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Prevalence of otitis media with effusion among preschool-age children in Erbil governorate

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Zhwan Maghdid Aziz Koye* Arsalan Awlla Mustafa Shem**

Abstract

Background and objective: Otitis media with effusion is one of the common diseases in children at preschool age. This study aimed to determine the prevalence of otitis media with effusion in Erbil governorate and compare this prevalence by urban and sub-urban areas and by different seasons.

Methods: This descriptive cross-sectional study was carried out in the Department of Otolaryngology, Rizgary Teaching Hospital from April 2015 to May 2016 through enrolling1077 children from randomly selected kindergartens.

Results: Of 1077 children, 124 were diagnosed as otitis media with effusion and the prevalence was 11.5% in Erbil governorate. The highest rate of otitis media with effusion was seen in spring (17.3%), followed by winter, autumn and summer (15.3%, 10.8%, and 4.3%, respectively). The prevalence of otitis media with effusion was higher in the sub-urban areas (13.8 %) compared with urban areas (10.7 %).The prevalence of otitis media with effusion was higher among male children (13.4%) than female children (9.4%). The highest proportion of diagnosed otitis media with effusion was among four years old children (13.6%), followed by five and six years old (10.5% and 7.7%, respectively). History of repeated upper respiratory tract infection and snoring were the most common risk factors seen in the child with otitis media with effusionin the rate of 70.2% and 69.4%, respectively.

Conclusion: The prevalence of otitis media with effusion among preschool-age children in Erbil governorate was 11.5% with a maximum prevalence of 17.4% in the spring season.

Keywords: Otitis media with effusion; Risk factors; Seasonal variation.

Introduction

Otitis media is a common health problem and is the second most common disease in children after viral upper respiratory tract infection.[1] It can be classified into acute otitis media which is middle ear inflammation with rapid onset acute infection symptoms like feverand earache, and otitis media with effusion which defined as inflammation and middle ear effusion without signs and symptoms of acute inflammation. The condition becomes chronic when fluid is present in the middle ear for more than 12 weeks.[1,2] Otitis media is the common childhood disease, particularly within two age range: (6 months - 2 years) of age and (5 – 6 years) old. At least one otitis media with effusion episode is experienced by 90% of children before they start school. The young age preference explained by the poorly developed immune defense, the anatomy of their Eustachian tube which is more horizontal and wider if compared to the Eustachian tube in adult, well endowed with lymphoid follicles and adenoid.[3-5] It is generally accepted that otitis media with effusion can arise either as a result of Eustachian tube obstruction or due to previous or ongoing middle ear inflammation, other condition like; upper respiratory tract infection (viral or bacterial), nasal inflammation secondary to infection or allergic rhinitis, adenoid

* Department of Otolaryngology, Rizgary Teaching Hospital, Erbil, Iraq.
** Department of Surgery, College of Medicine, Hawler Medical University, Erbil, Iraq.

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hypertrophy, nasopharyngeal mass, can affect the normal Eustachian tube function.[6,7] Certain risk factors predisposing to otitis media with effusion which are; age less than 8 years, lack of breastfeeding, sub-urban and rural area, upper respiratory tract infections, recurrent acute otitis media, allergy, family size more than 4 members in the household, mother education less than secondary school education, parental smoking, low socioeconomic status, daycare attendance, craniofacial abnormality and child obesity.[8-12] Since otitis media with effusion is a benign disease with insidious onset the diagnosis usually delay, the presence of fluid in the middle ear results in the impaired mobility of tympanic membrane and conductive type of hearing loss,[13,14] which may affect child education and quality of life. The long-term effect of these diseases on the language (delay language and poor speech development) and academic achievement has been reported.[1,15] Otitis media with effusion has potential risks and complications like retraction pockets, adhesive otitis media, tympanosclerosis, cholesteatoma, and cholesterol granuloma, latent mastoiditis and hearing or speech impairment.[16,17]It is recorded in some reports a common cause of childhood hearing loss in developing country.[18] Community screenings for epidemiology and prevalence of otitis media with effusion were done, and risk factors were determined especially in developed countries. In our country, a nationwide prevalence study of otitis media with effusion has not been conducted. Therefore, we aimed to investigate the prevalence of otitis media with effusion that will help in creating an accurate picture of the prevalence of otitis media with effusion found in preschool age children and will help in notifying the authorities in the Directory of Health and health centers about the importance of screening the children at this age for proper management. More specifically, this study aimed to determine the prevalence of otitis media with effusion in Erbil governorate and compare this prevalence by urban and suburban areas and by different seasons.

