

## **The Role of Nasal Allergy in Otitis Media with Effusion**

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**Objective:** To evaluate the association of allergy and otitis media with effusion (OME) in children.

**Design:** Case-control.

**Setting:** King Abdul-Aziz University Hospital, Saudi Arabia.

**Method:** Fifty-two children aged 1 to 15 years with diagnoses of recurrent or persistent secretory otitis media admitted for myringotomy and Grommet insertion from January 2008 to June 2009 (OME group) were included in the study. Children of similar age who attended the pediatric surgical unit during the same period for different pediatric surgical procedures other than ENT surgeries were matched using gender and age (control group).

**History of allergic rhinitis and results of RAST (radioallergosorbent test) were documented.**

**Result:** Fifty-two children had OME, all (100%) had positive history of allergic rhinitis and 31 (81.6%) had RAST positive, the test was performed in 38 children. In the control group, no allergic rhinitis history was obtained and only seven (23%) were RAST positive, the test was performed in 31 children.

**Conclusion:** This study shows that RAST positive is higher in OME group compared to control. In addition, history of allergy is higher in OME group compared to the controls.

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Otitis media with effusion (OME) in children is a common disease; its incidence is estimated to be 15% to 20%<sup>1</sup>. Approximately 10% of children have repeated episodes of chronic OME<sup>2</sup>. Chronic OME is associated with hearing loss, delayed speech and middle ear mucosal damage<sup>3</sup>. The etiology and pathogenesis of OME has not been fully elucidated although many theories exist, including ear infections, eustachian tube dysfunction, allergic reaction, and local immune reaction<sup>4-6</sup>.

Numerous studies have been performed to determine the relation between allergy and OME; the incidence of allergic rhinitis (AR) in OME has been found to vary from 14% to as much as 89%<sup>7-10</sup>.

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Some studies have implicated allergy in the pathogenesis of otitis media but definitive proof of the assertion is lacking although epidemiologic studies consistently identify allergy as a risk factor for otitis media<sup>9-18</sup>. An association between allergy and OME was supported by case-control studies reporting higher frequencies of OME in allergic children compared to age-matched non-allergic children<sup>11-20</sup>.

Because the environmental condition is changing in Saudi Arabia, allergy in children has become more prevalent with attendant complications. The aim of this study is to evaluate the relationship between otitis media with effusion and allergy in children.

## **METHOD**

Fifty-two children aged 1 to 15 years diagnosed with recurrent or persistent secretory otitis media admitted for myringotomy and Grommet insertion from January 2008 to June 2009 were included in the study (OME group). Fifty-two healthy children of similar age who attended the pediatric surgical unit during the same period for different pediatric surgical procedures other than ENT surgeries and who needed blood sample withdrawal for investigations before surgery (control group).

Informed consent was obtained from the parents or their legal guardians of those children who agreed to participate in the study.

A detailed history was obtained from parents regarding allergic attacks, their onset, periodicity, association with wheeze and eczema, food, and their relation to symptoms or presence of animals in the house. A positive allergic rhinitis history was defined as the presence of a watery, runny nose with one or more of the following symptoms: sneezing, nasal obstruction, nasal itching and conjunctivitis (i.e., red itchy eyes).

Physical examinations performed including otoscopy and anterior rhinoscopy. Impedance and pure tone audiometry was done to confirm the diagnosis of OME in patients admitted for ventilation tube insertion and to rule out ear problems in the control group. Children with any ear problems in the control group were excluded.

In the OME and control groups, 38 and 31 children respectively were tested for the radioallergosorbent test (RAST) panel, which consisted of 26 antigens, 19 inhalants, and 7 foods that are prevalent in our area. Because there were more controls than OME children, controls were matched to OME children by gender and age. Only 52 OME children could be case-matched to 52 control children.

Analysis was conducted using SPSS software version 16.0 (SPSS Inc., Chicago, IL).

## **RESULT**

The RAST was positive in 31 (81.6%) of the OME group and positive in seven (23%) of the control group. Allergic rhinitis history was 100% positive in 52 of the OME group and was 100% negative in the control group, see table 1.

The commonest allergens found in the allergic patients were cat fur followed by Bermuda grass, mesquite, house dust, and chenopodium, see table 2.

