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Risk Factors of Acute Otitis Media among Infants Children in Kerbala Pediatric Teaching Hospital: A Case-Control Study

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Abstract

Objective of the study: To explore the most prevalent risk factors those are associated with AOM among infant children. A case-control study design was carried out in the outpatient clinic at Kerbala pediatric teaching hospital, from the period from January 2017 to February 2019. A purposive sampling method of 100 infants was included in this study, 50 of them were infected with AOM and the others are not. A data were collected directly from infant's parent by the researchers through the interviewing technique, then the collected data were analyzed by using the program of IBM Statistical Package of Social Sciences (SPSS) Version 24. The results of this study revealed that about 40%, 64% and 40% of infected infants were 7-9 months of age, females and urban residency respectively. The study showed a significant association between AOM and nasal obstruction at p-value 0.02, child's position during feeding at p-value 0.00, mother's position in case of bottle feeding at p-value 0.00, and using bottle feeding at night (for breast feeding infants) at p-value 0.002. Infants exposed to cigarette smoking, and that's were using pacifiers when sleeping also identified a significant risk factors for AOM at p-value 0.00, and 0.00 respectively.

Key Words: *Risk Factors, Acute Otitis Media, Infants.*

Introduction

Otitis media are well identifying as an infection and/or inflammation of the middle ear [1], it is the second most common childhood disease after upper respiratory tract infection [2] AOM is the most frequently recognized ear infection [3], and it is one of the most widespread communicable diseases of childhood that is most frequently occurs between 3 months to 3 years of age. In the United States of America (USA), 80-90% of AOM occur in children less than six years, the main incidence is between 6 months to 24 months of age [4]. Newborns and infants are more likely to infect with AOM because of the immature immune system [6] reported that the AOM is a disease of infancy; it can affect more than 33% of children less than one year of age. Ginkel et al., (2017) mentioned that about 25-36% of children less than one year have experienced at least one event of AOM and approximately 20% of the infants developed more than one event of AOM. It is an estimated that about 709 million new AOM cases annually worldwide, with greater than half in children less than five years of age [8]. A recurrent and prolonged episode of AOM may lead to many health problems such as hearing impairment, delayed speaking development, and delayed language and educational development [9]. In the United States of America, the annual cost of AOM is approximately 5 billion dollars [10]. Several influences have been identified to be accompanied with the development of AOM, some of these influences are unanimously recognized such as environmental tobacco smoke exposure and adenoids hypertrophy; other influences are more controversial such as gender or poor economic status [11] stated that's the possible risk factors that are associated with otitis media are family history of otitis media, recurrent upper respiratory infections, younger age, and second hand smoking. [12] reported other risk factors for ear infections involve low birth weight, younger motherly age, inadequate housing conditions, lack of access to health care, and mothers who smoke during pregnancy. Numerous studies have been documented that the pacifier use for some babies was determined as an additional risk factor for developing otitis media. Other risk factors that are associated with recurrent otitis media among infants are includes orofacial anomalies such as cleft palate, overcrowding, lack of breast feeding or shorter duration

of breastfeeding, and prolonged bottle-feeding while lying. Supine-feeding positions, immune deficiencies, and gastro-esophageal reflux are also identified as a risk factors of AOM. Identifying of otitis media risk factors can contribute to improving management and effective prevention plan. Pawathil, and Rajamma (2016) mentioned that are by recognizing the risk factors if AOM, the clinician can notify parents about preventive measures to avoid these factors. Ginkel et al., (2017) reported that the documented of preventable risk factors is a significant effort in the prevention of AOM. In this study, we aim to determine the impact of several risk factors that are associated with AOM among children less than 12 months of age in order to improve preventive methods of this disease.

Methodology

A case-control study design was carried out in the outpatient clinic at Kerbala pediatric teaching hospital, in the period from January 5th 2017 to February 1st 2019, in order to investigate the most prevalent risk factors that are associated with AOM among children less than one year of age. A purposive sampling method of 100 infants was included in this study, 50 of them were infected with AOM and the others are not. A verbal informed consent was obtained from the infant's parent to be enrolled in this study. A questionnaire form was prepared by the researchers in order to collect all the relevant data associated with the study sample. The questionnaire form contains of (11) items that are (Age, gender, residency, type of feeding, nasal obstruction condition, child position during feeding, mother's position during feeding, upper respiratory tract infection, using bottle feeding at night, exposed to second hand smoke, and using the pacifiers when sleeping). Data were collected directly from infant's parents by the researchers through the interviewing technique. Finally the collected data were analyzed by using the program of IBM Statistical Package of Social Sciences (SPSS) Version 24, both descriptive statistical analysis procedures (frequency, percentage) and inferential statistical analysis were used in order to analyze and assess the results of the study, a p value <0.05 was considered statistically significant.

