

Original Research Article

Risk factors of acute otitis media among infants in a tertiary care hospital in Rawalpindi: a descriptive cross-sectional study

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ABSTRACT

Background: Acute otitis media (AOM) is the second most common disease of childhood. Many factors play role in the causation of AOM. However, the research-based data on risk factors for AOM in infants is still inadequate. Objective were this study aimed to determine the risk factors for AOM in infants with AOM.

Methods: This descriptive cross-sectional study was conducted among 189 infant patients with AOM in the otorhinolaryngology outpatient department of allied hospital of Rawalpindi medical university, Rawalpindi. Established inclusion and exclusion criteria and non-probability convenience sampling technique were utilized for the selection of patients. After taking informed consent, data were collected through a self-adapted questionnaire. Descriptive analysis was accomplished through SPSS version 25.

Results: AOM was more common among patients who had, an age group with a range of 9-12 months (41.28%), male gender (55.02%), lower birth order (49.73%), mothers with illiterate educational status (53.96%), mothers with the job (57.14%), lower socioeconomic status (59.25%), used bottle-feeding (46.56%), supine position during feeding (61.37%), used a pacifier (67.73%), poor feeding hygiene (58.21%), unvaccinated pneumococcal status (57.15%), and large family (63.50%). In the case of family ear infection and passive smoking, AOM incidence was more frequent among infants whose family had no history of ear infection (69.85%) and no smoking exposure (53.44%).

Conclusions: In short, the age group with a range of 9-12 months, male gender, low birth order, illiterate mothers, mothers with the job, lower socioeconomic status, bottle-feeding, supine feeding position, pacifier use, poor feeding hygiene, unvaccinated pneumococcal status, and large family size, all raise the risk of AOM incidence in infants.

Keywords: AOM, Risk factors, Infant, Tertiary care, Hospital, Rawalpindi, Descriptive, Cross-sectional

INTRODUCTION

Acute otitis media (AOM) is a disease of the ear in which inflammation of the middle ear occurs. It could be asymptomatic, or it could present with acute onset of symptoms and signs. Its symptoms vary with the age of children as in younger children, it presents with some general symptoms which include fever, poor feeding,

excessive crying, and irritability along with rubbing, tugging, or pulling affected ear, while, in older children, it presents with specific symptoms like earache, discharge from ear, and fever.

Its signs comprised of cloudy, dark, or yellow tympanic membrane. Its diagnosis is made by an otorhinolaryngologist by clinical history and otoscopy and tympanometry of the ear.^{1,2}

AOM is considered the second most prevalent disease of children succeeding upper respiratory infections around the world. It is also one of the most common communicable diseases and the most common disease of the ear in childhood. The most affected age group of children by this disease has an age range between three months to three years.³ It is estimated that 90% of children suffer from AOM in their preschool age. Its prevalence is three times higher in the first three years of children. Various studies reported AOM prevalence with a range from 9.20% to 40%. In Pakistan, its prevalence is also high (17.80%), relative to other developing countries like India with 9.20% as well as the Egypt with the 10.00%.⁴⁻⁶

High prevalence and high recurrent rate of the AOM put a high financial burden on the affected communities, and over time it causes the collapse of the health system of that society. Together with the economic burden, recurrent AOM also leads to several complications such as hearing loss and difficulty in writing and reading.⁷ Other drastic complications of AOM included chronic otitis media, mastoiditis, acute labyrinthitis, meningitis, and cerebral abscess. According to an estimation, every year complications associated with AOM lead to the death of almost 20,000 children under five years of the age.^{4,8}

The main pathogens of AOM are *Streptococcus pneumoniae*, *Hemophilus influenzae*, and *Moraxella catarrhalis*.⁹ Socio-demographic components such as age, gender, birth order, educational level of the mother, mother occupation, and socioeconomic status have a significant part in the development of AOM.^{2,3} Bottle-feeding, feeding in the supine position, pacifier use, unhygienic feeding practice, poor health status, low weight, no vaccination against *Streptococcus pneumoniae*, respiratory infection history, allergy history, family history of ear infection, large family size, and exposure to smoking, all predispose children to the AOM.^{4,10,11,12}

Although research in different regions of the world about the risk factors of AOM has been conducted,^{2,3,4} However, in Pakistan, research evidence regarding the risk factors of AOM up to this time is limited and people are not fully educated about AOM risk factors. Furthermore, primitive healthcare systems make health problems among the natives worse. In the presence of insufficient details about the risk factors of the AOM in Pakistan, this study aims to determine the risk factors among the infants with AOM at the otorhinolaryngology outpatient department allied hospital of the Rawalpindi medical university, Rawalpindi. By the identifying the risk factors of AOM, we would be capable to train people that how they could prevent Acute otitis media in their children. This could lead to relief in the economic burden on society as well as the improvement in the quality of life.

