

# Risk Factors of Otitis Media with Effusion in Children

Essam A. Abo el-Magd<sup>1</sup>, Yousseria Elsayed Yousef<sup>2</sup>, Osama M. El-Asheerr<sup>3</sup>,  
Karema M. Sobhy<sup>4</sup>

<sup>1</sup>Departments of Otorhinolaryngology, Faculty of Medicine, Aswan University, Aswan, Egypt

<sup>2</sup>Pediatric Nursing, Faculty of Nursing, Sohag University, Sohag, Egypt

<sup>3</sup>Pediatrics, Faculty of Medicine, Assiut University, Assiut, Egypt

<sup>4</sup>Public Health, Faculty of Medicine, Aswan University, Aswan, Egypt

Email: [esamali801@yahoo.com](mailto:esamali801@yahoo.com)

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## Abstract

**The aim of this study is to detect the risk factors associated with otitis media with effusion (OME) among children with age ranged from 6 months to 2 years. Materials and Methods: it is a cross-sectional study 500 children were selected from Assiut University Hospital clinics through multi-staged randomized sampling. Parents of these children were interviewed with a structured questionnaire. Clinical examination, including otoscopic examination and tympanometry was performed for each child. Results: There was no statistical significant relationship between OME and gender, age, mother job. There is statistical significant relationship between OME and breast feeding, using pacifier, mother education, sibling of children and exposure to passive smoking. Conclusion: There are multiple risk factors associated with OME in children between 6 months to 2 years of age.**

## Keywords

Otitis Media with Effusion, Risk Factors

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## 1. Introduction

Otitis media with effusion (OME) is a middle ear disease characterized by presence of serous or mucoid effusion in the middle ear without any signs of acute infection<sup>1</sup>. This problem occurred because of Eustachian tube dysfunction as well as other problems in the middle ear ventilation. Twenty to fifty percent of children aged 3 - 10 years' experience otitis media with effusion at least once in this period [1] [2].

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Vague presentations of otitis media in early stages and coincidence of the disease with the time of learning and speaking of the child cause many problems such as stuttering, delay of speaking, indifference of children at school, and educational problems [3]. Various risk factors are implicated, such as sex, race, premature delivery, passive smoking, allergy, asthma, family size, bottle feeding, socioeconomic status, cleft palate adenoid hypertrophy, which have been studied and are still controversial [4]-[7].

Passive smoking can increase the adherence of bacteria to the respiratory epithelium, depress local immune function and decrease mucociliary action, and thus may be a risk factor for the development of OM [8] [9].

## 2. Materials and Methods

In this cross-sectional study 500 children whose age ranged from 6 months to 2 years were selected from Aswan University Hospital Clinics through multi-stage randomized sampling in the period between June 2013 and December 2014 after approval from Aswan Faculty of Medicine ethics committee. Informed consent was obtained from the parents who agreed to be interviewed and have their children examined.

Children were considered to have OME in case of:

- Lack of cerumen in their ears
- Intact tympanic membrane
- Type B tympanogram

Retraction of tympanic membrane/or disappearance of cone of light/or presence of air-fluid level in examination.

There were healthy children matched to the case group as the control subjects. They collected information on smoking behavior of parents and other household members. Mothers were asked: “if father’s child was smoke?” if he still smoking?” and “Did he/she smoke inside the house, outside only or both?” If the baby’s father was part of the family unit, we asked the same questions about the baby’s mother.

Lastly, we asked the mother or guardian whether anybody else smoked inside the house. An answer of “yes” to any of these questions was taken to indicate ETS exposure. Information was also collected about feeding practices, parent’s education and employment, family history of allergy or atopy, and number, age, and childcare or school attendance of other children in the household. The number of adults and children living in the house as well as the number of rooms in the house were documented to obtain a measure of crowding (number of people/room). Research assistants performed further routine follow-up on study participants at ages 6 - 8 weeks, and 4, 6, 12, 18 and 24 months, when they again enquired about feeding practices and whether the study participant was attending childcare.

