ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 02 | February - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

EVALUATION OF BACTERIAL ISOLATES DETECTED IN NASOPHARYNX AND MIDDLE EAR OF CHILDREN WITH OTITIS MEDIA WITH EFFUSION.

Otolaryngology

Somu Lakshmanan Professor and Head of Department, Department of ENT, Head and Neck surgery, Sri Ramchandra Institute of Higher Education and Research, Porur, Chennai, India.

Nufra Senopher Zaffrullah * Post graduate, Department of ENT, Head and Neck surgery, Sri Ramachandra Institute of Higher Education and Research, Chennai, India. *Corresponding Author

Vinoth Manimaran Assistant Professor, Department of ENT, Head and Neck surgery, Sri Ramachandra Institute of Higher Education and Research, Chennai, India.

ABSTRACT

To analyze the bacterial profile of middle ear fluid in children with otitis media with effusion and to correlate the bacterial isolates from the middle ear fluid and nasopharynx in children with otitis media with effusion. This is a prospective observational study conducted in the Department of ENT, Head and Neck surgery from October 2018 to October 2020. 60 patients who fulfilled the inclusion and exclusion criteria were taken up for the study. During General anesthesia, nasopharyngeal culture samples were collected and the middle ear fluid samples were collected at the time of myringotomy were sent for bacteriological culture analysis using standard culture techniques. The results were obtained using paired sample t test and chi square test, analysis was done using SPSS software version 22. Bacteria were cultured in 12 (20%) out of 60 samples of middle ear fluid and the pathogens isolated were 5 (41.6 %) of Staphylococcus aureus, 2 (16.7 %) of each had Pseudomonas aeruginosa, Staphylococcus epidermidis and Hemophilus influenza and 1 (8.3 %) had Streptococcus pneumoniae respectively. On comparing the outcomes of nasopharyngeal c/s with respect to middle ear fluid c/s, it was not statistically significant (p Value > 0.05). In the present study, the middle ear fluid in children with otitis media with effusion are sterile and the bacterial isolates from the nasopharynx bears no correlation with that of the middle ear fluid

KEYWORDS

Otitis media with effusion, Nasopharynx, Microbial flora.

INTRODUCTION

Otitis media with effusion (OME) is an inflammation of the middle ear in which fluid accumulates behind the eardrum, without any signs or symptoms of acute infection, and with an intact tympanic membrane. (1) Eustachian tube plays a role in the pathogenesis of otitis media with effusion. The short length, horizontal position, and reduced rigidity of the eustachian tube in the pediatric population may permit the reflux of nasopharyngeal microbes into the middle ear cavity, explaining the higher incidence of OME in children compared to adults. (2) The mucosa lining of the eustachian tube is continuous with that of the nasopharynx and middle ear and it is characterized by respiratory epithelium. The nasopharynx is considered as the reservoir for bacterial pathogens involved in middle ear infections and the microorganism such as *Str. pneumoniae, H. influenzae* and *M. catarrhalis* colonise the nasopharynx. In Otitis media with effusion, the only pathway for the pathogens to reach the middle ear cavity in the presence of an intact tympanic membrane is through the eustachian tube, we aimed to identify and compare the bacterial isolates from the fluid from middle ear and nasopharynx in patients with otitis media with effusion.

MATERIALS AND METHODS-

This is a prospective observational study which was conducted in the Department of ENT, Head and Neck surgery from October 2018 to October 2020. 60 patients who fulfilled the inclusion and exclusion criteria were taken up for the study.

The Inclusion criteria are

- Children of age group 6-12years.
- Otitis media with effusion for more than 3 months duration not resolved with medical management and associated with adenoid hypertrophy.

The Exclusion criteria are

- Chronic diseases of ear like chronic otitis media.
- No fluid in middle ear aspirate.
- Previous history of adenoidectomy or otological surgeries.
- Craniofacial abnormalities.

Children of age group 6 to 12 years who presented to the ENT Out patient department were included in this study. Children were diagnosed with otitis media with effusion with adenoid hypertrophy based on clinical and audiological criteria. The clinical criteria included symptoms of snoring, mouth breathing, ear block and hard of hearing for a duration of more than 3 months and not responding to medical treatment. Otoscopic examination showing tympanic membrane opacification, changes in color, decreased mobility, visible air fluid level and increased vascularity of the tympanic membrane. The Audiological criteria included type B curve on impedance audiometry. The required information with relevant history including the otoscopic findings were recorded in the proforma.

