



Prevalence of otitis media with effusion among school age children in rural parts of Konya province, Turkey

Türkiye'de Konya ilinin kırsal kesimlerinde okul çağındaki çocuklarda efüzyonlu otitis media prevalansı

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ABSTRACT

Objectives: This study aims to evaluate the current prevalence of serous otitis media (SOM) among school age children living in rural areas of Konya province located in southern Turkey.

Patients and Methods: This cross sectional study which was conducted between October 2012 and January 2013 included 2,352 children (1,179 males, 1,173 females; mean age 8.9±2.8 years; range 4 to 15 years) who attended 36 different primary schools in rural parts of the Konya province. Otologic complaints, findings, and tympanometry results were recorded. Diagnosis of SOM was obtained based on history, symptoms, abnormal otoscopy and tympanogram findings.

Results: The overall prevalence of SOM was 4.6%. The highest prevalence was at the age of four (11.2%). There was a significantly higher prevalence of SOM at the age of six (11.1%). The overall prevalence was higher in males (6.17%) compared to females (3.16%) in all age groups (p<0.05).

Conclusion: Compared to the literature, overall prevalence of SOM in our study was lower. Development of preventive and therapeutic strategies in the first step health care service may have a considerable effect on this low rate.

Keywords: Child; prevalence; serous otitis media.

ÖZ

Amaç: Bu çalışmada Türkiye'nin güneyinde yer alan Konya ilinin kırsal kesimlerinde yaşayan okul çağındaki çocuklarda güncel seröz otitis media (SOM) prevalansı değerlendirildi.

Hastalar ve Yöntemler: Ekim 2012 - Ocak 2013 tarihleri arasında yürütülen bu kesitsel çalışmaya Konya ilinin kırsal kesimlerinde 36 farklı ilkokula giden 2352 çocuk (1179 erkek, 1173 kız; ort. yaş 8.9±2.8 yıl; dağılım 4-15 yıl) dahil edildi. Otolojik yakınmalar, bulgular ve timpanometri bulguları kaydedildi. Seröz otitis media tanısı öykü, semptomlar, anormal otoskopi ve timpanogram sonuçlarına dayanarak konuldu.

Bulgular: Toplam SOM prevalansı %4.6 idi. En yüksek prevalans dört yaşında idi (%11.2). Seröz otitis media prevalansı altı yaşında anlamlı olarak daha yüksekti (%11.1). Tüm yaş gruplarında toplam prevalans erkeklerde (%6.17) kızlara (%3.16) kıyasla daha yüksekti (p<0.05).

Sonuç: Literatür ile karşılaştırıldığında, çalışmamızda toplam SOM prevalansı daha düşük idi. Birinci basamak sağlık hizmetinde önleyici ve tedavi edici stratejilerin gelişimi bu düşük oranda önemli etkiye sahip olabilir.

Anahtar Sözcükler: Çocuk; prevalans; seröz otitis media.



Serous otitis media (SOM), also known as secretory otitis media or otitis media with effusion, is characterized by the collection of serous or mucous fluid behind an intact tympanic membrane cavity during an inflammatory process and the lack of acute signs and symptoms of infection.^[1] In fact, the formation of middle ear effusion frequently occurs after an episode of acute otitis media (AOM). Chronic otitis media with effusion is defined as the persistence of serous or mucoid middle ear effusion for three months or more.^[2] The etiology of chronic serous otitis media is multifactorial which includes adenoid hypertrophy, infection (viral or bacterial), allergy, environment and social factors.^[3] Geographic and socioeconomic factors such as overcrowding, poor diet and lack of health care may contribute to the development of otitis media. Other risk factors include male gender, bottle feeding and feeding position.^[4]

The prevalence of SOM varies from country to country because of geographical variations and different study designs, reporting and settings.^[5] Serous otitis media is one of the most common childhood diseases especially in developing countries. The disease causes moderate hearing loss and if persistent, may cause delayed language and speech development.^[6] To prevent potential complications, diagnosis and adequate treatment in the early phase of the disease is essential. Serous otitis media is a preventable public health problem and epidemiological studies examining the socioeconomic and geographic factors are critical in the prevention of this disease. This study was conducted to assess the prevalence of SOM among school age children in a rural area in southern Turkey.