At these follow-up visits, we also asked the child’s mother or guardian whether they smoked, and whether anybody smoked inside the house. However, as preliminary analysis indicated little change from responses at first interview and, in view of potential bias towards children remaining in the study, analyses were based on the first interview.

We scheduled three routine clinical examinations by an ear, nose and throat (ENT) specialist: before the age of 6 months, at 6 - 11 months and at 12 - 24 months. A clinical diagnosis was established by otoscopy, pneumatic otoscopy and tympanometry at 6 months, 12 months and at 24, and was based on national clinical guideline and approved by the local Ethics committee.

## Statistical Analysis

The collected data were computerized and analyzed by using the proper statistical programs such as “SPSS” ver. 16”. Data expressed as mean, SD and number, percentage. Using t test to determine significant for numeric variable Using Chi. square to determine significant for non-parametric variable. The difference was considered statistically significant when P-value  $\leq 0.05\%$ .

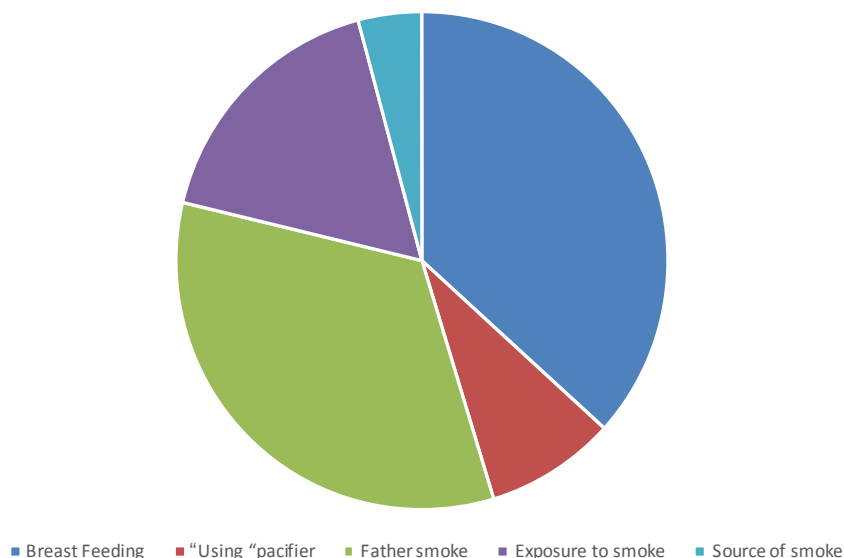
## 3. Result

A total of 250 children were examined. The examined group compared with 250 children of control group. Mean age of cases was  $18.16 \pm 11.9$  months while it was  $19.55 \pm 9.10$  months for controls. 61.6% of cases and 66% of controls were females, with no significant difference between cases and controls ( $P > 0.05$ ). 94% of cases and 92% of controls were Urban with no significant difference ( $P > 0.05$ ). On the other hand, for the higher

percentage 28% of cases and 58% of controls, their mothers completed university education with significant statistical difference between them  $P = 0.000$ . For more than half, 68.8% of cases and 74.8% of controls, their mothers worked with no statistical significant difference between them ( $P > 0.05$ ). There was a high significant difference between cases 45.6% versus 34% of controls had family history of second sibling of children  $P = 0.00$ . The majority 92.4 % of cases versus 83.6% of controls the number of children per room were 1 - 2 child with high statistical significant difference between them  $P = 0.02$  (Table 1). There was a highly statistically significant relationship between OME and breast feeding, use of pacifier, father smoke, exposure to smoke (Table 2) (Figure 1).

**Table 1.** Sociodemographic characteristics among study participants and their controls at Assuit University Hospital, 2014.

