

# Frequency of Serous Otitis Media in Children without Otolaryngological Symptoms

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## Abstract

**Introduction** Otitis media with effusion is the fluid in the middle ear with no signs or symptoms of acute ear infection.

**Objective** This study aims to research the frequency of serous otitis media in patients referred to the pediatric clinic between 3–16 years of age without any active ear, nose, and throat complaints.

**Methods** This study included 589 children patients (280 boys, 309 girls; mean age: 9.42; range 3–16) who were administered to the pediatric clinic without otolaryngologic complaints. Patients underwent examination with flexible nasopharyngoscopy for adenoid hypertrophy. An otorhinolaryngologist examined all children on both ears using an otoscope and tested with tympanometry. We used tympanometry results to diagnose SOM.

**Results** The study included 589 patients that underwent fiber optic examination of the nasopharynx with an endoscope. Adenoid vegetation was present in 58 patients (9.8%) and was not detected in 531 patients (90.2%). We found serous otitis media in 94 (15.9%) patients. We obtained Type A tympanogram in 47 (81%) of 58 patients with adenoid vegetation, 6 (10.3%) Type B, and 5 (8.6%) Type C. When comparing 58 patients with adenoid vegetation with 538 patients without adenoid vegetation for serous otitis media, the frequency was not statistically significant ( $p > 0.05$ ).

**Conclusion** We believe that in children without any ear, nose, and throat complaints, it is possible to detect serous otitis media with adenoid vegetation. Thus, pediatric patients should undergo screening at regular intervals.

## Keywords

- ▶ tympanometry
- ▶ adenoid
- ▶ otitis media

## Introduction

Otitis media with effusion (OME) is the fluid in the middle ear with no signs or symptoms of acute ear infection.<sup>1</sup> Relentless middle-ear fluid from OME results in decreased mobility of the eardrum and serves as a barrier to sound conduction.<sup>2</sup> The eardrum is often cloudy with distinctly weakened mobility,

and an air-fluid level or bubble may be visible in the middle ear.<sup>3</sup> About 2.2 million diagnosed episodes of OME occur yearly in the United States, resulting in a combined direct and indirect annual cost estimate of four billion dollars.<sup>4</sup> Approximately 90% of children have otitis media with effusion before school age, frequently between ages 6 months and 4 years.<sup>5,6</sup>

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## Objective

We investigated the frequency of serous otitis media in patients referred to the pediatric clinic between 3–16 years of age without any active ear, nose, and throat complaints in our study.

## Methods

This study included 589 children patients (280 boys, 309 girls; mean age: 9.42; range 3–16) who were administered to the pediatric clinic without otolaryngologic complaints (► Fig. 1). The Ethics Board granted approval for the study, and each individual signed the informed consent form. The authors declare there was no conflict of interests in this research.

The inclusion criteria applied in the selection of subjects were children belonging to the age group from 3–16 years old. Exclusion criteria were patients aged less than 3 years and over 16 years; patients having active otorhinolaryngological symptoms; cleft palate repair history in the past and cases with submucous cleft palate; and patients having ear wax.

All children underwent an ear, nose, and throat examination. Patients underwent examination with flexible nasopharyngoscope (Fiebert-Endotech, Tuttlingen, Germany) for adenoid hypertrophy. The scaling of adenoid hypertrophy was according to grade given by Clemens and McMurray,<sup>7</sup> which is: Grade I has adenoid tissue filling 1:3 the vertical tallness of the choana, Grade II up to 2:3, Grade III from 2:3 to almost complete but not completely filling the choana, and Grade IV with complete choanal obstruction. In our study, we considered Grade II-III-IV as adenoid hypertrophy. An otorhinolaryngologist examined all children on both ears using an otoscope and tested them with tympanometry. Tympanometric examinations were done with MAICO m40, (Minneapolis, USA). We classified tympanometric measurement results according to adjusted

Jerger's classification as types A, As, B, or C.<sup>8</sup> Type A and As curves were accepted as no middle ear effusion while type B, type C, and type As as predicting of middle ear effusion. Tympanometry results were used to diagnose EOM.

We performed statistical analyses by using SPSS 22.0 operating program (license no: 10240642). We used the Pearson chi-square test and Fisher-Freeman-Halton test. Each analysis used for each value was defined under the relevant tables. Significance limit was set at  $p < 0.05$  for all statistics.