Methods

This descriptive, cross-sectional study was carried out inthe Department of Otolaryngology, Rizgary Teaching Hospital from April 2015 to May 2016. The study included 1261 children from 21 kindergartens; 647 males and 614 females between4-6 years of age. These 21 kindergartens were randomly from Erbil governorate through simple random sampling method; 13 from Erbil city and eight from surrounding sub-urban areas of Khabat, Koysinjaq, Soran, and Shaqlawa districts. All children present in selected kindergartens at the day of data collection were included in this study. The 178 children with acute otitis media, chronic otitis media, impacted cerumen (wax), ear discharge, perforated drum and craniofacial abnormalities that made diagnosis of otitis media with effusion not possible were excluded from this study, and six of them were excluded before examining the child because their parents did not give consents, so enrolling number was 1077 children. Regarding the collection of data, a special questionnaire and consent paper were given to all parents two days before examining the child and papers were collected at the day of examining the child. The questionnaire included questions about: previous history of ear infection, the symptom of suspecting hearing impairment, history of frequent attack of flue and upper respiratory tract infection, previous history of ear discharge, snoring at night & history of previous ENT surgery. On the day of the examination, the otoscopic and portable tympanometric examination performed to all children from the selected kindergartens. As for otoscopic examination, the professional otoscope was used. The abnormalities suggest for otitis media with effusion included loss of tympanic membrane translucency (dull, yellow-orange or bluish

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color of tympanic membrane), cone of light distorted or diffused, handle of malleus is more horizontal with prominence of its short process, increased vascularization along the handle of malleus and radiating vessels from the handle to the tympanic membrane regarded as a sign of otitis media with effusion. Tympanogram was performed after otoscopic examination; the instrument used was a portable tympanometry machine (ampivox/ otowave tympanometry, Model 102). Tympanograms were divided into following types: type A; peak between (+100 and -100), type C1 peak between (-101 and -200), type C2 peak > -200 and type B (flat curve without peak identification). Children with an otoscopic sign of otitis media with effusion and simultaneous abnormal tympanogram (type B) were given a diagnosis of otitis media with effusion, and then all cases with features of otitis media with effusion were referred to consultant center (Rizgary teaching hospital/ department of otolaryngology) for further evaluation and management.

Data management:

Collected data and statistical analysis were done by using Graph-Pad Prism v. 6.01, September 21-2012 software program. The Chi-square test was used, and a *P* value of less than 0.05 was considered as statistically significant.

Results

A total of 1077 children were included in data analysis; 810 were from urban areas, and 267 were from sub-urban areas, and 559 (51.9 %) were males, and 518 (48.1%) were females. The age of children ranged from four to six years; 470 (43.6%) children were four years old, 477 (44.3%) were five years old, and 130 (12.1%) were six years old. The mean age was 4.68 ± 0.68 (Table 1).

Table 1: Gender and age distribution of children.

Gender	Frequency	Percent(%)
Male	559	51.9
Female	518	48.1
Age (years)		
4.00	470	43.6
5.00	477	44.3
6.00	130	12.1
Total	1077	100.0

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Out of 1077 children,124 children were diagnosed as otitis media with effusion depending on the finding of features of otitis media with effusion and tympanometry type B. So the prevalence of otitis media with effusion was 11.5% in Erbil governorate. The highest rate of otitis media with effusion seen in spring (17.3%), followed by winter (15.3%), autumn (10.8%) and summer (4.3%) and the difference was statistically significant (*P* <0.001). The prevalence of otitis media with effusion was higher in sub-urban area (13.8) than the urban area (10.7%), but this difference was not statistically significant (*P* = 0.18). The prevalence of otitis media with effusion was higher in male children (13.4%) than female children (9.4%) with statistically significant difference (*P* = 0.42). The prevalence of otitis media with effusion was higher in 4 years old children (13.6%), followed by five years old children (10.5%), six years old children (7.7%) with no statistically significant difference (*P* = 0.111) as shown in Table 2. Among children with otitis media with effusion, the proportion of bilateral otitis media with effusion was 41.1%, while others 58.9% were unilateral otitis media with effusion. The higher rate among unilateral otitis media with effusion was found in the right ear 57.5%. On the other hand the left side otitis media with effusion was 42.5% (Table 3).