PATIENTS AND METHODS

This study received an ethics review and approval from the Ethics Committee of the Medical School of Necmettin Erbakan University. This cross-sectional epidemiological study was conducted in 36 villages in Turkey between October 2012 and January 2013 on a total of 2,352 (1,179 males, 1,173 females; mean age 8.9±2.8 years; range 4-15 years) primary school and kindergarten children. Patients with suppurative or nonsuppurative chronic otitis media were not included in the study. Villages included in the study were chosen randomly. Most of the population living in those villages had

similar socioeconomic levels with occupations in agriculture and livestock. All of the patients were Turkish. The demographic data of the included patients were recorded in the data collection form. The children underwent an ear nose and throat examination; all children were examined on both ears using a static otoscope and tested with tympanometry by an otorhinolaryngologist. Tympanometric examinations were done with the 'Interacoustic Pediatric Impedancemeter MT10' device (Interacoustics, Assens, Denmark). All ear wax encountered was cleaned. The character of the tympanic membrane was determined as appearance (whether normal, dull or retracted), presence of fluid in the middle ear as air bubbles or fluid level and the color of the tympanic membrane (yellow, grey, blue or amber). Tympanometric curve results were classified according to modified Jerger's classification as types A, As, B or C.^[7] Type A curve was interpreted as no middle ear effusion while type B, type C, and type As as predictive of middle ear effusion. Symptoms, otoscopy and tympanometry results were used to diagnose SOM. The prevalence was calculated by dividing the number of the students diagnosed with SOM by the total number of students, and 95% confidence interval (CI) was used.

Statistical analysis of the data was done using chi-square test. Results with a p value <0.05 were considered significant. Statistical analysis was done using SPSS for Windows version 13.0 software program (SPSS Inc., Chicago, IL, USA).

RESULTS

The gender distribution was 50.3% male and 49.7% female. Of 2,352 children, 110 were diagnosed with SOM (4.67%). The highest prevalence was at age four years old (11.2%). There was a significantly higher prevalence of SOM at age six (11.1%). The overall prevalence was higher in males (6.17%) compared to females (3.16%) in all age groups (p<0.05). The prevalence of SOM according to age group is summarized in Table 1. None of the children had any craniofacial anomaly affecting Eustachian tube function, such as a cleft palate. The symptoms specifically sought were ear blockage, otalgia, and tinnitus and hearing impairment. Forty-two (38%) of the patients were asymptomatic. The most common presenting complaint was hearing impairment in 37 (33%) (p<0.05). The other presentations were

Table 1. Prevalence serous otitis media of according to the age groups by gender

Age	Female group		Male group		Total	
	SOM prevalence		SOM prevalence		SOM prevalence	
n	n/N	%	n/N	%	n/N	%
4	2/43	4.65	9/55	16.36	11/98	11.22
5	3/83	3.61	3/89	3.37	6/172	3.48
6	6/65	9.23	10/79	12.65	16/144	11.11
7	9/243	3.70	12/224	5.35	21/467	4.49
8	4/100	4	9/144	6.25	13/244	5.32
9	2/109	1.83	10/95	10.52	12/204	5.88
10	4/157	2.54	3/123	2.43	7/280	2.5
11	2/126	1.58	7/118	5.93	9/244	3.68
12	2/109	1.83	4/131	3.05	6/240	2.5
13	2/107	1.86	5/104	4.80	7/211	3.31
14	1/27	3.70	1/21	4.76	2/48	4.16
Total	37/1169	3.16	73/1183	6.17	110/2352	4.67

SOM: Serous otitis media; n: Number of patients diagnosed with SOM; N: Number of examinees.

ear block (16%), tinnitus (7%) and otalgia (4%) (Table 2).

The findings identified were fluid in the middle ear, dullness and retraction of the tympanic membrane. The most common finding was dullness of the tympanic membrane in as much as 41.8% of cases ($p<0.05$) (Table 3). All of the patients with SOM (a total of 110 patients) were assessed with tympanometry, 62 (56.3%) ears had a type B curve while 40 (36.3%) ears had a type C and eight (7.2%) ears had an As curve (Table 3).