METHODS

We carried out this descriptive cross-sectional study among one hundred and eighty-nine diagnosed infant patients with AOM at the otorhinolaryngology (study of ear, nose, and throat) outpatient department of allied hospital of Rawalpindi medical university, Rawalpindi, nearly for seven months from September 2021 to March 2022. Sample size was calculated through WHO sample size calculator. Patients were enrolled in the study by utilizing a non-probability convenience sampling technique and a set of inclusion and exclusion criteria. Only patients who had an age range between one to 12 months, diagnosed with AOM, normal birth weight, no prematurity, no congenital defects like cleft lip and cleft palate, and whose parents had the will to participate were included in the study, whereas, those patients who had age below one month or above 12 months, suspected of having AOM, low birth weight, prematurity, any congenital defects such as cleft lip and cleft palate, and whose parents had shown reluctance in the participation of study were excluded from the study. AOM diagnosis was made of each infant by an otorhinolaryngologist by performing a physical examination of the ear (otoscopy and tympanometry) and taking the history of the patients about the AOM. After explaining the objectives of the study to the parents of the patients, we obtained informed consent from them. We applied a self-adapted questionnaire for the collection of data through interviews with the parents of patients. The self-adapted questionnaire had two portions, one portion was about the demographic profile of the patients and their parents such as age group (1 to 4 months, 5 to 8 months, or 9 to 12 months), gender of infant (boy or girl), birth order among siblings (1, 2, 3, 4, or 5 and above), mother education (illiterate, primary, matric or above), mother occupation (housewife or employed), and socioeconomic status based on monthly income (lower=up to 40,000 Pkr, middle=41,000 to 100,000 Pkr, upper=Above 100,000 Pkr), whereas, the second portion was about the potential risk factors which included type of feeding (breastfeeding, bottle-feeding, or both), position of child during feeding (supine, lateral, or semi-fowler's), pacifier use (Yes or no), hygiene condition during feeding based on the general appearance of parents, child, feeder, and pacifier (good or poor), pneumococcal vaccination status (vaccinated or unvaccinated), family size based on family member (small=up to 5 family members, large=above 5 family members), family history of ear infection (Yes or no), and passive smoking because of parents smoking (Yes or no).

After finishing the data collection, we arranged data, entered it into SPSS version 25.0 (IBM Corp., Armonk, NY), and then data analysis was carried out through this software. For the estimation of the frequencies and percentages of the nominal variables and the means of numerical variables and the descriptive analysis was performed.

RESULTS

From the total of 189 patients of AOM, 104 (55.02%) were males, while 85 (44.98%) were females. The mean age for study participants was 7.80 months with a standard deviation (SD) of ± 4.10 .

Table 1 shows that AOM incidence was more prevalent among patients who had an age group of 9-12 months or higher age group, male sex, mothers with illiterate or lower educational status, working lady mothers, and lower socioeconomic status in contrast to patients who had younger age groups like 1-4 months or 5-8 months, female sex, mothers with higher educational status, housewife mothers and higher socioeconomic status, respectively.

Table 1: Distribution of socio-demographic characteristics of the study population.

Variables	Frequency	Percentage (%)
Age group (months)		
1-4	51	26.98
5-8	60	31.74
9-12	78	41.28
Gender		
Male	104	55.02
Female	85	44.98
Birth order		
1	94	49.73
2	53	28.04
3	23	12.16
4	12	6.34
5 or above	7	3.73
Mother education status		
Illiterate	102	53.96
Primary	58	30.68
Matric or above	29	15.36
Mother occupation		
Housewife	81	42.85
Working lady	108	57.14
Socioeconomic status		
Lower	112	59.25
Middle	58	30.70
Upper	19	10.05

Table 2 indicates that AOM incidence was higher among the patients who had bottle-feeding or mixed feeding types (breastfeeding and bottle-feeding), supine and lateral feeding positions, a used pacifier, poor feeding hygiene, unvaccinated pneumococcal vaccination status, large family, no family history of ear infection, and no passive smoking as compared to patients who had exclusive breastfeeding, semi-fowler's feeding position, not used pacifier, good feeding hygiene, vaccinated pneumococcal vaccinated status, small family, history of family ear infection, and passive smoking, respectively. Even so, a notable number of patients with

AOM had a family history of ear infections and passive smoking.

Table 2: Frequency and percentages of the determinants of AOM in the study population.

