

## RISK FACTORS FOR ACUTE OTITIS MEDIA IN NIGERIAN INFANTS

By

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### SUMMARY

**Objective:** The risk factors for acute otitis media (AOM) have been well documented in studies mostly conducted in temperate, developed countries. The present study seeks to determine the relevance of five selected risk factors in a tropical developing country.

**Method:** A cross-sectional study of two hundred and ten (210) infants was done in Enugu, eastern Nigeria. Their mothers were interviewed with structured questionnaires.

**Results:** The risk for AOM increased more with pacifier use (odds ratio = 1.278) and thumb sucking (odds ratio = 1.258) than with parental smoking (odds ratio = 1.144) and day care attendance (odds ratio = 1.092).

**Conclusion:** It is concluded that primary prevention of AOM may be achieved by strategies that can eliminate or reduce these risk factors since they are potentially modifiable.

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**Key words:** Risk factors, otitis media, Nigerian infants

### INTRODUCTION

Otitis media (OM) is a major cause of childhood morbidity in temperate developed countries.<sup>1,2</sup> Acute otitis media (AOM) often complicates upper respiratory tract infections such as the 'common cold' following obstruction of the eustachian tube ostia by nasopharyngeal oedema.<sup>3</sup> Most children are afflicted with at least one episode of AOM before the age of six years<sup>4</sup>. Its onset before the age of nine months reportedly favours the development of recurrent AOM.<sup>5,6</sup> Other distinct disease entities related to OM are middle ear effusion (MEE), chronic suppurative otitis media (CSOM) and otitis media with effusion (OME). The latter most frequently accounts for hearing defects in children.<sup>7</sup>

Some authors have observed that AOM may be a multifactorial disease determined by a number of genetic and environmental factors.<sup>8-10</sup> In fact, the role of some modifiable risk factors has been well documented in other reports.<sup>11-15</sup> These are pacifier use, bottle feeding, thumb-sucking, day care attendance and exposure to passive smoking or parental smoking.

There is however no unanimity in their findings regarding the risk-factor profile of these variables. For instance, there is no consensus of opinion on the role of breast-feeding pattern, as several investigators have failed to demonstrate an association between it and AOM.<sup>2</sup>

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Paucity of studies exists on this subject in this environment. Thus, the current study was initiated to evaluate the relevance of these factors in a selected population of infants in a tropical developing country.

## SUBJECTS AND METHODS

This hospital-based cross-sectional study was conducted in the infant welfare clinic of the University of Nigeria Teaching Hospital, Enugu - a cosmopolitan city in eastern Nigeria from May to August 2003. Eligible subjects were infants aged between 1 month and 12 months who were brought for immunization by their biological mothers. Enrollment was by systematic sample of every 3rd eligible infant during clinic sessions after obtaining informed consent from the mother. The mothers of the enrolled infants were interviewed by two of the principal investigators (S.N.U. and G.C.I.) and two trained paediatric interns using a 13- item structured questionnaire which comprised 3 sections. Section A recorded the age and gender of each infant as well as the maternal and paternal educational status/occupation.

Section B probed for the past medical history in the infant indicating the likelihood of previous AOM. Maternal report of these three options (a) earache and/or irritability with fever (b) ear discharge and (c) otoscopic examination/confirmation of ear infection by a doctor was accepted as highly suggestive of AOM because the positive predictive value of these parameters are reportedly high.<sup>16,17</sup>

Section C was structured to establish the presence of these possible risk factors - duration of exclusive breastfeeding, bottle-feeding (formula feeding), pacifier use, thumbsucking, exposure to parental smoking and daycare attendance. Statistical analyses included frequency tests and calculation of odds ratio (OR) for all these factors. The chi-square test and student's t-test were used to determine the significance of associations and of the difference in mean ages, of subjects with and without history of AOM respectively. Adopted level of significance was  $P < 0.05$ . The infants

were classified into socio-economic groups using the method, which employs parental education level and occupation.<sup>18</sup>

## RESULTS

### Biodata/AOM prevalence

A total of two hundred and ten (210) infants were recruited - 103 males and 107 females. Of these 210 infants, a history of AOM was noted in only 17; giving a prevalence rate of 8.1%. As shown in Table I, majority of the infants that had past history of AOM were aged 10 - 12 months (35.3%) and belonged to social class III (47.1%). The slight female preponderance was not statistically significant ( $P > 0.05$ ). However, the difference between the mean ages of infants with history of AOM (6.82 months) and those without AOM (4.96 months) was statistically significant ( $t = 2.217$ ,  $p = 0.028$ ).