Table 2: Prevalence of otitis media with effusion by studied variable.

			Prevalence of otitis media with effusion		
Variable	**Categories**	**N**	**No.**	**%**	***P* value**
Season	Summer	293	13	4.3	0.001
	Autumn	313	34	10.8	
	Winter	235	36	15.3	
	Spring	236	41	17.3	
Residency	Urban	810	87	10.7	0.1844
	Sub-urban	267	37	13.8	
Gender	Male	559	75	13.4	0.042
	Female	518	49	9.4	
Age	4 years	470	64	13.6	0.111
	5 years	477	50	10.5	
	6 years	130	10	7.7	
Total		1077	124	11.5	

Table 3: OME according to side affected.

Laterality of OME		**No.**	**%**
Bilateral OME		51	41.1
Unilateral OME	Right side	42	33.9
	Left side	31	25
Total		124	100

P value <0.001

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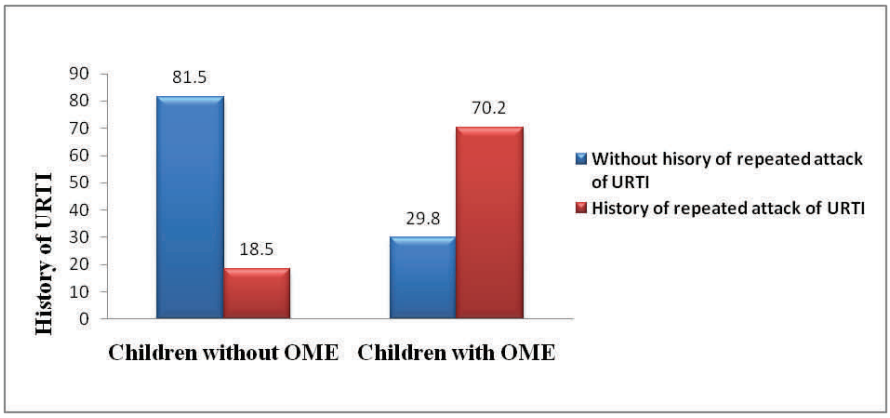
As illustrated in Table 4, 66.1% of children with otitis media with effusion were repeatedly asking for repeating the question (*P* <0.001). Figure 1 shows that 70.2% of children with otitis media with effusion had history of repeated attack of upper respiratory tract infection compared with 18.5% of children without otitis media with effusion (*P* <0.001). Figure 2 shows that the rate of snoring among children with otitis media with effusion (69.4%) was significantly higher than the rate among children without otitis media with effusion (8.7%), *P* <0.001.

Table 4: Distribution of children according to frequently asking for repetition.

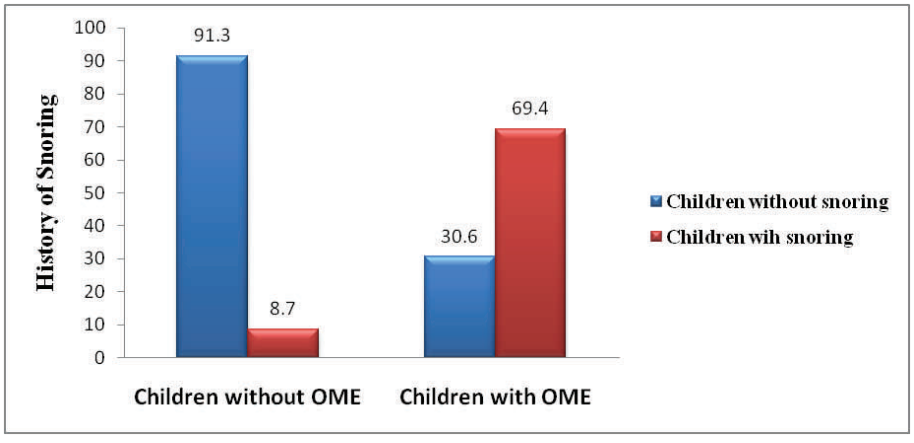
Children	Asking for repeat question		Total
	Yes/ No.(%)	No/ No.(%)	
Without otitis media with effusion	73 (7.7%)	880 (92.3%)	953 (100.0%)
With otitis media with effusion	82 (66.1%)	42 (33.9%)	124 (100.0%)
Total	155 (14.4%)	922 (85.6%)	1077 (100.0%)