DISCUSSION

Serous otitis media is a common childhood disease in developing countries. Many children with SOM do not require treatment due to high rates of spontaneous resolution. Current

guidelines recommend a three-month period of observation with serial audiometry and when otitis media with effusion is bilateral and persistent for more than three-months the chances of natural resolution are much lower and treatment becomes beneficial. Guidelines recommend either surgery in the form of ventilation tubes or hearing aids.^[8] Complications of SOM occur especially 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 SOM and when permanent hearing loss develops due to complications, it may lead to impairment

Table 2. Presence of symptoms at serous otitis media group

Symptoms	n	%
Asymptomatic	42	38.2
Otalgia	5	4.5
Ear block	18	16.3
Tinnitus	8	7.2
Hearing impairment	37	33.6
Total number of serous otitis media	110	100

Table 3. Otosopic and tympanogram findings of children diagnosed with serous otitis media

	n	%
Otosopic findings		
Retracted	20	18.1
Fluid in the middle ear	42	38.2
Dull	48	43.6
Tympanogram findings		
Type as tympanogram	8	7.2
Type B tympanogram	62	56.3
Type C tympanogram	40	36.3
Total number of serous otitis media	110	100

in development of speech and language.^[6,9] Routine examinations might help in reducing the complications of SOM, especially in a country where access to healthcare facilities is relatively limited and infrequent. Certain racial groups are believed to have a high prevalence of otitis media with effusion: American natives (Indians and Eskimos), the Maori of New Zealand, natives of Guam, Greenland Eskimos, Australian aborigines and Laplanders.^[10] Differences in SOM rates by race may reflect differences in access to the medical care, socioeconomic status and anatomic or biologic susceptibility. The pathophysiology of SOM is multifactorial. There are certain individual and environmental risk factors in the development of SOM including sex, socioeconomic status, family history, birth and neonatal history including breastfeeding, passive smoking, recent history of hearing loss, allergies, nasal symptoms, acute tonsillitis, recurrent and recent upper respiratory tract infections, previous history of acute otitis media, effect of the season and attendance in daycare centers.^[1-4]

The point prevalence of SOM varies among several studies and also depends on research methods and population characteristics. Epidemiological studies on SOM in Turkish children generally have been performed in major cities. A recent study from the northern part of Turkey has reported the prevalence of SOM among primary school children to be 9.86%.^[11] Another study by Kırıs et al.^[12] found the prevalence rate of SOM in preschool children in eastern Turkey to be 10.43%. In a screening study carried out with 1,077 children aged between 5 and 12 years in Trabzon, Turkey, in 2006, Caylan et al.^[13] found the prevalence of SOM to be 11.14% (n=120). In a school screening study in Kahramanmaraş, Turkey, by Okur et al.^[14] carried out with 2,930 children aged between 6 and 16 years, the prevalence was 6.45% (n=189). In a school screening study performed between September and November 2002 with 3,675 primary and intermediate school children in Elazığ, Turkey, the prevalence was 2.42% (n=89).^[15] Gultekin et al.^[16] examined 1,740 children in Istanbul, Turkey and found a prevalence of 8.7% (n=151). The prevalence rate of SOM in our study 4.67% (n=110) is lower than most other reports^[11-13,16] in comparative age groups. Common usage of antibiotics for treating AOM and easy access to health care services in the developing world

are closely related to the prevalence of SOM. Specifically in Turkey where the study took place, a new public health government policy since 2010 pays costs of medical care for those under age 18 regardless of whether or not patients have insurance. When we consider that, in reality patients living in rural areas might have benefited more than those in urban areas due to low-income levels. A low prevalence of SOM (4.3%) has been recently reported also in Chinese primary school children in Xi'an.^[5] Saim et al.^[17] found the prevalence rate of SOM in preschool children in Malaysia was 13.8% and the prevalence was higher in children amongst urban areas than rural areas. A study from Kuwait^[18] cites a point prevalence rate of 31.3% (in a sample of 893 children, 6-12 years old).

Irrespective of the researcher's method, most studies conclude that age is one of the most important factors for the disease. Reviewing 23 articles about the issue, Zielhuis et al.^[19] used the age-specific prevalence rate and came to the conclusion that the rate has two peaks: one around two years of age and the other around the age of five years. In our study the age-range was 4-15 years, and we observed that the greatest prevalence was at the ages of four and six years. A recent study conducted in central Turkey reported the prevalence of SOM as 1.32%.^[20] Most studies agree that the prevalence of SOM is greater among boys than girls. In our study, there was significant male predominance. Generally the first and the only symptom of SOM is hearing loss. In our study 38.2% of the patients diagnosed with SOM were asymptomatic and the most common presenting complaint was hearing impairment (33%). Other presentations were ear block (16.3%), tinnitus (7.2%) and otalgia (4.5%) respectively.

Conclusion

The prevalence rate of SOM among preschool children in a rural area of Konya a city in southern Turkey is 4.67%. When we compare this result to previous studies, overall prevalence of SOM in this study is lower. Our findings may suggest that development of preventive and therapeutic strategies for preventable diseases may have a considerable role on this low rate. At the same time considering the deep impact of SOM on hearing, the prevalence of the disease can be reduced more by interventions guided by well-planned epidemiological studies of risk factors.

