

Correlation of acute suppurative otitis media with infant feeding position

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ABSTRACT

Background: Acute otitis media (AOM) is the most common childhood illness necessitating medical therapy for children younger than 5 years. Long-term and exclusive breastfeeding is associated with protection against AOM. However, faulty feeding position and habits can lead to the occurrence of AOM in infants. **Objectives:** The aim of this study is to assess the risk of occurrence of AOM with faulty feeding positions during the 1st year of life. **Materials and Methods:** All breastfed infants <1 year with a provisional diagnosis of AOM, during August 2015 - January 2016 (6 months), were included in the study. Syndromic children, children with craniofacial anomalies, bottle-fed infants, and those not willing to participate in the study were excluded from the study. Demographic details and detailed history, especially, the feeding position were collected from the parents. Diagnosis of AOM was confirmed by a senior ENT surgeon after otoscopic examination. **Results:** 118 children with AOM were statistically analyzed. They aged between 1 month and 12 months with a mean of 6.8 and standard deviation of 4.1 months. There were 68 (57.62%) males and 50 (42.37%) females. No statistical significance was observed for sex or laterality with AOM. A statistically significant correlation was observed between AOM and age groups, AOM and position of the baby. **Conclusion:** In this study, we have observed that feeding the infant in supine position significantly increases the risk of AOM in infants.

Key words: Acute otitis media, Breastfeeding, Earache, Hearing loss, Otitis media

Acute otitis media (AOM) is defined clinicopathologically as inflammation of mucoperiosteal lining of middle ear cleft of rapid onset and infective origin, associated with a middle ear effusion and a varied collection of clinical symptoms and signs [1,2]. AOM is the most common childhood illness necessitating medical therapy for children younger than 5 years [3,4]. AOM affects more than one-third of the US children in the first 12 months of life and is responsible for the majority of antimicrobial prescriptions written for children younger than 3 years of age. Various recent reports have suggested that the prevalence of Otitis media (OM) among Indian children aged 5-15 years is 9.4-20% [5].

AOM is often secondary to viral infection of the upper respiratory tract, leading to dysfunction of the eustachian tubes (ETs) and subsequent microbial colonization of the nasopharynx and the middle ear by agents such as *Streptococcus pneumoniae*, non-typeable *Haemophilus influenzae*, and *Moraxella catarrhalis* [6].

Younger age, male sex, parental or sibling history of OM, low socioeconomic status, reduced duration of breastfeeding, overcrowding, daycare attendance, recurrent upper respiratory infections, snoring, allergic rhinitis, and passive smoking have been reported as possible risk factors [7]. Infants and young children are at highest risk of developing AOM, with peak prevalence between 6 and 36 months of age. This increased incidence may be credited to the structural and functional immaturity of the ET

and an immature immune system. The ET in the infant is shorter, wider, and more horizontal than in the adult, which accounts for the high rate of OM in infants and children [8].

Many studies have evaluated the protective role of breast milk in prevention of AOM and concluded that breastfeeding protects against AOM until 2 years of age, with greater protection for exclusive breastfeeding and of longer duration [9]. Some reviews and studies have shown that faulty feeding position can lead to increased risk of AOM in children [6,10-16]. In view of above, the purpose of this present investigation was to assess the risk of occurrence of AOM with position of the body during the first year of life utilizing a longitudinal study design.

MATERIALS AND METHODS

This study has been conducted in the Department of Pediatrics, Academy of Medical Sciences, Pariyaram, Kannur, during August 2015 – January 2016 (6 months). The study was approved by the Institutional Ethics Committee. A purposive sampling method was followed by inviting all infants <1 year with a provisional diagnosis of AOM. Syndromic children, children with craniofacial anomalies, those infants who were bottle fed, and those not willing to participate in the study were excluded from the study. The study was approved by the institutional ethics committee and written informed consent was obtained from parents of children enrolled for the study.

Provisional diagnosis of AOM is mainly a clinical diagnosis, which was made if a history of rapid onset of earache, hearing loss, ear-pulling, and otorrhea, with or without excessive crying, irritability, fever, coryzal symptoms, vomiting, poor feeding, and clumsiness. Diagnosis was confirmed by a senior ENT surgeon after otoscopic examination. Signs include erythema of the tympanic membrane (TM), congestion of blood vessels (cart-wheel appearance), bulging, or fullness of TM on otoscopy, and there may be acute perforation of the TM with otorrhea [2]. Demographic details, frequency, duration and laterality of otorrhea, and position of infant while feeding (upright/supine) were recorded. Pus was sent for culture and sensitivity in those children who presented with otorrhea.

The data obtained were spread into the master chart and were analyzed with SPSS software (SPSS 16.0, SPSS Inc., Chicago, IL). The statistical significance was calculated by Chi(χ)-square test, and $p < 0.05$ was considered statistically significant.