TABLE I. BIO-DATA OF INFANTS WITH/WITHOUT HISTORY OF ACUTE OTITIS MEDIA (AOM)

Characteristics	History of AOM	
	Present n = 17(%)	Absent N = 193(%)
1. Age (months)		
1-3	4(23.5)	88(45.6)
4-6	5(29.4)	46(23.8)
7-9	2(11.8)	36(18.7)
10-12	6(35.3)	23(11.9)
2. Gender*		
Male	7(41.2)	96(49.7)
Female	10(58.8)	97(50.3)
3. Social class		
I	-	4(2.1)
II	4(23.5)	44(22.8)
III	8(47.1)	89(46.1)
IV	5(29.4)	40(20.7)
V	-	16(8.3)

\*  $\chi^2 = 0.459$ ,  $P$  value = 0.498 ( $P > 0.05$ )

### Risk factors for AOM

Among the infants that had previous history of AOM, the presence of the following variables were not statistically significant;

exclusive breastfeeding ( $\chi^2 = 1.188$ ,  $P = 0.28$ ), and bottle-feeding ( $\chi^2 = 0.864$ ,  $P = 0.35$ ). Furthermore, in table 2 it is evident that the risk for AOM increased more with pacifier use (Odds ratio [OR] = 1.278) and thumb-sucking (Odds ratio [OR] = 1.258) than with exposure to parental smoking (Odds ratio [OR] = 1.144) and daycare attendance (Odds ratio [OR] = 1.092) but reduced with bottle-feeding (Odds ratio [OR] = 0.601).

TABLE 2 ODDS RATIOS OF RISK FACTORS FOR ACUTE OTITIS MEDIA

Risk Factor	Odds ratio (OR)*
Pacifier use	1.278(CI,0.152 – 10.733)
Bottle-feeding	0.601 (CI, 0.204 – 1.774)
Thumb-sucking	1.258 (CI, 0.458 – 3.453)
Parental smoking	1.144 (CI, 0.138 – 9.511)
Daycare attendance	1.092 (CI, 0.233 – 5.111)

\* 95% confidence Interval (CI)

## DISCUSSION

In spite of the low prevalence of AOM recorded in our study population, several reports from developed countries indicate that the incidence of otitis media (OM) is high during the first year of life.<sup>19-21</sup> In fact, about 50% of infants in the United States experience their first OM episode by 6 months of age.<sup>22</sup> The poorly developed immune system of the young infant, the age-related differences in eustachian tube anatomy and physiology, as well as early exposures to some environmental factors make them vulnerable to respiratory tract infection and AOM.<sup>2</sup> Nevertheless, the difference in prevalence rate noted in the current study and incidence rates elsewhere can be attributed to dissimilarities in race, risk factor profile and study methodology especially the diagnosis of AOM.

in this study the preponderance of infants with past history of AOM in the lower socio-economic group confirms a similar finding reported in a previous study<sup>22</sup>. Our observation can be explained by the fact that overcrowding, a product of low socio-economic status, promotes the spread of respiratory tract infection and thus episodes of AOM. Other workers in Malaysia in contrast reported an association of another related disease entity, otitis media with effusion (OME) with high parental socio-economic status.<sup>23</sup> The complexity of socioeconomic status and failure to adequately control for it in risk factor studies are said to account for these contradictory findings.<sup>2</sup>

Potentially alterable risk factors for AOM were noted among infants in our study. These include pacifier use (1.28-fold risk), thumb-sucking (1.26-fold risk), parental smoking (1.14-fold risk), daycare attendance (1.09-fold risk) and bottle-feeding (0.6-fold risk). Obviously, pacifier use remains the most frequently observed risk factor which agrees with the findings of Johnson and Mourino.<sup>11</sup> The least frequently noted risk factor was bottle feeding probably because the rate of exclusive breastfeeding is high in this environment, following the Baby Friendly hospital initiative.

Contrary to our findings, other studies have highlighted the prominent roles of daycare attendance and bottle-feeding as risk factors for AOM.<sup>8,11,14,15,24,25</sup> However, other workers in Greenland failed to confirm these variables as risk factors but rather documented parental history of OM and long period of exclusive breastfeeding as strongest factors associated with AOM.<sup>9</sup> On the other hand, several investigators have failed to establish an association between OM and breastfeeding.<sup>2</sup>

Interestingly, it has been observed that the combination of these different factors may for some children mean the difference between becoming otitis-prone or not.<sup>26</sup> Hence, in order to assess the significance of each risk factor for an individual child, the values for other relevant factors must be considered concurrently.<sup>27, 28</sup>

It is not surprising that thumb-sucking is a major risk factor in our study because this habit disorder has been found to be relatively common in this locality<sup>29</sup>. Undoubtedly, thumb-sucking and bottle-feeding which encourage persistent collapse of the eustachian tube during the act of swallowing can result in functional obstruction followed by effusion in the middle ear and subsequent susceptibility to OM.

In conclusion, our study has shown that the risk for AOM increased more with pacifier use and thumb-sucking. Since these risk factors are potentially modifiable, primary prevention of AOM is thus feasible by strategies that can eliminate or reduce them.

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