Under General Anesthesia, mouth opened using Boyle Davis mouth gag and was fixed using Draffin Bipod stand. Under Sterile aseptic precautions, nasopharynx was visualized and a sterile swab with a cotton tipped applicator was introduced and a swab was taken from the nasopharynx. Intra operatively, Under microscopic vision, the tympanic membrane was visualized. The external auditory canal was cleaned using a 10% Povidone iodine antiseptic solution for two minutes. Using a sterile ear speculum, myringotome was introduced and incision was made over the antero-inferior quadrant of tympanic membrane, a sterile 16 gauge spinal needle is used to aspirate the fluid or glue from the middle ear and is transferred to a sterile swab with a cotton tipped applicator. The swabs taken from the nasopharynx and the middle ear was transported to the microbiology laboratory in a sterile glass container within one hour. The swabs taken were used for aerobic culture and smear study. The plates showing microbial growth underwent quantification and identification of bacteria according to the routine practice established by the laboratory, considering the morphology and tinctorial properties displayed on gram stain. The results were obtained using paired sample t test and chi square test, analysis was done using SPSS software version 22.

RESULTS-

The study had cases between the age 6 to 12 years with majority of the cases in the age group 9 years. The study had a mix up of male and female population in the proportion of 56.7 % and 43.3 % respectively. The middle ear fluid culture showed that 80 % had no growth and 20 % had growth of which 41.6 % of the cases had *S. aureus*, 16.7 % of each had *P. aeruginosa*, *S. epidermidis* and *H. influenzae* and 8.3 % had *Str. pneumoniae*.

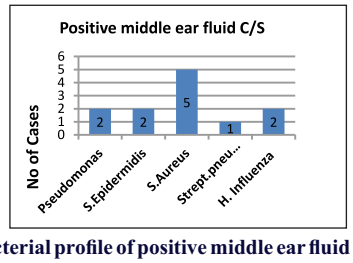

Figure 1- Bacterial profile of positive middle ear fluid culture.

The nasopharyngeal culture showed that 36.7 % had *Str. pneumoniae*, 23.3 % had *H. influenzae*, 11.7 % had *S. aureus*, 10% had *M. catarrhalis* among the total cases. However, 18.3 % of the total cases did not have growth.

The total cases were studied to understand the association between the middle ear culture sensitivity and nasopharynx culture sensitivity. It was found that 10 positive middle ear culture patients simultaneously had positive nasopharyngeal culture. 2 positive middle ear culture patients simultaneously had negative nasopharyngeal culture. 39 negative middle ear culture patients simultaneously had positive nasopharyngeal culture. 9 patients were found culture negative in both the parameters. While comparing both the nasopharyngeal culture with respect to Middle ear culture sensitivity, it was not statistically significant (p Value > 0.05).

Table 1- Comparison of nasopharyngeal isolates with Middle ear fluid culture.

Middle ear fluid C/s	Nasopharynx C/s		Total	Chi Square Test	P Value
	Positive	Negative			
Positive	10	2	12	0.028	0.868
Negative	39	9	48		
Total	**49**	**11**	**60**		

DISCUSSION

Otitis media with effusion is clinically defined as the presence of effusion in the middle ear with no inflammatory signs and symptoms. (3) In the past, otitis media with effusion was regarded as a strictly inflammatory process, and its effusion was considered sterile. However in 1958, Senturia et al found bacteria in the middle ear effusion redefining the accepted concepts. (4) The involvement of an inflammatory component originating in the nasopharynx as the cause of the most common changes is suggested by demonstration of increased numbers of pathogens in the nasopharynx resembling those found in Middle ear. (5) *Str. pneumoniae, H. influenzae, M. catarrhalis* and *Str. pyogenes* account for the majority of organisms in both sites. Demonstration of bacterial adherence to nasopharyngeal epithelial cells by pathogenic organisms has been shown by several studies. (6)

Positive bacterial cultures have been demonstrated in up to 50% of Middle ear effusions. Bacteria found are similar to those cultured in cases of acute suppurative otitis media. (7) Studies done by Pereira et al on the prevalence of bacteria in children with otitis media with effusion had suggested that bacteria plays a role in the pathogenesis of otitis media with effusion, *H. influenzae* was the most frequent microorganism observed and PCR technique was found to be more sensitive to detect bacteria in middle ear effusion compared to the conventional culture methods. (8)

There are several studies done for the evaluation of prevalence of bacteria in children with otitis media with effusion. Some of those studies had used traditional culture methods for analysis of the microorganisms, few others had used PCR techniques and Confocal laser microscopy methods for the isolation of microorganisms. However, the latter techniques had better results in isolating bacteria in comparison with the conventional techniques and had shown significant results to suggest that involvement of bacterial isolates in the pathogenesis of otitis media with effusion.