Variables	Frequency	Percentage (%)
Feeding type		
Breastfeeding	39	20.63
Bottle-feeding	88	46.56
Both	62	32.81
Position during feeding of child		
Supine	116	61.37
Lateral	59	31.23
Semi fowler's	14	7.40
Pacifier use		
Yes	128	67.73
No	61	32.27
Hygiene during feeding		
Good	79	41.79
Poor	110	58.21
Pneumococcal vaccination status		
Vaccinated	81	42.85
Unvaccinated	108	57.15
Family size		
Small	69	36.50
Large	120	63.50
Family history of ear infection		
Yes	57	30.15
No	132	69.85
Passive smoking		
Yes	88	46.56
No	101	53.44

DISCUSSION

The results of our research study have provided significant details regarding the risk factors of AOM, which is one of the most common diseases of childhood.

In the first phase of data analysis, the role of socio-demographic characteristics in the development of AOM was determined. We noticed the highest prevalence (41.28%) of AOM among infants of age group with a range of 9-12 months. A study that was performed in the Solomon Islands also reported a high prevalence of AOM in a similar age group of infants.¹¹ The number of male infants (55.02%) with AOM was higher than the number of female infants (44.98%) with AOM. This observation was supported by some other studies in Taiwan and Pakistan.^{13,15} However, other studies reported inconsistent results with a higher prevalence of AOM among females.^{2,4} Infants with lower birth order were more affected by AOM than infants with higher birth order and this determination was also endorsed by a study that was conducted in Indonesia.² AOM incidence was more among infants of mothers who had low education levels and this statement was consistent with the results of a study.¹⁰ Infants had higher AOM prevalence whose

mothers were employed or holding jobs. In literature, different views were faced regarding the impact of a mother's job on AOM incidence in infants as a study that was carried out in Iran showed similar results.⁴ While in another study described incongruous findings about the impact of a mother's job on AOM incidence in infants.¹⁰ Low socioeconomic status was found a major risk factor for AOM, and it was also recorded in a study carried out in the United States of America.¹³

In the next phase of data analysis, we observed how various potential risk factors impact AOM incidence in infants. First, we noted the feeding practices' effect on the determination of AOM incidence. Breastfeeding, semi-fowler's feeding position, and proper hygiene during feeding, all were protective against AOM development. Whereas bottle-feeding, a mix of both breastfeeding and bottle feeding, feeding in supine or lateral positions, poor hygiene during feeding, and use of a pacifier, all were significant risk factors for AOM in infants. In the literature, several studies presented similar findings about the influence of feeding type, feeding position, feeding hygiene, and pacifier use on AOM incidence.^{2,3,10} Pneumococcal vaccination was preventive against AOM establishment and this finding of the current study was also congruous with another research finding about vaccination's role in causing AOM.¹⁴ The large family size was also found to predispose infants toward AOM and it has been proven in previous studies as well.^{4,12} In this study, the AOM was more prevalent among the infants who had no history of ear infection in family history and this was contrary to the finding of other studies, in which family history of ear infection has been noticed as one of the main risk factors for AOM.^{2,11} Our current study also presented observations about the impact of second-hand smoking on AOM incidence in neonates that, AOM was more common among infants who were exposed to smoking in contrast to neonates who had a history of passive smoking. A conflicting finding has been reported by a study in literature, that passive smoking among neonates leads to a higher incidence of AOM.³

Our study suggests that parents should be educated about AOM and its risk factors properly. Breastfeeding in proper feeding position with good hygiene should be encouraged in infants, while pacifier use should be discouraged. Moreover, infants should be vaccinated against AOM causative agents.

Limitations

Although this study has highlighted the risk factors of one of the most common diseases of childhood and which would be beneficial in educating the people about AOM, however, it has a limitation too like descriptive cross-sectional study design. Because of this descriptive cross-section design of the study, we could not determine how these factors lead to AOM. Therefore, more research with

some other study designs is required to identify how these factors predispose infants to AOM.

CONCLUSION

Current study results have proposed that AOM develops more frequently in infants who have an age group with a range of 9-12 months, male gender, lower birth order, mother having illiterate educational status and job, and low socioeconomic status. The important risk factors linked with AOM are bottle feeding, supine feeding position, pacifier use, poor feeding hygiene, unvaccinated pneumococcal status, and large family size. The number of infant patients who had a family history of ear infection and second-hand smoking was comparatively less. Health care providers and health-related authorities should provide information to the people regarding the risk factors for AOM. By raising the information about AOM among people reduction in AOM incidence and related complications could be achieved.

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