonest group showing adenoid hypertrophy is also from the same age group i.e. 7-9 years (53%).
2. Males are more common in both serous otitis media (60%) and adenoid hypertrophy (57%).
3. Predominant symptoms in both serous otitis media and adenoid hypertrophy are mouth breathing (100%) and snoring (100%).
4. 95% culture shows bacterial growth.
5. Bacteria isolated from nasopharyngeal swab are Gram positive bacteria includes Streptococcus pneumoniae (40%), Staphylococcus aureus (35%), Enterococcus species (30%), Streptococcus viridians (20%), Streptococcus pyogenes (15%), Staphylococcus epidermidis (2%) and Gram negative bacteria includes Moraxella catarrhalis (13%), Klebsiella pneumoniae (5%), Hemophilus influenzae (2%), E.coli (2%) and Pseudomonas aeruginosa (2%).

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Bacteria from adenoid tissue culture are Gram positive bacteria includes Streptococcus pneumoniae (40%), Staphylococcus aureus (35%), Enterococcus species (30%), Streptococcus viridians (20%), Streptococcus pyogenes (15%), Staphylococcus epidermidis (2%) and Gram negative bacteria includes Moraxella catarrhalis (13%), Klebsiella pneumoniae (5%), Hemophilus influenzae (2%), E.coli (2%) and Pseudomonas aeruginosa (2%).

So, the nasopharyngeal and adenoid bacterial flora are polymicrobial in nature and there is no difference in the pathogens isolated from nasopharynx swab or adenoid culture in patients of serous otitis media.

6. The predominant pathogens are the gram positive such as S. aureus, Str. pneumoniae and Enterococcus species.

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