

Prevalence of Otitis Media with Effusion Among Primary School Age-Children and Etiopathogenic Examination

Arif Sanli · Omer Tasdemir · Mehmet Eken ·
Ozlem Celebi · Suleyman Hilmi Yilmaz

Received: 11 February 2011 / Accepted: 9 November 2011 / Published online: 15 December 2011
© Association of Otolaryngologists of India 2011

Abstract A prevalence study was carried out in order to look into the etiopathogenic relation of otitis media with effusion (OME) in primary school-age children. The study included ENT examination and a questionnaire that was carried out in 4 randomly selected schools on 1,165 children. 143 of the cases (12.2%) had OME. A significant relation between OME and adenoid vegetation was found ($P < 0.01$) while no significant relation between EOM and recurrent tonsillitis and allergic rhinitis was found ($P > 0.05$). As a result, OME is a common disease that can lead to other hard-to-cure health problems and be costly if etiopathogenic factors are not resolved on time.

Keywords Otitis media with effusion · Prevalence · Etiology

Introduction

Otitis media (OM) is the commonest childhood disease after viral upper respiratory infections (VURI). Acute otitis media (AOM) is an inflammatory disease table of the middle ear which exhibit rapid-occurring acute infection

symptoms like fever and earache. As for otitis media with effusion (OME), which does not exhibit acute infection symptoms, it is the inflammatory response of the middle ear that is defined by effusion in the tympanic cavity [1].

Community screenings for epidemiology and prevalence of OME were done and risk factors were determined especially in developed countries. According to these screenings annual prevalence rate of OME was between 14–62% and 2–62% [2]. In our country a nationwide prevalence study of OME has not been conducted. Screenings done in Ankara show that OME prevalence rates vary between 11.20 and 18.3% [3, 4]. According to a screening study that was carried out by S. Inanli et al. in İstanbul, OME prevalence was 9% [5].

Our study made use of otoscopic examination, tympanometry and also endoscopic examination which makes it the most comprehensive and broad screening study ever done in Istanbul in this regard. Our aim is to determine the risk factors for OME, enable the taking of precautionary measures and provide guidance for the preparation of appropriate treatment protocols.

Material and Method

The study was carried out in our region in 4 randomly selected schools between March 2010 and June 2010. Approval was obtained from the local health authority, district governorship and district national education directorate for the study.

All the children were given a comprehensive 25-item questionnaire that consisted of both multiple choice and fill-in questions about ENT diseases 1 week before the examination. The questionnaire pertained to recurrent tonsillitis, allergic rhinitis, upper respiratory tract

A. Sanli · M. Eken (✉) · S. H. Yilmaz
ENT Department, Kartal Dr. Lutfi Kirdar Training and Research
Hospital 2, Istanbul, Turkey
e-mail: memedeken@yahoo.com

O. Tasdemir
ENT Department Kelkit, Kelkit Public Hospital, Gumushane,
Turkey

O. Celebi
ENT Department Rize, Rize Training and Research Hospital,
Rize, Turkey

obstruction, snoring, hearing loss, passive smoking and success at school, interest in lessons (filled in by teachers).

The questionnaires were given to the children in envelopes and were received in closed envelopes after their parents completed them. All the examinations were performed by 2 ENT specialists and 2 ENT assistants in infirmaries or separate rooms reserved for this study at schools. Forms were evaluated before the examination and the examination was carried out after the evaluation.

All the children underwent otoscopic, oral cavity and anterior rhinoscopic examinations. Adenoid vegetation (AV) examination was performed on all children who did not have sinusitis, septum deviation or nasal polyposis and could tolerate the examination, with 0 degree (2.7 mm) portable rigid telescope. AV that was obstructing 50% and more of the choana was accepted as positive [6]. Children who were suspected to have OME underwent endaural pressure measurement with 226 Hz portable tympanogram. Children who had tonsillectomy, adenoidectomy and intubation story were not included in the study.

Eighty-one children who could not tolerate AV examination, who had nasal polyposis, septum deviation, craniofacial anomalies, who did not complete the form appropriately and lacked the consent form were excluded from the study.