We studied the bacterial profile of middle ear fluid in children with otitis media with effusion and compared it with the bacterial isolates from the nasopharynx in 60 patients diagnosed with otitis media with effusion by conventional culture methods. Conventional culture method is used in this study as it is widely used technique for the isolation of bacterial organisms, cheaper and readily available.

In this study, detection of bacterial isolates in middle ear fluid such as *S. aureus* (9%) and *S. epidermidis* (3%) could be due to contamination of the sample taken from the middle ear fluid as they are the commensals of the external auditory canal. *H. influenzae* (3%) and *Str. pneumoniae* (8.3%) in the middle ear fluid suggests the role of commensals of nasopharynx which are the respiratory pathogens in the development of OME. However larger sample size is required for significant results and isolation of microorganisms. Different inclusion criteria, microbiological methodology, geographical variations are the cause for discrepancies observed between our study and the other studies.

In this study, the microorganism isolated from nasopharynx is not similar to that found in the middle ear fluid, reflecting the presence of some microorganisms residing in the nasopharynx as pure commensals. While comparing both the outcomes of nasopharynx c/s with respect to middle ear fluid c/s, it was not statistically significant (p-Value = 0.97). Hence, no correlation was found on comparison of bacterial isolates from middle ear fluid with the nasopharyngeal isolates. A Systematic review done by Van Dongen et al on evaluation of concordance between the microorganisms detected in nasopharynx and middle ear of children with otitis media with effusion have showed that the microorganism isolated from the nasopharynx is not in concordance with that found in middle ear fluid which is similar to that of our study. (9)

The limitations of this study are small sample size on comparison with other studies, Evaluation of bacteria in the biofilm form could have yielded better results as the pathogens are isolated more in biofilm form. The use of molecular based methods like PCR, Confocal laser scanning microscopy would have been more reliable than the traditional culture methods. The advantages of molecular based methods are can assess DNA sequences, recover majority of microbes, relatively quick, high specificity. We recommend evaluation of microorganisms in biofilm form and use of molecular based methods like PCR, Confocal laser scanning microscopy for better isolation and correlation of microorganisms.

CONCLUSION-

This study showed that the middle ear fluid in children with otitis media with effusion is sterile as majority of the middle ear fluid culture had no growth. We have also showed that the bacterial isolates from middle ear fluid bear no correlation with that of the nasopharyngeal isolates. Evaluation of bacteria in biofilm form and use of molecular based methods like PCR, Confocal laser scanning microscopy is recommended for better isolation and correlation of microorganisms.

REFERENCES-

1) Gates, G. A., Klein, J. O., Lim, D. J., Mogi, G., Ogra, P. L., Pararella, M. M., Paradise, J. L., & Tos, M. (2002). Recent advances in otitis media. 1. Definitions, terminology, and classification of otitis media. *The Annals of otology, rhinology & laryngology. Supplement*, *188*, 8–18.
2) Minovi, A., & Dazert, S. (2014). Diseases of the middle ear in childhood. *GMS current topics in otorhinolaryngology, head and neck surgery*, *13*, Doc11.
3) Seiden, A. M., Tami, T. A., & Pensak, M. L. (Eds.). (2011). *Otolaryngology: the essentials*. Thieme.
4) Senturia, B. H., Gessert, C. F., Carr, C. D., & Baumann, E. S. (1958). XXXIV Studies Concerned with Tubotympanitis. *Annals of Otology, Rhinology & Laryngology*, *67*(2), 440-467.
5) Klein JO. Microbiology of Otitis Media. Annals of Otorhinolaryngology, 1980; Suppl. 68: 98.
6) Scadding, G. K., Hawk, L. J., Martin, J. A., Darby, Y., & Alles, R. S. (1993). Persistent glue ear in children. *BMJ (Clinical research ed.)*, *306*(6875), 455.
7) Dong, W., Li, Z., & Zhou, S. (2001). *Lin chuang er bi yan hou ke za zhi = Journal of clinical otorhinolaryngology*, *15*(10), 452–454.
8) Pereira, M. B., Pereira, M. R., Cantarelli, V., & Costa, S. S. (2004). Prevalence of bacteria in children with otitis media with effusion. *J Pediatr (Rio J)*, *80*(1), 41-48.
9) van Dongen, T. M., van der Heijden, G. J., van Zon, A., Bogaert, D., Sanders, E. A., & Schilder, A. G. (2013). Evaluation of concordance between the microorganisms detected in the nasopharynx and middle ear of children with otitis media. *The Pediatric infectious disease journal*, *32*(5), 549–552.