## Results

The study included 589 patients that underwent fiber optic examination of the nasopharynx done with an endoscope. Adenoid vegetation was present in 58 patients (9.8%) and was not detected in 531 patients (90.2%). Serous otitis media was found in 94 (15.9%) patients. We detected Grade 2 adenoid vegetation in 22 of 58 patients (38%), 18 (31%) had Grade 3, 18 (31%) had Grade 4 adenoid vegetation (► Fig. 2). We obtained Type A tympanogram for 47 (81%) of the 58 patients with adenoid vegetation, 6 (10.3%) were Type B, and 5 (8.6%) Type C. We found serous otitis media frequency in the 58 patients with adenoid vegetation to be 18.9%.

In this study, we obtained Type A tympanogram in 448 patients without adenoid vegetation (84.4%), Type B in 19 (3.6%), and Type C in 64 (12%) patients. We found the incidence rate of serous otitis media in 531 patients without adenoid vegetation to be 15.6%. ► Table 1 shows the frequency of adenoid vegetation in patients with and without serous otitis media. When 58 patients with adenoid vegetation compared with 538 patients without adenoid vegetation about serous otitis media, the frequency was not statistically significant ( $p > 0.05$ ).

Relation between age range and EOM is not found statistically meaningful ( $p > 0.05$ ).

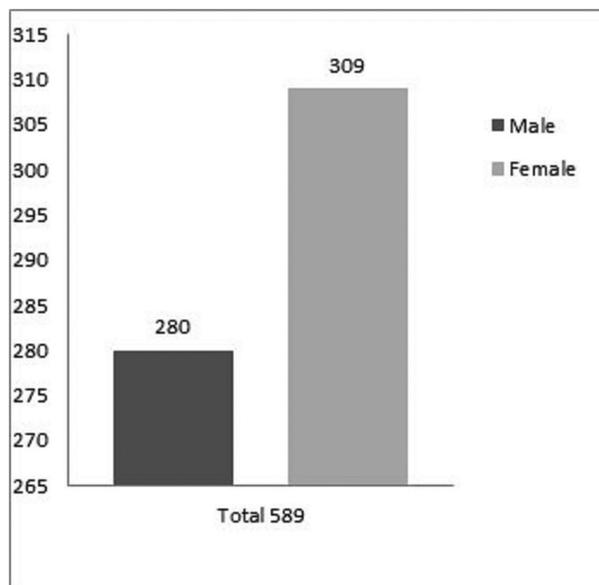


Fig. 1 Variation of patients' genders.

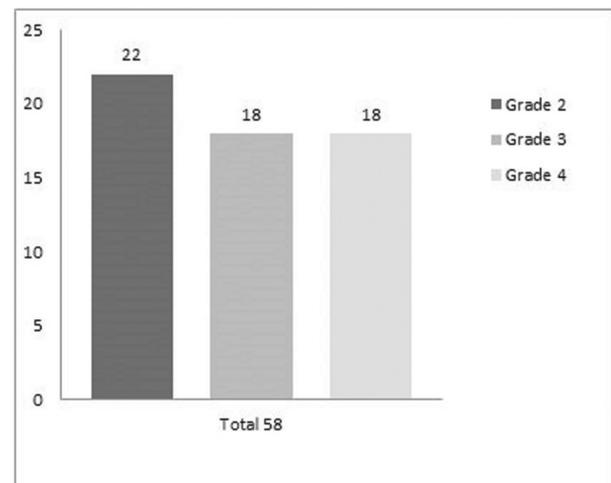


Fig. 2 Grading of patients with adenoid vegetation.

**Table 1** The rates of adenoid vegetation and otitis media with effusion (EOM) in 589 patients

	Type A tympanogram	Type B tympanogram	Type C tympanogram	EOM frequency
with adenoid vegetation = 58 (9.8%)	47 (81%)	6 (10.3%)	5 (8.6%)	11 (18.9%)
without adenoid vegetation = 531 (90.2%)	448 (84.4%)	19 (3.6%)	64 (12%)	83 (15.6%)
Total 589	495 (84.1%)	25 (4.2%)	69 (11.7%)	94 (15.9%)

Abbreviation: EOM, otitis media with effusion.