Statistical Examinations

Statistical analysis of the findings was performed using the SPSS (Statistical Package For Social Sciences) Windows 10.0. Data from the study was assessed using descriptive statistical methods (frequency) besides using χ^2 test to compare qualitative data. Results were assessed at 95% confidence interval with significance level at $P < 0.05$.

Findings

The study was performed on a total of 1,246 cases between March 2010–June 2010 by Dr Lütfi Kirdar Kartal Training and Research Hospital 2. ENT Clinic. Ages of the cases differed between 5 and 14. The mean age was 9.59 ± 2.60 . 1,165 children were included in the study.

In overall 1,165 cases, 143 cases (12.2%) had clinic OME. 1,037 cases (89.01%) had Type A Tympanogram and 128 cases (10.9) had Type B Tympanogram (Tables 1, 2).

In the questionnaire, 170 children were stated to have hearing loss according to their parents and teachers. The examinations and tympanogram showed that 40 cases had hearing loss.

Of 143 OME cases, 82 had AV. The rates of AV in OME cases are found to have high significance levels ($P < 0.01$).

Table 1 Distribution of characteristic features

Total cases		<i>N</i> = 1,165	100%
Cronic tonsillitis		468	40
A. Vegetation		234	20
Allergic rhinitis		82	7.03
Clinic OME		143	12.2
Tympanogram	Type A	1,037	89
	Type B	128	10.9
Hearing loss		170	14.6
Total		1,165	100

Table 2 Findings in OME cases

<i>n</i> = 143	Case	%
Adenoid vegetation	82	57.3
Cronic tonsillitis	40	27.9
Allergic rhinitis	30	20.9
Hearing loss	40	27.9

Cronic Tonsillitis

Of 1,165 cases which constitute the study group, 468 cases had cronic tonsillitis anamnesis and 40 of the 468 cases had OME. The relation between them was not found statistically significant ($P > 0.05$).

Hearing Loss

Within the cases diagnosed with OME after anamnesis and clinical examination; cases that were diagnosed with hearing loss following tympanogram are statistically significant ($P < 0.01$). Of the 170 children who were stated to have hearing loss in anamnesis, 40 had OME.

Allergic Rhinitis

The difference was not statistically significant between allergic rhinitis incidence rates and OME incidence ($P > 0.05$). 30 cases had allergic rhinitis out of 143 OME cases.

Discussion

OM is the commonest childhood disease after VURI. OME is the inflammatory response of the middle ear that is defined by effusion in the tympanic cavity and does not exhibit acute infection symptoms [1].

Especially in developed countries, community screenings for epidemiology and prevalence of OME were done

and risk factors were determined. According to these screenings annual prevalence rate of OME was between 14–62% and 2–62% [2]. In our country a nationwide prevalence study of OME has not been conducted. Screenings done in Ankara show that OME prevalence rates vary between 11.20% and 18.3% [3, 4]. According to a screening study that was carried out by S. Inanli et al. in İstanbul on 539 children, OME prevalence was 9% [5]. In another study performed by Caylan et al. in Trabzon in 2006, 1,077 children between the ages 5 and 12 were screened and examined and OME prevalence was found to be 11.14% (120/1,077) [7]. The screening study carried out by Okur E et al. at a school in Kahramanmaraş, in which 2,930 children aged between 6–16 were examined, OME prevalence was found 6.5% (189/2930) [8]. OME prevalence was 2.42% (89/3675) in another screening study in which 3,675 primary and secondary school students were screened in Elazığ in september and october [9]. Gültekin et al. found OME prevalence as 8.7% (152/1740) in a study they performed in Şişli and Beyoğlu [10].

The relation between adenoid vegetation's existence which is diagnosed through endoscopic examination and OME has not been clarified by the screening studies towards prevalence of OME that were performed in our country. What we intended to do with this study was to the relation between AV growth and OME.

According to the screening study that we conducted, the prevalence of OME in primary-school age children was 12.2% (143/1165). OME prevalence may vary according to the region and climate the study is performed; however in light of the previous studies which we performed and were performed in this field in our country, we can state that the prevalence of OME among primary school-age children is between 2% and 18%.