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REFERENCES

- Iversen M, Birch L, Lundqvist GR, Elbrønd O. Middle ear effusion in children and the indoor environment: an epidemiological study. *Arch Environ Health* 1985;40:74-9.
- Bennett KE, Haggard MP. Accumulation of factors influencing children's middle ear disease: risk factor modelling on a large population cohort. *J Epidemiol Community Health* 1998;52:786-93.
- Ahn JH, Yoon TH, Pae KH, Kim TS, Chung JW, Lee KS. Clinical manifestations and risk factors of children receiving triple ventilating tube insertions for treatment of recurrent otitis media with effusion. *Pediatrics* 2006;117:1119-23.
- Sophia A, Isaac R, Rebekah G, Brahmadathan K, Rupa V. Risk factors for otitis media among preschool, rural Indian children. *Int J Pediatr Otorhinolaryngol* 2010;74:677-83.
- Zhang Q, Wei J, Xu M, Zhang Q, Zhang X, Zhang Z, et al. Prevalence of otitis media with effusion among children in Xi'an, China: a randomized survey in China's mainland. *Ann Otol Rhinol Laryngol* 2011;120:617-21.
- Teele DW, Klein JO, Rosner BA. Otitis media with effusion during the first three years of life and development of speech and language. *Pediatrics* 1984;74:282-7.
- Jerger J. Clinical experience with impedance audiometry. *Arch Otolaryngol* 1970;92:311-24.
- Wallace IF, Berkman ND, Lohr KN, Harrison MF, Kimple AJ, Steiner MJ. Surgical treatments for otitis media with effusion: a systematic review. *Pediatrics* 2014;133:296-311.
- Surgical management of children with otitis media with effusion (OME). London: National Institute for Health and Clinical Excellence; 2008 [updated May 30, 2012]. Available from: <http://guidance.nice.org.uk/CG60>. [Accessed October 30, 2013]
- Bluestone CD, Klein JO. Management. In: *Otitis Media in Infants and Children*. 2 nd ed. Philadelphia: W.B. Saunders; 1995. p. 226-27.
- Erdivanli OC, Coskun ZO, Kazikdas KC, Demirci M. Prevalence of Otitis Media with Effusion among Primary School Children in Eastern Black Sea, in Turkey and the Effect of Smoking in the Development of Otitis Media with Effusion. *Indian J Otolaryngol Head Neck Surg* 2012;64:17-21.
- Kırıs M, Muderris T, Kara T, Bercin S, Cankaya H, Sevil E. Prevalence and risk factors of otitis media with effusion in school children in Eastern Anatolia. *Int J Pediatr Otorhinolaryngol* 2012;76:1030-5.
- Caylan R, Bektas D, Atalay C, Korkmaz O. 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* 2006;263:404-8.
- Okur E, Yildirim I, Akif Kilic M, Guzelsoy S. Prevalence of otitis media with effusion among primary school children in Kahramanmaraş, in Turkey. *Int J Pediatr Otorhinolaryngol* 2004;68:557-62.
- Keleş E, Kaygusuz I, Karlıdag T, Yalçın S, Açık Y, Alpay HC, et al. Prevalence of otitis media with effusion in first and second grade primary school students and its correlation with BCG vaccination. *Int J Pediatr Otorhinolaryngol* 2004;68:1069-74.
- Gultekin E, Develioğlu ON, Yener M, Ozdemir I, Külekçi M. Prevalence and risk factors for persistent otitis media with effusion in primary school children in Istanbul, Turkey. *Auris Nasus Larynx* 2010;37:145-9.
- Saim A, Saim L, Saim S, Ruzymah BH, Sani A. Prevalence of otitis media with effusion amongst pre-school children in Malaysia. *Int J Pediatr Otorhinolaryngol* 1997;41:21-8.
- Holmquist J, Al Fadala S, Qattan Y. Prevalence of secretory otitis media among school children in Kuwait. *J Laryngol Otol* 1987;101:116-9.
- Zielhuis GA, Rach GH, van den Bosch A, van den Broek P. The prevalence of otitis media with effusion: a critical review of the literature. *Clin Otolaryngol Allied Sci* 1990;15:283-8.
- Ozkiriş M, Kapusuz Z, Saydam L. The prevalence of middle ear diseases among 7- to 13-year-old primary school students in Yozgat province. *Turk J Pediatr* 2012;54:493-6.