P value <0.001



OME: Otitis media with effusion, *P* value <0.001

Figure 1: Frequency of history of repeated upper respiratory tract infection to otitis media with effusion.



OME: Otitis media with effusion, *P* value <0.001

Figure 2: Frequency of history of snoring to otitis media with effusion.

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Discussion

Otitis media with effusion is a common health problem, especially in preschool age children. If left untreated or inadequately treated, it may lead to a series of sequel and complications, such as permanent hearing loss and hearing or speech impairment.[19-21] In the present study, the prevalence of otitis media with effusion was 11.5%. Several study conducted in Turkey as in Eastern Black Sea during the period 2007-2009 between age 4-15 years old mention that overall prevalence of otitis media with effusion was 9.9% and about 14.7% in 4-6 year old children, other study in Istanbul done in 2010 showed that in 1165 cases between 5-14 years old 143 (12.2%) were diagnosed as otitis media with effusion.[22,23] In a screening study of ages between 5 and 12 years in Trabzon, in 2006, found that the prevalence of otitis media with effusion was 11.14%.[16] Gultekin et al. examined 1740 children in Istanbul and found a prevalence of 8.7%.[10] While the study in Iran (Tehran) examined 1833 children between 2-6 years and 2000 children between 7-11 years conclude that prevalence of otitis media with effusion in preschool and school-age children was 9.1% and 14.1% respectively.[24] On the other hand, a study carried out in Saudi Arabia in 2014, found that out of 1488 candidates between 6-12 years old 112 (7.5%) were suffering from otitis media with effusion.[25] The results of the present study showed that the prevalence of otitis media with effusion lower than Turkey and slightly higher than Iran and Saudi Arabia. The overall prevalence of otitis media with effusion is somewhat variable, ranging from 1.3 to 31.3%, depending on the methods used, ages of children, population characteristics like race, countries and environmental factors.[26-28] The present study showed a statistically significant difference in seasonal variation, in which the higher rate was in the spring season. That is because winter season in our country is short when they get an attack of upper respiratory tract infection and acute otitis media; part of them might be unresolved and became otitis media with effusion in spring, also neglecting, improper management and exposure to different kind of allergens which is high in spring season play significant roles. The current study was correlated with the study carried out in the Netherlands that showed the highest prevalence of otitis media with effusion in April (8.0%) and the lowest in October (1.5%).[29] Whereas the study in British on a group of children less than five years concluded that otitis media with effusion was significantly more prevalent in the winter than in the summer months.[30] The current study showed a high prevalence of otitis media with effusion in sub-urban in comparing with prevalence in urban region, although statistically was not significant; this can be explained by low socioeconomic status and less access to healthcare facilities in our sub-urban and rural area. In a screening study (in Brazil) comparing families with low and high socioeconomic status, the incidence of otitis media with effusion was found to be higher among children of families with low socioeconomic status and resolution of the condition was observed to be poor.[31] Others also ascertain that socioeconomic state has a significant effect on the prevalence of otitis media with effusion.[32,33] According to gender, the results showed a statistically significant higher rate of otitis media with effusion in males than females. It was similar to a study done in Nijmegin, Netherland that showed a high prevalence of otitis media with effusion among males.[34] A study by Saudian researchers showed that 7.6 % of males (59/767) and7.3 % of females (53/721) wasotitis media with effusionbut they mentioned that statistically no significant differences.[25] While the study in the Netherlands found no differences between the genders in the prevalence of otitis media with effusion.[35] Astudy in Boston, USA, reported non-significant differences between males and females in the prevalence of otitis media with effusion and acute otitis