## Discussion

OME may be spontaneously due to poor eustachian tube function, or as an inflammatory response following acute otitis media. The importance of understanding the OME condition stems from its high prevalence with effusion, difficulties in identifying and assessing duration, increased risk of conductive hearing loss, potential impact on linguistic communication and cognition, and significant practice variations in management.<sup>9</sup> When the diagnosis of otitis media with effusion is uncertain, tympanometry or acoustic reflectometry should be measured as an adjunct to pneumatic otoscopy.<sup>10,11</sup> In our study, an otorhinolaryngologist examined all children on both ears using an otoscope and tested them with tympanometry. We used tympanometry results to diagnose otitis media with effusion.

We investigated the frequency of serous otitis media in patients referred to the pediatric clinic between 3–16 years of age without any active ear, nose, and throat complaints in our study.

Williamson et al studied 856 children aged 5 to 8 years from four South West Hampshire schools, which underwent an examination in three-years time by tympanometry, a method used to detect otitis media with effusion (> 90% specificity and sensitivity) performed once per school term. They recorded normal ears in 54.9% of children with 27% showing evidence of middle ear effusion.<sup>12</sup> Our study found similar results, albeit in smaller numbers: 94 of 589 patients (15.9%) presented serous otitis media. The lower ratio of serous otitis media in our study may be due to the fact that none of the patients included in this study had active otolaryngologic complaints.

Tomonaga et al studied nasopharyngeal bacterial flora in 259 children with otitis media with effusion. The results of this study suggest that adenoid vegetation plays an important role in the etiology of otitis media with effusion.<sup>13</sup> Sanli et al performed that ear, nose, and throat examination and a questionnaire on 1,165 children from four randomly selected schools. They found that 143 of the patients (12.2%) had OME. There was significant relation between otitis media with effusion and adenoid vegetation ( $p < 0.01$ ).<sup>14</sup> The incidence of serous otitis media in 58 patients with adenoid vegetation was similar to the rate of 18.9% in this study. The incidence of serous otitis media is 15.6% in the 531 patients without adenoid vegetation and the comparison of 58 patients with adenoid vegetation and 538 without adenoid vegetation considering serous otitis media is not statistically meaningful ( $p > 0.05$ ). This may be because adenoid vegetation does not

have much impact on serous otitis media; moreover, the number of the patients with adenoid vegetation ( $n = 58$ ) is less than the number of the patients without adenoid vegetation ( $n = 531$ ), which leads us to consider the reason insufficient.

Otitis media with effusion is highly prevalent in young children. Screening surveys of children in good health ranging in age from infants to age five years show a 15% to 40% prevalence of middle-ear effusion.<sup>6,12–21</sup> Among children examined at normal intervals for one year, ~50% to 60% of child care center attendees<sup>17</sup> and 25% of school-aged children<sup>22</sup> had otitis media with effusion at some time during the examination period, with elevated incidence during the winter months. Population-based screening has not impacted short-term language outcomes<sup>18</sup> and we have not assessed its long-term effects in a randomized clinical trial. Thus, the recommendation for screening is based not only on the ability to identify otitis media with effusion but, more importantly, on a lack of incontrovertible benefits from treating children identified as such that exceed the auspicious natural history of the disease. The New Zealand Health Technology Assessment<sup>23</sup> could not determine if preschool screening for otitis media with effusion was effective. More recently, the Canadian Task Force on Preventive Health Care<sup>24</sup> studied that there was insufficient evidence to recommend including or excluding regular early screening for otitis media with effusion. Although screening for otitis media with effusion is not inherently harmful, potential risks include erroneous diagnoses, overtreating self-limited disease, parental fear, and the costs of screening and excessive treatment. Population-based screening is suitable for conditions that are ordinary, can be found by a sensitive and specific test, and provide the advantages stemming from early detection and treatment.<sup>25</sup> The first two requirements are fulfilled by otitis media with effusion, which affects up to 80% of children by school entry<sup>4,6,12</sup> and can be easily screened with tympanometry. Kucur et al reported that the prevalence of OME among 7–12-year-old schoolchildren in Erzurum ( $n = 26$ ). Local data provide a population specific standard and can be used in healthcare planning.<sup>26</sup> Complications of OME especially occur if the disease is not recognized in its early stages and/or treated accordingly. Chronic otitis media, adhesive otitis media, retraction pockets, and tympanosclerosis are the most common complications of chronic OME. When permanent hearing loss develops due to complications, it may lead to impairment in development of speech and language.<sup>27</sup>

## Conclusion

As a result, we believe it is possible to detect serous otitis media in children without any ear, nose, and throat complaints with adenoid vegetation. Therefore, pediatric patients should undergo screening at regular intervals. The scan time and frequency terms are needed for further and multicenter studies.

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