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ASSESSMENT OF MIDDLE-EAR CHANGES IN PATIENTS WITH ALLERGIC RHINITIS

Otolaryngology

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ABSTRACT

Evaluation of middle-ear modifications in individuals with allergic rhinorrhea SYNOPSIS **Background:** Allergic rhinitis (AR), primarily caused by immunoglobulin E (IgE), is a type-I hypersensitivity reaction of the nasal mucosa to airborne allergens. It is distinguished by nasal congestion, watery rhinorrhea, sneezing, and itching in the nose, palate, and nasopharyngeal area. Many studies have been conducted to investigate the relationship between middle ear disorders and allergic rhinitis, and the majority of them point to nasal allergies as a likely cause of otitis media. Procedures: After meeting the inclusion and exclusion criteria, 40 people with allergic rhinitis were selected for the study. Tympanometry tests and a full audiological evaluation were completed. After that, patient data was gathered and statistically analyzed. **Methods:** After meeting the inclusion and exclusion criteria, 40 individuals with allergic rhinitis were included in the study. Comprehensive audiological evaluation, encompassing tympanometry investigations, was carried out. After this, statistical analysis was used to assemble and examine the patient data. **Results:** The condition affects people more frequently in the 10–50 age range. Seasonal allergic rhinitis affected 40% of patients, but persistent allergic rhinitis affected 60% of them. Participants had otoscopic examination, which showed that aberrant findings on the tympanic membrane, such as retracted, congested, bulging, and dull TM, are more common in PAR than in SAR. Compared to SAR, hearing loss is more common in PAR. According to a tympanometry study, in PAR, the 'B' type of tympanogram was detected in 27% of cases, and in SAR, the 'C' type curve was detected in 15% of cases; in contrast, these numbers were 9% and 6% in SAR. **Conclusion :** Allergic rhinitis, whether seasonal or perennial, can negatively impact eustachian tube function, leading to an increased risk of middle ear effusion and otitis media. The key to avoiding these middle ear diseases is to diagnose and treat allergic rhinitis correctly.

KEYWORDS

Allergic rhinitis, Tympanogram, Eustachian tube functions, Otitis media with effusion, PAR , SAR

INTRODUCTION

The primary mediator of allergic rhinitis (AR), a type I hypersensitivity reaction affecting the nasal mucosa, is immunoglobulin E (IgE).Sneezing, watery rhinorrhea, nasal blockage, and itching of the nose, palate, and nasopharynx are among the clinical signs of allergic rhinitis. 1. Seasonal allergic rhinitis is typified by rhinorrhea and conjunctivitis, while perennial allergic inflammation presents as nasal congestion, hyperactivity, and, frequently, a poor sense of smell.Numerous writers have examined the connection between allergic rhinitis and otitis media. Most concur that bacterial infection, Eustachian tube obstruction (ETO), and allergens are likely to have a role in the development of OME.

2 Epidemiological research consistently demonstrates that allergies provide a risk for otitis media. Furthermore, allergy rates are higher in otitis media patients than in the general population. 3. The results of two review papers, which showed that allergies ranged from 25% to 89% among individuals with otitis media, lend weight to this theory. 4 Numerous other writers established without doubt that allergies affecting the upper respiratory tract are the root cause of middle ear problems. 5. It is also suggested that inflammatory mediators, cytokines, and colony-stimulating factors secreted by mucosal mast cells and other inflammatory and epithelial cells in the nose and nasopharynx are responsible for the reported association between allergies and otitis media with effusion. These mediators use a number of different methods to restrict the Eustachian tube. Six Nasal inflammation is a result of both viral upper respiratory infections and allergic reactions to allergens, and it can lead to Eustachian tube dysfunction, elevated middle ear negative pressure, and insufficient ventilation. Conductive hearing loss is caused by the tympanic membrane retracting.

Several studies imply that the middle ear is important in the United Airway Concept and link allergies to MEE.8 Patients with allergic rhinitis had a higher prevalence of hearing loss and otoacoustic emission anomalies than controls, according to a study on the audiological aspects of the condition. 9. According to the results of another study, nasal allergies can alter the function of the Eustachian tube, which can lead to changes in middle ear pressure and hearing loss.