Variable	Cases (No. 250)		Control (No. 250)		Significant Tests
	No.	%	No.	%	
<b>1-Age "months"</b>					
Mean $\pm$ SD	18.16 $\pm$ 11.19		19.55 $\pm$ 9.10		T-test = 2.54 P = 0.128 n.s
<b>2-Sex:</b>					
Male	96	38.4	85	34.0	$\chi^2 = 1.048$ P = 0.176
Female	154	61.6	165	66.0	
<b>3-Residence:</b>					
Rural	15	6.0	20	8.0	$\chi^2 = 0.768$ P = 0.242
Urban	235	94.0	230	92.0	
<b>4-Level of education of mother</b>					
Illiterate	29	11.6	21	8.4	$\chi^2 = 51.965$ P = 0.000
Read and write	38	15.2	22	8.8	
Primary education	58	23.2	20	8.0	
Secondary education	55	22.0	42	16.8	
University	70	28.0	145	58.0	
<b>5-Mother Job</b>					
Work	172	68.8	187	74.8	$\chi^2 = 2.222$ P = 0.082
House wife	78	31.2	63	25.2	
<b>6-Sibling of children</b>					
First	58	23.2	63	25.2	$\chi^2 = 32.139$ P = 0.000
Second	114	45.6	85	34.0	
Third	39	15.6	61	24.4	
Fourth	20	8.0	40	16.0	
Fifth	19	7.6	1	0.4	
<b>7-No. of room</b>					
1 - 2 rooms	231	92.4	209	83.6	$\chi^2 = 9.167$ P = 0.002
3 - 4 rooms	19	7.6	41	16.4	



**Figure 1.** Pie chart for percentage analysis of risk factors among study participants attending Assuit University hospital, 2012.

**Table 2.** Risk factors among study participants and their controls at Assuit University Hospital, 2014.

Variable	Cases (No. 250)		Control (No. 250)		Significant Tests
	No.	%	No.	%	
1-Breast Feeding:					
Yes	168	67.2	212	84.8	$\chi^2 = 21.228$ P = 0.000
No	82	32.8	38	15.2	
2-Using "pacifier":					
Yes	39	15.6	21	8.4	$\chi^2 = 6.136$ P = 0.009
No	211	84.4	229	91.6	
3-Father smoke:					
Yes	153	61.2	106	42.4	$\chi^2 = 17.695$ P = 0.000
No	97	38.8	144	57.6	
4-Exposure to smoke:					
Yes	78	31.2	42	16.8	$\chi^2 = 14.211$ P = 0.000
No	172	68.8	208	83.2	
5-Source of smoke:					
Yes	19	7.6	1	0.4	$\chi^2 = 16.875$ P = 0.000
No	231	92.4	249	99.6	

#### 4. Discussion

In the literature, the range of prevalence of OME is wide as the population studied, the countries, environmental factors and climatic factors were different [10]. In our study we did not find any significant difference in the incidence of OME between male and female. Other studies showed higher incidence in male [11]-[13], owing to higher incidence of infectious disease in male. In the same with our results Gultekin *et al.* [14] and Sassen *et al.* [15] showed that higher number of siblings in family increases the risk of OME. Various studies done in the past support the protective role of breast feeding and development of OME [12] [13] [16] [17] but other studies did

not establish a significant relationship between the two [14] [15] [18] [19]. Various studies with different designs relating to middle ear disease among young children have a point of consistence in suggesting a modest increase in the risk associated with parental smoking [1] [2] [17].

Hinton *et al.* demonstrated that parental smoking is an influential factor in OME among the children. They require more ventilation tube insertion for OME treatment, comparing with other patients with the same age [20].

This indicates the resistance of OME to suitable therapeutic modalities. Green *et al.* showed the increased risk of OME in case of parental smoking especially with maternal smoking during pregnancy [21].

Moreover, Etzel *et al.* have presented cigarette smoking as an effective factor in extension of the disease period and increasing the frequency of the disease attacks at shorter intervals [22]. Their results are similar to our findings on parental smoking, since both studies indicate increased risk of OME among children with smoker parents. Furthermore, a direct relation exists between pack-years cigarette smoking of parents and the prevalence of the disease. Blackley and Blackley [7], and few others [15] [16] [23] [24] deny any relationship between passive smoking and development of OME. Other studies demonstrated the relationship between the two [24] [25].

Finally, we believe that passive smoking is a preventable cause of otitis media with effusion in children. This seeks further parental attention. The limitations of our study are small number of patients and short period of follow up.

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