**Table 1: History of Allergic Rhinitis (AR) and RAST in OME and Control Groups**

Variable	OME Group (%)	Control Group (%)
AR history	Positive: 52 (100)	Positive: 0 (0)
	Negative: 0 (0)	Negative: 52 (100)
	Performed: 38 (73)	Performed: 31 (60)
RAST	Positive: 31 (81.6)	Positive: 7 (23)
	Negative: 7 (18.4)	Negative: 24 (77.4)

**Table 2: Common Allergens Found in the OME Group (N = 52 Patients; Some Patients Are Allergic to More Than One Allergen)**

Inhalants	Number	Fungi	Number
House dust	10	<i>Aspergillus fumigatus</i>	3
Cockroach	5	Moulds	2
Cat fur	18	<i>Alternaria alternaria</i>	1
Goat	4		
Dogs	1		
Pollens	Number	Ingestant	Number
Bermuda grass	16	Egg (whole)	4
Mixed grass	7	Tomato	2
Timothy	2	Peanuts	3
Mesquite	13	Fish	1
Chenopodium	8	Green beans	1
Orris roots	3		

## DISCUSSION

The association between allergy and otitis media with effusion has been a controversial issue with many contradicting results. Alles et al studied the prevalence of atopic disorders in 209 children with chronic otitis media with effusion and found AR in 89% of children<sup>11</sup>. On the other hand, Yeo et al found that 28.4% of the children with OME had AR and concluded that allergic rhinitis may not be related to the development of OME in children<sup>12</sup>.

Shah reported that only 5 of 95 children with proven bilateral OME had positive skin tests to allergies while Fernandez and McGovern studied 113 children with OME and found 83% to be allergic based on history and 92% positive skin test<sup>13,14</sup>. Borge performed the first controlled study in 1983 in which he examined 89 children with OME and 67 controls<sup>15</sup>. Based on history and intradermal skin tests, he found that 41% of the study children and 11% of the control children were allergic. Bernstein and co-workers reported in series of articles that approximately 23% of all children with OME are allergic based on history, physical examination, and skin or RAST<sup>16-19</sup>. They found that 35% to 40% of these children with repeated ventilation tube insertion were allergic indicating that allergy may play a larger role in those patients who have recurrent OME.

Zakzok and Al Anazy studied allergic rhinitis as a risk factor for hearing impairment in an epidemiological survey of 9540 children, 2529 children were identified with history of allergic rhinitis (26.51%)<sup>10</sup>. Hearing impairment was found in 450 children out of 2529 (17.8%). They concluded that allergic rhinitis might be a risk factor for hearing impairment.

The mechanisms by which allergy play a role in OME are also controversial. Bluestone proposed that “the role of allergy in the etiology and the pathogenesis of acute and chronic OME may be one or more of the following mechanisms:

- ❖ Middle ear acting as a shock organ;
- ❖ Inflammatory swelling of the eustachian tube;
- ❖ Inflammatory obstruction of the nose or
- ❖ Aspiration of bacteria-laden allergic nasopharyngeal secretion into the middle ear cavity”<sup>7</sup>.

Bernstein studied the potential mechanisms of IgE-mediated hypersensitivity in OME and addressed two important questions:

- ❖ Whether OME is an allergic disease, or
- ❖ Whether OME is a complication of an allergic disease in another part of the respiratory system<sup>8</sup>.

Concerning the first question, recurrent OME is associated with allergic rhinitis in about one-third of the studied population. However, the middle ear mucosa is not the target organ in the majority of patients who have allergic rhinitis. There appears to be increasing evidence that eustachian tube function is altered by nasal allergy.

Several studies had been performed to determine if the middle ear mucosa acts as a “shock organ”<sup>20-23</sup>. These immunologic studies although contradictory, indicate that if the “shock organ” theory has any validity, only a very small percentage of OME cases are caused by middle ear mucosal allergy and only in patients who are allergic by history or laboratory determination. These studies also refute the theory that OME results from nasopharyngeal mucus reflux through the eustachian tube.

## CONCLUSION

**This study shows that the prevalence of allergic history is higher in children with OME compared to the control group. The RAST positivity test was higher in children undergoing surgery for OME compared to the control group.**

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