Age is the most important risk factor for OME. It is a childhood disease and as the age gets older, the incidence rate of the effusion decreases. This is because the eustachian tube (ET) shifts its anatomical orientation and gradually changes its angle from horizontal to vertical with age and as the child grows the immune system gets stronger by having met many types of allergens. In a screening study carried out at a kindergarten in İstanbul the prevalence of OME was found to be 19.5% for 2–6 years [11]. This is higher than the rates of all other screenings performed on primary school-age children in İstanbul. This finding particularly supports the fact that prevalence of OME decreases as the age gets older. In our study we found that the ages 5–7 had the highest prevalence (16.06%) of OME. The result we reached is also confirmatory of the previous studies. OME rates decreased with age in the study carried out by Okur et al. as well [8].

Studies stating that pharyngeal tonsil hypertrophy might cause OME were published [8]. In our screening study,

statistically no significant relation between OME and the size of tonsillitis was observed ($P>0.05$). On the other hand, it is possible that tonsil hypertrophy can lead to recurrent tonsillitis and recurrent VURIs can cause OME.

The relation between AV and OME is a controversial matter. Nowadays, it is known that problems specific to the eustachian tube (ET) rather than AV-originating obstructions play an important role in eustachian tube (ET) dysfunction in children. Though AV is not so large as to obstruct nasopharynx, it can play an important role in OME pathophysiology by causing cronic or recurrent inflammation and pathogen colonization [12, 13].

In our study, we examined the most blamed AV as the cause for OME. We compared the OME and the adenoid growth that covered 50% and more of the choanas and settled laterally while obstructing the tube. AV incidence rates in cases with OME were found significantly high. According to the conclusion we reached there is a serious relation between AV which obstructs the tuba and OME, and the OME rate in these patients with AV significantly increased.

We also examined the awareness of the child's parents and the teacher of his/her hearing loss. We examined the OME probability in children who doubtedly had hearing loss and the relation between them. Subjective hearing loss rates were found significantly high in cases that had OME. Based on this result, we demonstrated that the hearing loss can be noticed by parents and the teacher. In a study in which preschool children aged between 3–6 were examined in 2002 in İstanbul, although the children did not complain about any problem the prevalence of OME was found 19.5% and asymptomatic OME existence was pointed out [11]. As to our study, primary school-age children (ages 5–14) were evaluated. Even though this result might be very subjective, it must not be forgotten that it can be observed more clearly as the child grows.

Research on allergy's role on the formation of effusion in OME pathogenesis have not been concluded yet, though comprehensively investigated and argued [14, 15]. As for our study, we investigated the relation between OME and cases with allergic rhinitis. We did not find the relation between allergic rhinitis incidence rates and OME rates statistically significant ($P>0.05$). Martines et al. performed a skin prick allergy test on children with OME, according to the result 62.9% was positive, 37% was negative [16]. According to the study that was carried out by Caylan and et al. in Trabzon on 1,077 primary education-age children, the rate of allergy in non-OME children was 9.9% while it was 11.8% in children with OME [7].

It is stated that a Type B curve in tympanometry has an over 80% sensitivity of detection for OME. This means that a Type B curve does not always indicate the existence of OME. We used 226 Hz portable tympanogram in our study

to evaluate the relation between OME incidence and tympanogram type. We found that a high ratio of cases with OME were Type B and all the cases who did not have OME were Type A ($P<0.001$). On the other hand, existence of a Type A curve does not eliminate the possibility of OME. Because the OME possibility in this type of curve is 5% and below, but not 0%. This fact underlines the importance of tympanogram in evaluating the effusion in the middle ear.

Conclusion

OME is a common disease that can lead to other hard-to-cure health problems. In our country a nationwide prevalence study of OME has not been conducted. It is a childhood disease and incidence rate of the effusion decreases with age. According to our study the prevalence of OME (16.06%) in children aged between 5 and 7 was the highest.

The results we obtained indicate that there is a serious relation between OME and AH which is obstructing the tube, and that the OME rate in these patients increased significantly.

