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Original Article

# Allergy and recurrent middle ear effusion

**Nader Saki[1], Ali Khodadadi[2], Fakher Rahim[3], Soheila Nikakhlagh[1,*], Mozafar Sarafraz [1]**

1. *Associated professor of Otolaryngology, Head and Neck Surgery. Hearing & Speech Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran*
2. *Assistant professor of Immunology, Cancer Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran*
3. *Endocrinology and Metabolism Research Center, Tehran University of Medical Sciences, Tehran, Iran*

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**Abstract**

**Objectives:** The aim of this study was to compare the otitis media with effusion (OME) groups that improved when treated with adenoidectomy and Ventilation Tube (VT), to the group of the recurred after surgery and detect the possible role of allergy in OME.

**Material and Methods:** This study was performed on two groups. The Patient group consisted of 38 patients with recurrent OME with allergy and control group made up of 38 patients with OME without allergy and no recurrence. Diagnosis of inhalant and food allergy include positive skin prick test , total IgE. The patients ranged from 11 months to 14 years of age. Blood samples were analyzed in patients for serum total IgE concentrations. Statistical analysis was performed using SPSS 16.0 version. Statistical significance was defined as *P* values less than 0.05.

**Results:** Fifteen (39.47%) patients had positive skin tests for both inhalant and food allergens in the patients group. Five patients (13.15%) of the control group had a positive skin tests for both inhalant and food allergens. The mean concentration of serum IgE in the study group was 379.5 IU/ml and in the control group was 94.8 IU/ml. The results showed that allergic patients had four fold concentration than non-allergic group and this indicative of an allergic background in recurrent OME.

**Conclusion:** This study demonstrates that inhalant and food allergy may play a role in the pathogenesis of recurrent OME. Thus, the possibility of allergy should be considered in OME patients that did not improve with medical treatment and adenoidectomy and VT insertion.

**Key words:** Otitis media with effusion; Recurrence; Allergy; Foods; Inhalants

## 1. Introduction

Otitis media with effusion (OME) is defined as the presence of non-purulent fluid behind an intact eardrum without signs or symptoms of an acute infection (otalgia, fever, and irritability) and is the most common etiology of hearing loss during childhood. A total of 25% of patients are accidentally discovered during a routine check-up. The OME potentially impacted on hearing and speech and in this time its need for medical or surgical intervention. OME may occur as a primary disorder or as a sequel to acute otitis media1. There are many studies about the role of allergy in OME2-5. The causes of OME are multifactorial and the importance of allergy has been underestimated. Adenoids play an important role in the etiology of

*** Corresponding author:** Soheila Nikakhlagh, Associated professor of Otolaryngology, Head and neck surgery, Imam Khomeini hospital, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. Tel: +986132921838. E-mail: ahvaz.ent@gmail.com

OME6. The incidence of allergy in OME has been reported to be between 0% and 80%. Food allergy is another etiologic factor investigated in the pathogenesis of OME. The aim of this study was to compare the OME groups that improved when treated with adenoidectomy and Ventilation Tube (VT) with the group the recurred after surgery and determine the possible role of allergy in OME.

## 2. Materials and Methods

This study was carried out prospectively between September 2008 and September 2009 at the department of Otolaryngology, Jundishapur University of medical science in Ahvaz/Iran. In this study 38 children with recurrent OME suffering from loss of hearing were selected among 358 patients who had adenoidectomies and had been inserted VT for OME. The patients were selected for allergy evaluation because of recurrent OME not responsive to medical therapy and adenoidectomy, requiring more than one ventilation tubes. Patients were entered into this study after the parental consent form was given. In our study patients group had complaints of OME for at least three months after following medical and surgical treatment of OME. The control group consisted of 38 healthy children who were treated with adenoidectomy and VT, and had no recurrence. Subjects were not eligible to enter the study if any of the following criteria were present: Acute otitis media, Perforation of either tympanic membrane due to inserted VT, cleft palate, recurrent adenoid growths, severe nasal septum deviation, nasal polyposis, uncertain access to medical care, including lack of telephone access. OME diagnostic Criteria are tympanometry, audiometry and tympanic membrane pattern for OME (air fluid/ air bubbles, amber or pinkish color, retraction). Recurrent OME was defined as persistent evidence of effusion by otoscopy, and/or tympanometry with a persistent conductive hearing loss in audiometry, three months after adequate medical therapy. Diagnosis of inhalant and food allergy include positive skin prick test, total IgE and nasal smears. Common allergens that may be tested include: pollen, mold, animal dander, dust mites, foods (peanuts, eggs), and cockroaches. The patients ranged from 11 months to 14 years of age. Follow-up of the patients was performed on a monthly basis. Otolaryngologic examinations, pure tone audiograms, and tympanogram tests of all patients were done. Blood samples were analyzed in patients for serum total IgE concentrations.