Results and Discusion

As shown in table (1), there are a statistically significant association between female gender with AOM, and no significant association with the other listed factors. Analysis of the risk factors associated with AOM among infants as shown in table (3), indicates that the nasal obstruction, infant's position during feeding, mother's position in case of bottle-feeding, using bottle-feeding at night, second hand smoke, and using of pacifiers when sleeping were found to be a significant risk factor associated with AOM among infants. A total of (50) infants who are infected with AOM, and (50) non-infected infant were involved in this study to investigate the most prevalent risk factors that are associated with AOM. Data that listed in table (1 and 2) show that are many risk factors are contributing to the occurring of AOM in the examined group of infants. The results in table (1) revealed a significant association between female gender and AOM (at P value 0.005), this result was disagreement to the findings of the study which was done by Abed Alsalama, et al, (2018) revealed that the male gender were determined a significant risk factor for the occurrence of AOM. Another study, which was done by Sangeetha, et al., (2014) revealed that the boys infant were found to have a higher incidence of AOM than girls. Concerning to the association between nasal obstruction and AOM among the study subjects, the results in table (2) exposed a significant association between AOM and nasal obstruction (at p value of 0.02), this result was corresponding with the findings of a meta-analysis study which was done by Ilechukwu, et al., (2017) that identified the upper respiratory tract infection as an important risk factor for the occurrence of AOM. Regina, et al, (2017) reported that the AOM is mostly occurring secondary to viral upper respiratory tract infection and subsequent microbial colonization of the nasopharynx and the middle ear. Supine position of infants during feeding as shown in figure (2) also determined as a main factor contributing to AOM because this position lead to leakage of milk into the ear canal and therefore increase the chance for developing AOM, the result in table (2) show that are about 66% of infant infected with AOM were putting in supine position by their mothers during feeding, this finding was corresponding with the study of Regina, et al, (2017) emphasized that the use of supine position during feeding was significantly increases the risk of AOM in infant. Another studies that were done by Sangeetha, et al., (2014), Swamy, et al, (2017), and Abed Alsalama, et al, (2018) revealed that there is a significant association existed between supine feeding position and AOM in infants. Furthermore, the findings of the study of Regina, et al, (2017) illustrated that the using of supine or near so position by mothers for feeding their babies facilitates the reflux of milk into middle ear, with carriage of respiratory flora into

the middle ear space, thereby leading to otitis media. Pawathil, and Rajamma (2016) indicate that the supine feeding position was identified to be highly significant risk factor for otitis media in infancy. Bottle feeding as shown in figure (1) and the mother's position in case of bottle-feeding are considered as an important factor that are associated with AOM, the findings in table (2) show that about 68.5% of mothers are always away from their infants when using bottle-feeding. Many studies have been evaluated breast-feeding role in the prevention of AOM and showed that the breast milk protects against AOM. Some studies also have been exposed that the wrong position of feeding can increased AOM among children (Regina, et al, 2017). Abrahams and Labbok (2011) highlight that the breast milk feeding, unlike bottle feeding formula, because human milk is a containing antimicrobial, and anti-inflammatory substances, therefore infants with bottle feeding show a relative immunodeficiency compared with those receiving breast feeding, placing them at significantly greater risk of infections. In a case-control study that was done by Pawathil, and Rajamma (2016), confirmed that are a significant association between bottle-feeding and the occurrence of AOM.

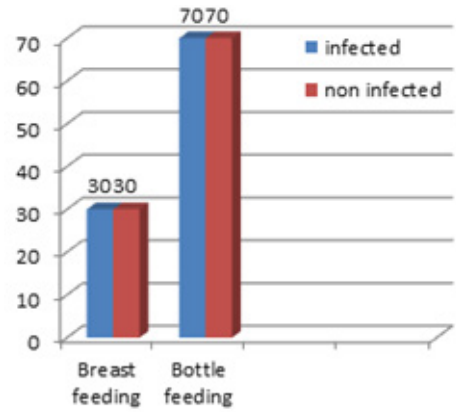

Figure1: Association of AOM with type of feeding

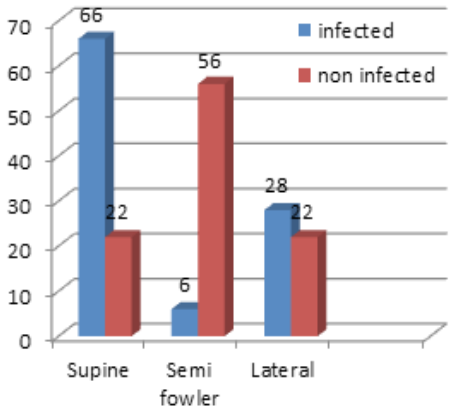

Figure 2: Association AOM with infant's position during feeding

Table (1): Demographic characteristics for infant infected and non-infected with AOM.