By using rhinomanometry in conjunction with tympanometry, the authors state that nasal challenges involving allergens were conducted. PTA might be an additional helpful diagnostic tool for people with persistent OME. 10. A decline in MEP and ET dysfunction (ETD) have also been linked in a number of investigations, which are important discoveries in otitis media with effusion. 11 Unlike the previous research, this study discovered that those suffering from allergic rhinitis were able to hear sounds at 8000 Hz better than the control group. 12 The aforementioned literature review illustrates how allergies might impact the middle, inner, or outer ear. Thus, the purpose of this investigation was to assess the otological and audiological conditions of individuals suffering from allergic rhinorrhea.

METHODS

This 12-month study was conducted at Asram Medical College in Eluru, Andhra Pradesh, India, Department of ENT. Patients were initially judged for the following inclusion and exclusion criteria. Inclusion criteria are:The study included patients aged 10-50 with clinically diagnosed allergic rhinitis, based on signs and symptoms. Exclusion criteria Exclusion criteria included the use of ototoxic agents, metabolic and systemic diseases causing hearing loss, otoscopic evidence of a perforated tympanic membrane, serum IgE <200 IU/ml, negative skin prick test, H/o ear surgery, mentally retarded patients, and patients unwilling to undergo a complete otological assessment.

PROCEDURE

Fourty patients were enlisted in the trial after fulfilling the inclusion and exclusion criteria. Of the forty patients, sixteen suffered from seasonal allergic rhinitis and twenty-four from perennial allergic rhinitis. A comprehensive history and clinical examination were performed on the individuals. We had in-depth interviews with these individuals regarding the frequency of allergic rhinitis and how it affected their hearing. There was a thorough audiological examination, which included tympanometry testing. Skin pricks and serum IgE levels were also assessed in the patients.

Tools for measuring the outcomes

The goal purpose of this was to assess middle ear function and hearing threshold as well as to formally certify the existence of allergic rhinitis.

Here is a list of the tests that were run.

Otoscopy Serum Ig level Skin prick test

Tuning fork test

Tympanogram Pure tone audiometry

Following that, a statistical analysis was performed on the patient data.

Analytical Statistics

Discrete data were given as numbers and percentages, whereas continuous data were summarized as Mean±SD (standard deviation). Using the chi-square test ($\chi 2$), the category groups were compared. To assess how the variables related to one another, Pearson correlation analysis was employed. A p-value less than 0.05 was deemed statistically significant when it was two-tailed ($\alpha=2$). The SPSS program was used for all analyses (Windows version 17.0).

RESULTS

Demographic characteristics: The frequency distribution of patient demographic characteristics (age and gender) was investigated in relation to the incidence of allergic rhinitis (Table 1). Disease was found to be more common in both genders between the ages of 31 and 40 years.The patients were further divided into two groups. The first category is seasonal allergic rhinitis, followed by perennial allergic rhinitis. In this study, 60% of patients had perennial allergic rhinitis, while the remaining 40% had seasonal allergic rhinitis.

Table 1: Age And Sex Distribution Of Patients (N=40)

Age group (years)	Male	Percentage (%)	Female	Percentage (%)	Total	Percentage (%)
10-20	9	37.5	4	25	13	32.5
20-31	4	16.6	3	18.75	7	17.5
31-40	6	25.07	7	43.75	13	32.5
41-50	5	20.83	2	12.5	7	17.5
Total	24	100	16	100	40	100

Table 2: Comparison Of Otoscopic Findings In SAR And PAR

Otoscopy	SAR Group No. of ears (32)	Percentage (%)	PAR Group No. of ears (48)	Percentage (%)
Normal Tympanic membrane	24	75	26	54.16
Bulged tympanic membrane	3	9.37	4	8.33
Congested tympanic membrane	1	3.12	3	6.25
Dull tympanic membrane	0	0	7	14.58
Retracted tympanic membrane	4	12.5	8	16.66