### Statistical analysis

The data were analyzed by grouping the patients by the following characteristics: (1) recurrent OME with allergy, (2) OME without allergy and no recurrence. Statistical analysis was performed by using SPSS 16.0 version (SPSS Inc, Chicago, IL). The chi-square test was used to compare the prevalence of IgE-mediated hypersensitivity in each of the groups. The independent t-test was used to compare the serum total IgE concentration in each group. Statistical significance was defined as P values less than 0.05.

## 3. Results

The patient group consisted of 38 patients ranging in age from 11 months to nine years (mean age of 34.7±18.5 months). Twenty-three patients (60.5%) were boys and 15 patients were girls (39.5%). The control group consisted of 38 children ranging in age from 4 to 12 years (The mean age was 7.03). Twenty-one patients (55.3%) from the control group were boys and 17 patients (44.7%) from the control group were girls. The entire control group was not allergic by history. In the study group, all patients had previous adenoidectomies, and had been inserted VT. Fifteen (39.47%) patients had positive skin tests for both inhalant and food allergens in the patients group. Five patients (13.15%) of the control group had a positive skin test for both inhalant and food allergens. As a whole, 39.47% of the study group had positive test, as compared with 13.15%of the control group. This was statistically significant (P= 0.043). A pattern to multiple positive nasal and food reactions was shown in the patient group rather than the control subjects (Table 1). The mean concentration of serum IgE in the study group was 379.5 IU/ml and in the control group was 94.8 IU/ml. The results showed that allergic patients had four fold concentration than non-allergic group and

this indicative of an allergic background in recurrent OME.

**Table 1. The inhalant and food allergens in the study and control groups**

| Allergens | Patients No. | Control No. |
|---|---|---|
| | Inhalant | |
| Mite | 2 | 0 |
| Sp. Gras Mix | 4 | 1 |
| Mixed | 1 | 1 |
| Epidermals | | |
| Foods | | |
| Soybean | 1 | 0 |
| Almond | 2 | 0 |
| Onion | 4 | 1 |
| Orange | 1 | 1 |
| Tea | 5 | 0 |
| Sweet corn | 3 | 1 |
| Peanut | 1 | 0 |
| Lemon | 1 | 0 |
| Tomato | 1 | 1 |
| Egg | 2 | 1 |
| Meat | 7 | 2 |
| Carrot | 5 | 0 |
| Watermelon | 6 | 2 |
| Mushroom | 2 | 1 |

## 4. Discussion

Otitis media is the most common disease encountered in the pediatric age group aside from upper respiratory infection.Allergy has long been recognized as one of the causative factors of OME based on clinical observations. Mucosal congestion of eustachain tube associated with inhalant allergy leads to dysfunction of the tube, thus interfering with the exchange of gases between the middle ear and the nasopharynx during swallowing. The aim of this study was to investigate the relationship between allergy and the recurrence of OME. Bernstein et al.[4] reported that about two thirds of patients with recurrent OME are not allergic, and approximately one third of patients with recurrent OME (35%) do have allergic rhinitis. He suggested that there is some supportive evidence that food immune complexes, particularly with dairy products, may play a role, especially in the otitis-prone child under the age of 2 years. Becker et al.[6] reported an allergic genesis of recurrent OME and adenoids in about 20 to 30% of patients. Caffarelli et al.[7,] reported that food allergy may play an important role in the pathogenesis of OME, especially in children under two years of age. It has been reported that children with cow's milk allergy in infancy, even when properly treated, had experienced significantly more recurrent otitis media. Hurst reported an allergic basis in all 20 patients studied on the basis of RAST and skin testing[8]. Following control of inhalants by immunotherapy 65% of patients had normal hearing and the remaining 35% resolved following food elimination. Howard et al. detected the incidence of IgE mediated hypersensitivity in patients with Eustachian tube dysfunction as 38%, which was more than double the published national average data. Corey et al. reported 89 patients with OME who were significantly more allergic against egg white and soya than the control group. The results of the present study reveal that a high prevalence of inhalant and food hypersensitivity was detected in 39.47% of patients with recurrent OME and previous adenoidectomies, who had been placed a ventilation tube when compared with the control group (13.15%). The prevalence of food and inhalant allergy in our series was similar to the reports of Bernstein et al. However, Hurst detected a higher prevalence of food hypersensitivity than in our series. As a whole, 39.47% of the study group had a positive test, as compared with 13.15% of the control group. This was statistically significant (p: 0.043). The mean concentration of serum IgE in the study group was 379.5 IU/ml and in the control group was 94.8 IU/ml. The results showed that allergic patients had four- fold concentration than non-allergic group and this indicative of an allergic background in recurrent OME.

## 5. Conclusion

This study demonstrates that inhalant and food allergy may play a role in the pathogenesis of recurrent OME. Thus, the possibility of allergy should be considered in OME cases that did not improve with drug treatment and adenoidectomy and VT insertion.

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