No.	Demographic characteristics		Case N=50		Control N=50		p. value	Significant level
		Categories Frequency (F)	Percent (%)	Frequency (F)	Percent (%)			
	Items							
1.	Age	1-3 months	5	10	5	10	0.5	N.S
		4-6 months	11	22	14	28		
		7-9 months	20	40	13	26		
		10-12 months	14	28	18	36		
		Total	50	100	50	100		
2.	Gender	Female	32	64	18	36	0.005	S
		Male	18	36	32	64		
		Total	50	100	50	100		
3.	Residency	Urban	30	60	24	48	0.2	N.S
		Rural	20	40	26	52		
		Total	50	100	50	100		

NS: Non-Significant (P value >0.05); S: Significant (P value < 0.05).

Table (2): Statistical result of the risk factors for infants infected and non-infected with AOM.

No.	Risk Factors		Case N=50		Control N=50		p. value	Significant level
	Items	Frequency (F) Categories	Percent (%)	Frequency (F)	Percent (%)			
1.	Type of feeding	Bottle feeding	35	70	35	70	1.0	N.S
		Breast feeding	15	30	15	30		
		Total	50	100	50	100		
2.	Nasal obstruction	Yes	37	74	26	52	0.02	S
		No	13	26	24	48		
		Total	50	100	50	100		
3.	Child's position during feeding	Supine	33	66	11	22	0.00	S
		Semi fowler's	3	6	28	56		
		Lateral	14	28	11	22		
		Total	50	100	50	100		
4.	Mother's position in case of bottle feeding	Away from infant	24	68.5	8	23	0.00	S
		Near of infant	11	31.5	27	77		
		Total	35	100	35	100		
5.	Upper respiratory infection	Yes	22	44	29	58	0.1	N.S
		No	28	56	21	42		
		Total	50	100	50	100		
6.	Using bottle feeding at night (for breast feeding infants)	Yes	12	80	4	26.7	0.002	S
		No	3	20	11	73.3		
		Total	15	100	15	100		
7.	Children exposed to passive smoking	Yes	42	84	22	44	0.00	S
		No	8	16	28	56		
		Total	50	100	50	100		

Furthermore, data in table (2) have been recognized that the using of bottle-feeding at night for breast feeding infants are also contributing to development of AOM in 80 % of infant, and determine statistically significant (at P value 0.002), this finding was corresponding with the results of the study of Sangeetha, et al., (2014) who stated a higher prevalence of otitis media were associated with bottle-feeding than with breast feeding. A study of Abrahams and Labbok (2011) emphasized that the introduction of infant bottle-feeding formula in the first 6 months of life is associated with increased risk of otitis media when compared with 6 months of exclusive breast-feeding. In a meta-analysis study which was done by Bowatte, et al., (2015) provided an evidence that the breast-feeding protects against AOM until two years of age.

Concerning the children exposed to passive smoking, the finding of the study indicates a statistically significant association (at P Value 0.00) for the development of AOM in 84% of infants who have exposed to second hand smoke, this was consistent with the findings of a meta-analysis study that identified reliable passive smoke are important risk factor for the occurrence of otitis media. The results in table (2) also demonstrate that are the using of pacifiers for infants was determine a significant risk factor for 82% of infants (at P value 0.00), its believes that the saliva may be leakage into the ear canal of infants due to the pacifiers use, that's leads to increase the chances for developing AOM. The results of the present study confirms the findings of previous studies regarding the association between pacifier use and otitis media, and largely agrees with other findings of the previous studies regarding otitis media occurrence and its risk factors.

Conclusion

Many risk factors that are associated with AOM, these include nasal obstruction, infant's and mother's position, using bottle-feeding formula, exposure to cigarette smoking, and using pacifiers when sleeping.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the College of Nursing/ Kerbala University and all experiments were carried out in accordance with approved guidelines.

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