

**Original Article****The prevalence and risk factors of secretory otitis media in elementary school students in Hakkari city center****Hüseyin Günizi<sup>1</sup>**<sup>1</sup> Specialist doctor, Başkent University Alanya Research and Education Center**Abstract**

**Objective:** The intention in this study was to determine the prevalence and the risk factors associated with otitis media with effusion (OME) in elementary school students in Hakkari city center.

**Method:** The study was made of 1,068 children studying in elementary schools in Hakkari city center. The educational and socioeconomic status of the students' families and the students' success in school were determined, after which, the students were given a physical examination, as well as an otoscopy and tympanometry. The findings were fed into the SPSS for Windows 16 software program, and were analyzed using chi-square and Fisher's exact tests. P values <0.05 were considered as statistically significant. The prevalence and risk factors related with OME will be discussed.

**Findings:** The mean age of the test subjects was 7.8 ( $\pm 1.45$ ) years, 610 were male (57.1%), and 458 students were female (42.9%). Of the total, 119 (11.1%) students were diagnosed with OME, 72 of which were male (60.5%), and 47 students were female (39.5%). A positive correlation was identified between the prevalence of OME and nasal obstruction, sinusitis-allergic rhinitis and school success ( $p < 0.01$ ,  $p < 0.05$ ,  $p < 0.01$ , respectively). In contrast, no significant correlation could be found between the prevalence of OME and age, gender, passive smoking, or educational and economic status of the students' families ( $p = 0.201$ ,  $p = 0.428$ ,  $p = 0.064$ ,  $p = 0.757$ ,  $p = 0.579$ , respectively).

**Conclusion:** Informing parents and instructors about OME and raising awareness levels will significantly increase the educational success of students, making it possible to raise healthier generations.

**Keywords:** Otitis media with effusion, children, prevalence, school.

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**Introduction**

Otitis media with effusions (OME) or secretory otitis media, is characterized by an accumulation of fluid behind the tympanic membrane, without any general or local symptoms of infection. OME is among the most common pediatric diseases [1], and if left untreated, may lead to permanent hearing loss, retardation in speaking and poor language development. Accordingly, a

number of studies have been carried out to detect these diseases.[2-4] Although there have been studies to determine the prevalence of OME in certain Turkish cities, including Diyarbakır, Kocaeli and Isparta, there has to date been no study that reflects the overall situation in Turkey.[2,5,6] The aim of the present study is to determine the prevalence and risk factors associated with OME in the Hakkari region, and to compare the findings with other regions. The

prevalence and risk factors associated with otolaryngological diseases in students in Hakkari are discussed in the first part of this study. Here, the prevalence and risk factors of OME will be discussed.

### Materials and Methods

The study was carried out among 1,068 elementary school students in Hakkari city center between April and May 2013. A questionnaire was handed out to the participating students' families to garner information on the families' socio-economic status, smoking status, and histories of allergies. Then, the school success rates of the students were determined by their instructors. The participating schools were visited, all students were examined by a single physician, and a tympanometric examination was made by an audiologist using Maico MI 34 instrument. The tympanometric results were evaluated in line with the Nikolajsen modification of the Jerger classification. The classification of the tympanogram curves were as follows: Linear tympanogram curves with a tympanum pressure lower than -300 daPa and high gradient values were classified as Type B; tympanograms peaking between -400 and -200 mmH<sub>2</sub>O pressure were classified as Type C2; tympanograms peaking between -199 and -100 mmH<sub>2</sub>O pressure were classified as Type C1; and tympanograms peaking peak between -99 and 200 mmH<sub>2</sub>O were classified as Type A (normal tympanogram).

SPSS for Windows 16 software was used for the data analysis, which included a chi-square and Fisher's exact test. P values <0.05 were considered to be statistically significant.