Table 3: Tympanometry In SAR and PAR

Types of tympanogram	SAR No. of ears (N=32)	Percentage (%)	PAR No. of ears (N=48)	Percentage (%)
A type curve	24	75	20	41.6
As type curve	1	3.12	3	6.25
Ad type curve	2	6.25	5	10.41
B type curve	3	9.37	13	27.08
C type curve	2	6.25	7	14.58

Comparison of otoscopic findings in SAR and PAR. Otoscopic examination of the participants revealed that SAR patients had more normal tympanic membrane findings than PAR patients. Abnormal tympanic membrane findings, such as retracted, congested, bulged, or dull TM, are more common in PAR than in SAR. Hearing status of patients The majority of the patients had normal hearing thresholds.It demonstrates that hearing impairment is more common in PAR than in SAR. None of the patients had a profound hearing loss.

Tympanometry findings

Tympanometry testing of the patients revealed that 'A' type curves are more common in SAR than PAR, indicating normal middle ear impedance. In PAR patients, 'B' type tympanograms were found in 27% of cases and 'C' type curves in 14% of cases, whereas in SAR these values were 9% and 6%, respectively (Table 3).

DISCUSSION

The study found that allergic rhinitis was more common in young males aged 31 to 40 years, accounting for more than 68 percent, which was consistent with the findings of the majority of researchers. According to the study, allergic rhinitis is more common in males in their younger years, after which the prevalence is nearly equal between the sexes. Other studies have supported this finding.Perennial allergic rhinitis was found in 24 patients (60%) and is more common than seasonal allergic rhinitis, which was found in 16 patients (40%). Another study reported similar findings.In seasonal allergic rhinitis, otoscopy revealed a normal TM in 32 ears, while TM congestion was seen in one ear and negative middle ear pressure was apparent by retracted TM in four ears (12.5% cases).

In 75% of the ears, TM was normal, while in 12.5%, it was retracted. In perennial allergic rhinitis, otoscopy revealed normal TM in 48 ears, TM congestion in 3 cases, and negative middle ear pressure indicated by retracted TM in 8 ears, representing 16.6% of cases.The study included a PAR patient who had conductive hearing impairment while in SAR. Similarly, other studies showed that allergic rhinitis patients had a higher prevalence of hearing loss, especially in cases of perennial allergic rhinitis, but another study concluded that the patients with allergic rhinitis had better hearing than the control group at 8000 Hz.Changes in ear drum impedance indicate changes in middle ear pressure due to tubal air pressure. Tympanogram revealed insignificant middle ear changes in PAR, with type 'B' tympanograms in 13% and type 'C' tympanograms in 7% of the patients. In SAR cases, type 'B' tympanograms were seen in 3% of cases and type 'C' tympanograms in 2% of cases. Other studies have reported similar findings indicating the presence of eustachian tube dysfunction, such as fluid in the middle ear and negative middle ear pressure, which was found more frequently in patients with allergic rhinitis.

CONCLUSION :-

Allergic rhinitis is more common in young and adult patients aged 10 to 20 and 31 to 40 years, accounting for 65% of total cases. It is more prevalent in the male population at this age. Perennial allergic rhinitis accounted for 60% of the total patient population studied, while seasonal allergic rhinitis accounted for 40%, indicating that the former is more prevalent than the latter. Perennial allergic rhinitis patients have a higher level of hearing impairment than seasonal allergic rhinitis. which is predominantly conductive in nature. Seasonal allergic otoscopy revealed abnormal TM findings in 25% of patients, while abnormal TM was observed in 59% of cases of perennial allergic rhinitis.27% of patients with perennial rhinitis had a type B tympanogram, while 9% had seasonal rhinitis. Type C tympanograms were found in 15% of perennial and 6% of seasonal rhinitis patients. The study's findings support the authors' conclusion that allergic rhinitis, whether seasonal or perennial, impairs eustachian tube function and may raise the risk of otitis media and middle ear effusion. Correct diagnosis and treatment of allergic rhinitis is the key to preventing these middle ear conditions.

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