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media.[36] According to study gender difference in otitis media represents mainly the influence of cultural factors.[37] We can consider age as the most important risk factor for otitis media with effusion because 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) gradually shifts its angle from horizontal to vertical with age and the immune system gets strong eras the child grows by having met many types of allergens. In Istanbul, a screening study carried out at a kindergarten between 2-6 years old, show that the prevalence of otitis media with effusion was found to be 19.5%. [38] This is higher than the rates of all other screenings performed on primary school-age children in Istanbul. This finding particularly supports the fact that the prevalence of otitis media with effusion decreases as the age gets older. A study by Okur et al. concludes that otitis media with effusion decreased with age as well.[28] Although this study found that the ages 4 years had the highest prevalence (13.6%) of otitis media with effusion, and then followed by 5 years old, and lower prevalence was found among 6 years old, but statistically was not significant, because of narrow range of ages, it needs a wider range of ages to confirm that. This study showed the prevalence of unilateral otitis media with effusion was higher than Bilateralotitis media with effusion; this might be due to the presence of infection in the middle ear rather than an allergy. Another study from Nepal (2011) show that prevalence of all cases of otitis media with effusion was 12.9%, Unilateral otitis media with effusion was found to be more prevalent than bilateral otitis media with effusion (unilateral = 8.3%, bilateral = 4.6%).[39] Also, Schilder et al. showed a higher rate of unilateral otitis media with effusion than bilateral otitis media with effusion in the rate of 2.5% and 7% respectively.[34] In this study, the most important symptom among children with otitis media with effusion was hearing loss in the shape of repeated asking for recall questions and increase TV sound or sit close to it. This was statistically significant. This result was correlated with a study done in Baghdad (2010-2012) on 180 children with otitis media with effusion, show that the most common presenting symptom was hearing impairment which was noticed by the parents.[40] Another study concluded that From univariate analysis, hearing loss symptom was significantly higher in children with otitis media with effusion.[25] Repeated attacks of upper respiratory tract infection regarded one of an important risk factor for otitis media with effusion, Factors such as pharyngeal edema and inflammation due to upper respiratory tract infection may lead to effusion by affecting both the mucociliary transport system and the normal opening of the Eustachian tube.[41] Aydemiret al. concluded that significant relationships were present between otitis media with effusion and upper respiratory tract infection episodes. [3] Another study showed that high prevalence of otitis media with effusion in winter was due to increase frequency of upper respiratory tract infection.[40] Another study showed that one of the most common risk factors for otitis media with effusion is the history of upper respiratory tract infection.[42] Also the result of this study confirmed that there was a close relation of otitis media with effusion with the repeated attack of upper respiratory tract infection and statistically was highly significant (P <0.0001). Snoring whether due to rhinitis, large adenoids, tonsilar hypertrophy or adenotonsillar hypertrophy is more common in children with chronic ear problems.[3,8] One study show that snoring was reported in 18% of children with otitis media with effusion compared to 11% of normal children (p= 0.03, OR=1.76; 95% CI= 1.06-2.94).[25] Another study concludes that 18.3% of cases with otitis media with effusion had snoring.[41] Also, this study show snoring in the higher rate among child with otitis media with effusion, the result was highly

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significant in the association between snoring and otitis media with effusion. This needs further study to clarify that; snoring due to which causes are more related to otitis media with effusion

Conclusion

We concluded that the prevalence rate of otitis media with effusion among preschool-age children, in Erbil governorate was 11.5% with a maximum prevalence being in the spring season. Moreover, the results of this study show that a higher prevalence of otitis media with effusion was seen in males, the age of four years old, unilateral otitis media with effusion, children with the repeated attack of upper respiratory tract infection and children with snoring. Furthermore; the ratio of otitis media with effusion diagnosed children that were frequently asking for repetition was high.

Competing interests

The authors declare that they have no competing interests.

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