We examined family's and teacher's awareness degree of the child's hearing loss. We found that the difference between hearing loss rates and OME incidence rates was not statistically significant ($P<0.01$).

When we examined the relation between OME and the cases with allergic rhinitis, we found that the relation between allergic rhinitis and OME was not statistically significant ($P>0.05$).

References

1. Bluestone CD, Gates GA, Klein JO et al (2002) Recent advances in otitis media. Panel reports. I. Definitions, terminology, and classification of otitis media. *Ann Otol Rhinol Laryngol* 111:8–18
2. Teele DW, Klein JO, Rosner BA (1984) Otitis media with effusion during the first three years of life and development of speech and language. *Pediatrics* 74(2):282–287
3. ve ark Çuhruk Ç (1979) TED Ankara koleji ilkököl öğrencileri arasında kulak burun boğaz hastalıkları prevalansı. *Türk ORL Bülteni* 4:250
4. Göksu A (1992) Park Eğitim Sağlık Ocağı bölgesine bağlı ilkökullarda sekretuar otitis media prevalansı araştırması. Uzmanlık Tezi. Ankara Üniversitesi Tıp Fakültesi Halk Sağlığı Anabilim dalı, Ankara
5. ve ark İnanlı S (2000) İstanbul'da Okul Öncesi ve Okul Çağı Çocuklarda Sekretuar Otitis Media Prevalansı ve Risk Faktörleri. *Türk ORL Arşivi* 38(1):9–16
6. Aydın S, Sanlı A, Celebi O, Tasdemir O, Paksoy M, Eken M, Hardal U, Aydurhan E (2008) Prevalence of adenoid hypertrophy and nocturnal enuresis in primary school children in Istanbul. *Turkey Int J Pediatr Otorhinolaryngol* 72:665–668
7. Caylan R, Bektaş D, Atalay C, Korkmaz O (2006) Prevalence and risk factors of otitis media with effusion in Trabzon, a city in northeastern Turkey, with an emphasis on the recommendation of OME screening. *Eur Arch Otorhinolaryngol* 263(5):404–408. Epub 2005 Nov 22
8. Okur E, Yıldırım I, Akif Kilic M, Guzelsoy S (2004) Prevalence of otitis media with effusion among primary school children in Kahramanmaraş. *Turkey Int J Pediatr Otorhinolaryngol* 68(5): 557–562
9. Keleş E, Kaygusuz I, Karlıdag T, Yalçın S, Açıık Y, Alpay HC, Sakallıoğlu O (2004) Prevalence of otitis media with effusion in first and second grade primary school students and its correlation with BCG vaccination. *Int J Pediatr Otorhinolaryngol* 68(8): 1069–1074
10. Gultekin E, Develioğlu ON, Yener M, Özdemir I, Külekçi M (2010) Prevalence and risk factors for persistent otitis media with effusion in primary school children in Istanbul, Turkey. *Auris Narus Larynx* 37:145–149
11. Hidayeti A, İnci E, Korkut N, Ada M, Kaytaş A, Devranlıoğlu İ (2002) Okul öncesi kreş çocuklarında efüzyonlu otitis media. *Türk Otolarengoloji Arşivi* 40(1):53–57
12. Hergils L, Magnuson B (1985) Morning pressure in the middle ear. *Arch Otolaryngol* 111:86–89
13. Luntz M, Sadé J (1990) Daily fluctuations of middle ear pressure in atelectatic ears. *Ann Otol Rhinol Laryngol* 99:201–204
14. Ceylan A, Goksu N, Kemaloğlu YK, Uğur B, Akyurek N, Bayazit YA (2007) Impact of Jacobson's (Tympanic) nevre sectioning on middle ear functions. *Otol Neurotol (Baskıda)*
15. Kemaloğlu YK (2005) Orta Kulak Effüzyonları. *Türkiye Klinikleri. J Surg Med Sci* 1(7):41–49
16. Martines F, Bentivegna D, Di Piazza F, Martinciglio G, Sciacca V, Martines E. The point prevalence of otitis media with effusion among primary school children in Western Sicily. *Eur Arch Otorhinolaryngol*. doi:10.1007/s 00405-009-1131-4