

Risk Assessment Of Otitis Media In Infants And Young Children

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Abstract: Background: Children are more likely to suffer from otitis media (OM) than adults because their immune systems are still developing and the Eustachian tube is shorter and straighter. **Objective:** To identify the risk factors of OM in children and to design a program for prevention and control. **Material and Methods:** Children with OM (600) were selected randomly from the cases attending the ENT and pediatrics outpatient clinic of Benha University Hospital in the period from January-to-December, 2009. Age of these children ranged between 3months up to 12 years. Also, 600 children were selected from Ophthalmology and Dermatology clinics as a control group. Both case and control groups were subjected to investigations including history, clinical examination and audio-metric tests. **Results:** The study showed that the rural areas ($p<0.05$), artificial feeding ($p<0.05$), lower socioeconomic classes ($p<0.05$), smoking parents ($p<0.05$), allergic rhinitis ($p<0.05$), adenoid hypertrophy ($p<0.05$), chronic tonsillitis and upper respiratory tract infection ($p<0.05$) and introduction of foreign body into the ear ($p<0.05$) are the major risk factors of O.M. Also, the study showed that the hearing impairment was more significantly frequent. **Conclusion:** Risk factors of OM were rural areas, unhealthy habits, artificial feeding, chronic septic foci of the nose and pharynx, respiratory tract infection and low socioeconomic standards. **Recommendations:** A health education program is indicated to encourage breast feeding, avoid unhealthy habits, early detection and treatment of respiratory infection and septic foci of nose and pharynx and improving the socioeconomic status.

[Abdullah M. Almslmani; Rasha M Eldesoky; Omyma H. Hassan and Shereen M. Abdel wahab. **Risk Assessment Of Otitis Media In Infants And Young Children.** Journal of American Science 2012; 8(3):443-446]. (ISSN: 1545-1003). <http://www.americanscience.org>. 59

Keywords: Otitis Media, respiratory tract infection, chronic tonsillitis, adenoid hypertrophy and septic foci.

1. Introduction

Inflammation of the middle ear is an ear infection, usually caused by bacteria, that occurs when fluid builds up behind the eardrum. Anyone can get an ear infection, but children get them more often than adults. Three out of four children will have at least one ear infection by their third birthday. In fact, ear infections are the most common reason parents bring their child to a doctor. The scientific name for an ear infection is Otitis media (OM) ⁽¹⁾. An ear infection usually is caused by bacteria and often begins after a child has a sore throat, cold, or other upper respiratory infection. If the upper respiratory infection is bacterial, these same bacteria may spread to the middle ear; if the upper respiratory infection is caused by a virus, such as a cold, bacteria may be drawn to the microbe-friendly environment and move into the middle ear as a secondary infection. Because of the infection, fluid builds up behind the eardrum ⁽²⁾. The primary prevention and control of this disease need to study its determinants ⁽³⁾. The causative organisms vary in different areas of the world ⁽⁴⁾. Doctors also are beginning to learn more about what happens in the ears of children who have recurring ear infections. They have identified colonies of antibiotic-resistant bacteria, called biofilms that are present in the middle ears of most children with chronic ear infections. Understanding how to attack

and kill these biofilms would be one way to successfully treat chronic ear infections and avoid surgery. Patient Education includes the following: Avoiding risk factors, appropriate use of antibiotics and understanding the implications of antibiotic-resistant bacteria in OM. Education for health care providers should focus on the following topics: Antibiotic-resistant bacteria and the need to avoid, overprescribing antibiotics and importance of pneumatic otoscope examination ⁽⁵⁾. So this study was designed to identify the risk factors of otitis media in children and to plan for prevention and control.

2. Materials and Methods

The children who had OM and aged 3months - to -12 years, were selected by systematic random sampling from the cases, who were attending the ENT and pediatrics outpatient clinics of Benha University Hospital during the period from January-to-December, 2009. After appointment of mothers, only 600 women had participated in this study.

Also, 600 children of the same age and sex were selected randomly from the Ophthalmology and Dermatology clinics as a control group.