### Results

The study was made of 1,068 elementary school students aged 5–11 with a mean age of 7.8±1.4 (Figure 1). Of the total, 610 were male (57.1%), and 458 were female (42.9%) (Table 1). Some 65.3 percent of the students were from families with a low socio-economic status, while the remaining 34.7 percent were from families of a normal or high socio-economic status. There was at least one smoker at home in 55.1 percent of the students' families. Allergic rhinitis was observed in 64 children (6%) whose parents

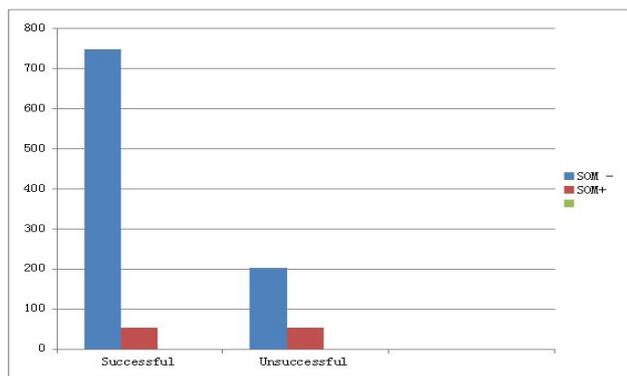
stated the presence of symptoms of allergy, and who displayed nasal mucosal paleness, congestion and seromucoid discharge during the physical examination. A further 82 students (7.7%) were diagnosed with rhinosinusitis, while nasal obstruction was observed in 189 children (17.7%).

**Table 1.** Gender distribution among the participants

n=1068	
Gender	
Male	610 (57.1%)
Female	458 (42.9%)

The otoscopic examination highlighted 146 children (13.7%) with plugged ear (earwax), and a tympanometric examination was carried out after cleaning the plugged ears. Foreign bodies (bead, pen tip and part of an eraser) were detected in three children and were removed. A ventilation tube was observed in five children (0.5%). Chronic otitis was observed in eight children (0.7%), who were given treatment regimes. Of the total 1,068 children, 119 (11.1%) were diagnosed with OME, of which 72 (60.5%) were male and 47 (39.5%) were female. There was no significant correlation between gender or age and OME development ( $p=0.428$  and  $p=0.201$ , respectively). The incidence of OME was higher in children who were passive smokers compared to non-smokers, but the observed difference was not statistically significant ( $p=0.064$ ). The incidence of OME was significantly higher in children with nasal obstructions due to septum deviation and concha hypertrophy, allergic rhinitis and rhinosinusitis ( $p<0.01$ ). There was no correlation between the family's educational level or level of income and OME ( $p=0.757$  and  $p=0.579$ , respectively).

Some 75 percent of the children were successful in school, the remaining 25 percent being considered unsuccessful (Figure 1). The school success of children with OME was significantly lower when compared to the other children ( $p<0.01$ ).



**Figure 1.** Distribution of OME with respect to success in school.

## Discussion

OME is a common pediatric disease that can develop into suppurative otitis if left untreated, and may also cause problems in the education and psychological development of a child. Low socio-economic status, air pollution, passive smoking and climate conditions are all associated with OME development.[7] Various studies have been conducted to determine the incidence of OME [2-8], although to date there has been no study of the situation in the Hakkari region.

Permanent effusions lasting for four months or more have been reported in approximately one-third of the children with acute otitis media. The cumulative OME incidence in children aged 6-12 years in the United States is 22 percent, whereas prevalence is reported to be higher in Central and Northern European countries. Chadha et al. report that the prevalence of OME was 3.06 percent in a group of 15,718 students.[8] According to studies carried out in elementary school students in Turkey, the prevalence of OME ranges between 4.03-14.5 percent [2,5-7], and in the present study, the prevalence of OME was recorded as 11.1 percent, which is consistent with previous literature.