RESULTS

A total of 132 children, with a provisional diagnosis of AOM, satisfying the inclusion criteria were invited to participate in the study. After applying the exclusion criteria, 118 patients were statistically evaluated. The findings from data analysis are listed in Table 1. Recruited children aged between 1 month and 12 months with a mean of 6.8 ± 4.1 months. There were 68 (57.62%) male and 50 (42.37%) female babies. Although we observed a male predominance, this was not statistically significant ($p = 0.202$). Among the children, the highest incidence of AOM was found between 7 and 9 months age group ($n = 39$, 33.05%), followed by 1-3 months age group ($n = 31$, 26.27%). The association of AOM with age groups was statistically significant ($p = 0.001$).

Out of the 118 children, 45 (38.13%) were the right side AOM and 46 (38.98%) were the left side AOM, and 27 (22.88%) were bilateral cases. p value calculated for the association of AOM with laterality was non-significant ($p > 0.05$). 82 (69.49%) of 118 children presented with the first episode of AOM, whereas the remaining presented with the second or third episode. It was observed that frequency of recurrence was higher with increasing age.

72 (61.01%) of AOM babies were fed in supine position at times which was significant ($p < 0.001$) higher than those who were breastfed in an upright position (46, 38.98%). 43 (36.44%)

of the mothers specifically said that they took care to raise the baby's head during feeding. Higher number of babies fed in supine position were seen in 7-9 months age group ($n = 24$, 20.33%), followed by 1-3 months age group ($n = 19$, 16.10%). Among the babies fed in supine position, AOM was more prevalent in male babies and those in the age group of 7-9 months.

DISCUSSION

AOM is a common disease among childhood with the highest incidence in first year of life, more specifically the second 6 months of life in most studies, and gradually reducing with increasing age. In this study, the highest incidence of AOM was observed among children of 7-9 months age group. Our results were similar to that of Swamy et al. who observed a higher incidence of AOM in 7-12 months age group [12]. Tos et al. have reported an incidence of a first episode of AOM in the 1st year of life among 22%, in year two among 15% and in year three among 10%, falling to 2% by the year 8 [1].

Three potential routes of spread of infection to middle ear are described in the literature, through the ET, tympanic membrane perforations or grommets, and hematogenous route. Spread through ET is considered to be the most common route. In infants, the ET is short, straight, and widely patent which makes it easy for nasopharyngeal secretions and microorganisms reaching the middle ear. Negative pressure in the middle ear may facilitate the movement of bacteria up through ET [1]. In our study, we observed that babies fed in supine position are significantly more prone to get AOM. Swamy et al. observed that out of 130 infants, 79 were fed in supine position and 51 infants were fed in upright position. There was a significant association ($p < 0.010$) between incidence of AOM and feeding in supine position [12]. Tully et al. observed that, out of 90 children aged 7-24 months, abnormal tympanograms (objective assessment) were noted in 34 (59.6%) of 57 infants fed in supine position, whereas it was only 5 (15%) of 33 infants fed in semi upright position [13].

Owen et al. highlighted that supine feeding position was associated with an early onset otitis media [14]. Narayanan et al. also found supine feeding to be associated with parental reporting of recurrent AOM [15]. They observed that, compared to Western societies, more Indian babies were receiving breastfeeding, and among these, the head was more frequently flat during feeding,

Table 1: Characteristics of study population

Age group (months)	Side of AOM			Position of breastfeeding				Total			
				Supine		Upright		Male	Female	Total	
	Right	Left	Bilateral	Male	Female	Male	Female				
1-3	10	12	9	12	7	8	4	20	11	31	
4-6	12	8	9	11	7	6	5	17	12	29	
7-9	16	20	3	13	11	8	7	21	18	39	
10-12	7	6	6	6	5	4	4	10	9	19	
	$p = 0.947$				$p < 0.010$				$p = 0.202$		

AOM: Acute otitis media

leading to an increased incidence of AOM among Indian babies. Beauregard et al. found that young children with AOM were more likely to have been fed in the horizontal position than matched control subjects who had three or more upper respiratory tract infections without the development of OM [16].

Feeding the baby in supine (horizontal/lying down) or near so position facilitates the reflux of milk into middle ear, with carriage of respiratory flora into the middle ear space, thereby leading to OM [10-16]. Narayanan et al. recommended that, in promoting breastfeeding, it would appear to be beneficial to stress that while the mother may adopt any position that she finds comfortable, the infant's head and where possible shoulders should be raised and supported during feeding, either on the arm or a pillow [15].

A limitation of our study was that it was a short-term study among a limited number of patients. A long-term large cohort is recommended to validate our results.

CONCLUSION

Our study has observed a significant correlation between faulty position of the baby (supine position) with incidence of AOM in children less than one year. It is recommended to keep the infants head and where possible the shoulders raised and supported during feeding.

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