All cases of both groups were interviewed and the mothers answered a questionnaire including full history of any disease related to nose, ear, throat or respiratory tract.

The children were subjected to local clinical examination, tympanometry (for children >7months)⁽⁶⁾ and audiometry (for children >3years)⁽⁷⁾.

The collected data were presented and analyzed statistically by using X^2 and Odd Ratio in the MedCalc program.

3. Results

Table (1): shows the relation between O.M. and age, sex, residence, season, type of feeding, socioeconomic characteristics and smoking of parents. OM was more common in rural areas ($p < 0.05$), artificial and mixed feeding ($p < 0.05$), low socio-economic standards ($p < 0.05$), and smoking parents ($p < 0.05$). O.M. was significantly higher in winter ($p < 0.05$) than in other seasons.

Table (2): shows that allergic rhinitis, adenoid hypertrophy, chronic tonsillitis, recurrent common cold and respiratory tract infection were significantly associated with O.M. ($p < 0.05$), while, there was no significant association between chronic sinusitis and O.M.

Table (3): shows a significant association between O.M. and introduction of foreign body into the ear, history of O.M. and misuse of antibiotics ($p < 0.05$), while, sniffing has insignificant association ($p > 0.05$).

Table (4): shows that the laterality and hearing impairment were significantly associated to O.M. ($p < 0.05$).

4. Discussion

Otitis media represents a major health problem among children in Egypt and other countries⁽⁸⁾. Our study was designed to identify the risk factors which may be related to O.M.

Children of rural areas were more affected than those of urban ($p < 0.05$) and this result agrees with the study of Minja Coker *et al.*⁽⁹⁾. Also, this study showed that O.M. was more frequent in school and preschool children ($p < 0.05$), agreeing other studies^(10,11).

Lindgren *et al.*⁽¹²⁾ explained the high prevalence of O.M. in preschool children by their poor immunity and shortness of Eustachian tube in this age. Furthermore, O.M. was more frequent in males than females but the difference is insignificant ($p > 0.05$). Children of low socio-economic classes were more affected than the high classes ($p < 0.05$) and this result coinciding with other studies⁽¹¹⁾ which attributed O.M. to the poverty, overcrowding, malnutrition, bad hygiene and under-utilization of health care. Bottle feeding was found to be an important risk factor ($p < 0.05$). Breast feeding plays an obvious role in prevention of respiratory and gastro-intestinal infections, while, bottle feeding

leads to leakage of milk into the ear⁽¹²⁾. Smoking parents were more affected than non-smokers ($p < 0.05$) and this result coincides with that of Owen *et al.*⁽¹³⁾. Tobacco smoke irritates the mucosa of middle ear and leads to repeated respiratory infection⁽¹⁴⁾. Allergic rhinitis had a limited role as a risk factor of O.M. in accordance with another study⁽¹⁵⁾.

O.M. was more frequent ($p < 0.05$) in children with previous history of adenoid hypertrophy, chronic tonsillitis, recurrent common cold and lower respiratory tract infection. This finding agrees with results of Institute of Deafness⁽¹⁶⁾, where, viral infection makes the mucosa less resistant to bacterial infection⁽¹⁷⁾. Also, chronic sinusitis, adenitis and tonsillitis act as septic foci of infection.

Sniffing was insignificantly associated with O.M. ($p > 0.05$), while, introduction of foreign bodies (FB) into the ear had significant association ($p < 0.05$). Sniffing may lead to negative pressure and introduction of FB may break the skin and predispose to infection⁽¹⁸⁾. Antibiotic misuse was a significant risk factor in this study ($p < 0.05$) explained by easy obtaining the antibiotic leading to failure of treatment. O.M. was more common in winter, the season of recurrent infections. This result agrees with Lee *et al.*⁽¹⁹⁾. Impairment of hearing significantly ($p < 0.05$) complicated O.M. in this study, in accordance with Coker *et al.*⁽²⁰⁾.