Given the findings of previous studies, the incidence of OME is believed to decrease with age [1-2,9], and several hypotheses have been put forward to explain the effect of age on OME, some of which have shown that mastoid air cells are smaller in cases with OME. OME emerges in a period when mastoid cells have yet to complete

their maturation process. Insufficient mastoid airing results in an insufficient air reservoir in the tympanic system, and causes problems in the gas exchange process that is carried out by the mucosal layer covering the mastoid cells. Airing of the mastoid cells increases with age, and the development of OME decreases. According to another hypothesis, the incidence of OME is higher in younger children due to the fact that they are more prone to infection owing to insufficient development of the immune system [1-2,10-11]. Okur et al. and Midgley et al. report that the incidences of OME decrease with age.[7,9] Guzel et al., who carried out a study of 1,800 elementary school students, reported that there was no significant difference in the incidence of OME between different age groups.[2] In this study, no correlation was identified between age and OME ( $p=0.201$ ).

The correlation between gender and OME is still controversial. Despite the studies showing a higher OME incidence in males, others indicate that there is no correlation between gender and incidences of OME. Midgley et al. addressed this question in a study of 1,400 students, and reported no correlation between the prevalence of OME and gender [9], which was a similar finding to that of Gultekin et al.[12] On the other hand, due to the faster mastoid pneumatization in girls, boys will theoretically have a higher incidence of upper respiratory tract infections, and therefore the prevalence of OME can be expected to be higher in boys than in girls. Daly et al. also report that males are at higher risk in the development of OME.[13] In the present study, there was no statistically significant correlation between gender and OME ( $p=0.428$ ).

There have been a number of studies into the effect of nasal inflammatory pathologies, such as allergic rhinitis and sinusitis, on OME.[2-3,12-13] The incidence of allergic rhinitis and sinusitis is highest in winter and spring, and so these months are associated with higher incidences of OME. Such pathologies are known to play role in OME development, causing tubal dysfunction or direct damage to the tympanum mucosa. The detection of antibodies, antigens and elements of the complement system in the tympanum indicates that OME is an immunocomplex disease. In 2008, Marseglia et

al. reported that allergic rhinitis was a major risk factor in OME development [14]; and similarly, Gultekin et al. determined a significant correlation between OME and allergies.[12] Likewise, in this study, incidences of OME development were significantly higher in the presence of sinusitis and allergic rhinitis ( $p<0.05$ ); and the incidence of OME was also significantly higher in patients with nasal obstructions due to septum deviation and concha hypertrophy ( $p<0.01$ ). These findings suggest that nasal obstructions in patients cause rhinosinusitis and secondarily OME.

Despite the number of comprehensive studies reporting that smoking is a significant factor in the etiology of OME, there are studies indicating that smoking has no effect on OME [3,12,15] Smoking is known to cause ciliary damage, to increase the predisposition towards viral and bacterial invasion in these regions and to disrupt the eustachian tube, causing OME. In a study carried out in Turkey, Guzel et al. determined that incidences of OME development were significantly higher among passive smokers [2], but the observed difference was not statistically significant ( $p=0.064$ ).

The correlation between a family's socio-economic level and OME is a controversial issue, according to literature. Some authors report an increase in the prevalence of upper respiratory tract infections and secondarily OME in families of low socio-economic status due to such factors as poor hygiene. Costagno Lavinsky, on the other hand, determined a higher incidence of OME, especially in the winter months, in children belonging to families of low socio-economic status.[16] Similarly, Siddartha et al. have determined that incidences of OME increase in line with socioeconomic status [10], contradicting El Sayed and Brooksda, who have reported no correlation between socio-economic status and incidences of OME [17-18] In the present study, no correlation was identified between the families' educational and socioeconomic status and OME incidences ( $p=0.757$  and  $p=0.579$ , respectively).

At first, the temporary hearing loss in OME decreases and increases, however hearing loss may become permanent due to irreversible

changes in the tympanum and tympanic membrane. The emergence of hearing loss at an early age may prevent a child from speaking and may lead to problems in language development, thus limiting the patient's intellectual capacity, and causing the success of children at school to decline.[1-2,18] Considering the slow course of the disease and its silent development, awareness must be raised among parents and instructors. In this study, the academic success of the students with OME was significantly lower when compared to the other children ( $p<0.01$ ).

### Conclusion

The incidence of OME in students in Hakkari was in agreement with the findings. Informing parents and instructors about the disease and raising awareness levels will increase significantly the academic success of the students, making it possible to raise healthier generations.

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