Table (1): Distribution of the study group according to the socioeconomic status

Socio-demographics	Cases No.	%	Controls No.	%	OR	X2	P
Age							
Infants	118	19.7	108	18.0		0.27	>0.05
preschool	250	41.7	256	42.7			
School	232	38.7	236	29.3			
Sex							
Male	362	60.3	330	55.0		1.54	>0.05
Female	238	39.7	270	45.0			
Residence							
Urban	112	18.3	180	30.0		9.86	<0.001
Rural	488	81.7	420	70.0			
Season							
Winter	206	34.3	394	65.7		59.24	<0.0001
Spring	160	26.7	440	73.3			
Summer	92	15.3	508	84.7			
Autumn	142	23.7	458	76.3			
Type of feeding							
Breast	200	33.3	420	70.0	1		
Mixed	140	23.3	60	10.0	4.9		<0.05
Artificial	260	43.3	120	20.0	4.6		<0.05
*Social class							
High class	72	12.0	114	19.0	1		
Moderate	172	28.7	198	33.0	0.7		P= 0.08
Low	356	59.3	288	48.0	0.3		< 0.0001
Smoking parents							
Non-smokers	266	44.3	430	71.7	1		
Smokers	334	55.7	170	28.3	3.2		<0.0001

*Fahmy and Elsherbini⁽²¹⁾

Table (2): Distribution of the study group according to upper and lower respiratory tract infection

	Case of OM		Control		OR	P
	No.	%	No.	%		
Allergic rhinitis						
Absent	492	82.8	548	91.3	1	
Present	106	17.7	52	8.7	2.3	<0.05
Adenoid hypertrophy						
Absent	308	51.3	446	74.3	1	
Present	232	48.7	154	25.7	2.8	<0.05
Chronic tonsillitis						
Absent	308	47.0	396	78.3	1	
Present	292	53.0	204	21.7	1.9	<0.05
Chronic sinusitis						
Absent	552	92.0	558	93.0	1	
Present	48	8.0	42	7.0	1.2	>0.05
Recurrent colds						
Absent	396	66.0	468	78.0	1	
Present	204	34.0	132	22.0	1.9	<0.05
LRT infections						
Absent	426	71.0	476	79.3	1	
Present	174	29.0	124	20.7	1.6	<0.05

OR=Odd Ratio

LRT=Lower Respiratory Tract

Table (3): Distribution of the study group according to the unhygienic habits

	Cases		Controls		OR	P
	No.	%	No.	%		
Sniffing :						
Absent	522	78.0	536	9.3	1	
Present	78	22.0	64	10.7	1.3	P>0.05
Introduction of F.B.						
Absent	440	73.3	494	82.3	1	
Present	160	26.7	106	17.7	1.7	P<0.05
Antibiotic misuse						
Absent	526	87.9	558	93.0	1	
Present	74	12.1	42	7.0	1.9	P<0.05
Neglecting medical care:						
Early	404	67.3	514	85.7	1	
Delayed	196	32.7	86	14.3	2.9	P<0.05

O.M.= Otitis Media

F.B.=foreign body

Table (4): Distribution of cases of O.M. according to laterality and hearing impairment

	Cases of O.M.		Comparison of proportions**	
	No.	%	X ²	P
Laterality				
Bilateral	252	42.0%	14.34	<0.001
Unilateral	348	58.0%		
Hearing impairment				
Absent	406	67.7%		
Present :	194	32.3%	65.42	<0.0001

** According to MedCalc program

5. Conclusions:

Risk factors associated with O.M. were residence in rural areas, unhealthy habits, artificial feeding, chronic septic foci of the nose and pharynx, recurrent respiratory tract infection and low socioeconomic standards. Hearing impairment was significantly related to O.M.

Recommendation

Health education program; to encourage the breast feeding, avoid unhealthy habits, early diagnosis and treatment of respiratory tract infection.

Also, improvement of the socioeconomic and environmental conditions is necessary.

The target population of health education is the mother, child and school health team.

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1/25/2012