Original Article

DOI: 10.17354/ijss/2016/260

Risk Factors Responsible for Acute Otitis Media in Infancy and Children Less than Five Years: A Case-control Study

Manji Mathew Pawathil[1], K B Rajamma[2]

[1]Resident, Department of ENT, Sree Gokulam Medical College and Research Foundation, Trivandrum, Kerala, India, [2]Professor and Head, Department of ENT, Sree Gokulam Medical College and Research Foundation, Trivandrum, Kerala, India

Abstract

Introduction: Acute otitis media (AOM) is the most frequent diagnosis in sick children visiting clinician's offices and the most common reason for administration of antibiotics. To highlight the relationship between AOM and its risk factors and its significance if any in children <5 years.

Methods: A case-control study of 200 children where 100 children with AOM and 100 children without ear disease coming to out-patient department (OPD) were assessed.

Results: Analysis showed significant statistical risk factors of AOM such as low birth weight, siblings with otitis media, bottle feeding, recumbent feeding, passive smoking at home, day care attendance, chronic tonsillitis.

Conclusion: There are significant risk factors associated with AOM, which can give rise to serious complications. By identifying the modifiable risk factors, the clinician could inform parents regarding measures to avoid these factors.

Key words: Otitis media, Infancy, Children

INTRODUCTION

Acute otitis media (AOM) also called acute suppurative otitis media is one of the most frequent diagnoses for children seeking acute medical care. It is the second most common disease of childhood after upper respiratory infection mainly affecting children under 10 years of age. AOM accounts for antimicrobial or surgical therapy among a large population of children. The pathogenesis of otitis media is multifactorial including Eustachian tube dysfunction, genetic, infectious, immunologic, allergic, environmental, and social factors. Known risk factors are young age, male gender, bottle feeding, siblings with otitis media, crowded living conditions, smoking at home, hereditary, and a variety of associated conditions such as cleft palate, immunodeficiency, ciliary dyskinesia, down's syndrome, cystic fibrosis, unawareness on the preventive effect of newly arrived vaccinations.

Access this article online

www.ijss-sn.com

Month of Submission : 03-2016
Month of Peer Review : 04-2016
Month of Acceptance : 05-2016
Month of Publishing : 05-2016

Aims of the Study

The main objective of the study is to highlight the relationship between AOM, and its various risk factors and the significance of association if any. The major factors under consideration are as follows:

- Male gender
- Low birth weight – Any infant with a birth weight of <2.5 kg regardless of gestational age
- Preterm birth – Defined as babies born before the end of 37 weeks of gestation (<259 days)
- Breastfeeding factors
  - Duration of exclusive breastfeeding,
  - Recumbent feeding,
  - Bottle feeding,
  - Sibling with otitis media,
  - Parental history of otitis media,
  - Passive smoking,
  - Family history of atopy,
  - Chronic tonsillitis,

Correspondence Author: Dr. Manji Mathew Pawathil, Department of ENT, Sree Gokulam Medical College and Research Foundation, Trivandrum, Kerala, India. Phone: +91-9846923703; 9633653896. E-mail: manjimathew@yahoo.in

- Adenoid hypertrophy,
- Status of pneumococcal vaccination,
- Day care attendance.

METHODS

- Study design: Case-control study
- Setting: Sree Gokulam Medical College and Research Foundation, Thiruvananthapuram
- Duration of study: 1 year
- Period of study: Dec 2012 – Dec 2013
- Case definition: Infants and children <5 years diagnosed as AOM, attending the out-patient department (OPD) of Otorhinolaryngology at Sree Gokulam Medical College, Thiruvananthapuram, during study
- Control definition: Infants and children <5 years of age without history of ear infection attending the OPD of Otorhinolaryngology, Pediatrics at Sree Gokulam Medical College, Thiruvananthapuram, during the study
- Source of cases: OPD of Otorhinolaryngology at Sree Gokulam Medical College, Thiruvananthapuram
- Source of controls: Matched controls
- Attending the OPD of Otorhinolaryngology and Pediatrics, Sree Gokulam Medical College, Thiruvananthapuram
- Sample size: 100
- Number of controls: 100.

RESULTS

Among cases, 52% were males and 48% were females and among the control group, 54% were males and 46% females.

Birth Weight

In children with AOM, 34% had low birth weight (<2.5 kg), whereas in the control group, only 12% had low birth weight. Statistically showing 3.77 times increased the risk of developing AOM in children with low birth weight.

Sibling with History of AOM

The presence of sibling with otitis media was found to have 6.71-fold increased risk fold of AOM in infancy.

Socio-economic Status

About 58% of cases hailed from middle-class family comparing with 39% of the controls. Moreover, it showed 2.16 times chance of children from middle-class family to develop AOM.

History of Bottle Feeding

The presence of bottle feeding in cases group were 45% of children while only 25% in the control group. Thus, statistically showing that bottle feeding has a definite risk of 2.45 times in children for AOM.

Recumbent Feeding

Among the two study groups, recumbent feeding was significantly higher among the cases accounting 66%, compared with 14% in controls (>11 times).

Day Care Attendance

About 38% of children attending day care among the cases developed AOM compared to 24% of children in the control group. The statistical significance was 1.94. Thus, it shows that attending day care has a definite role to develop AOM.

Passive Smoking

Those children exposed to passive smoking at home among the cases were 50% while it was 24% among controls. Hence, highlighting the risk of passive smoking at home in developing AOM.

Chronic Tonsillitis

Among the two study groups, chronic tonsillitis was significantly higher in cases with 32% compared with 14% in controls. The difference was highly significant statistically (>twice). Therefore, chronic tonsillitis has increased risk of AOM. ((Figures 1-14)

DISCUSSION

AOM is the most frequent diagnosis in sick children[1] visiting clinicians' offices and the most common reason for administration of antibiotics.[2] AOM occurs at all ages but is most prevalent in infancy.[3] AOM is defined by the presence of fluid in the middle ear accompanied by acute signs of illness and signs, or symptoms of middle ear inflammation.[4] Bulging of the tympanic membrane is considered the quintessential sign.[5] The objective of this study was at identifying the risk factors of AOM and its significance in children <5 years.

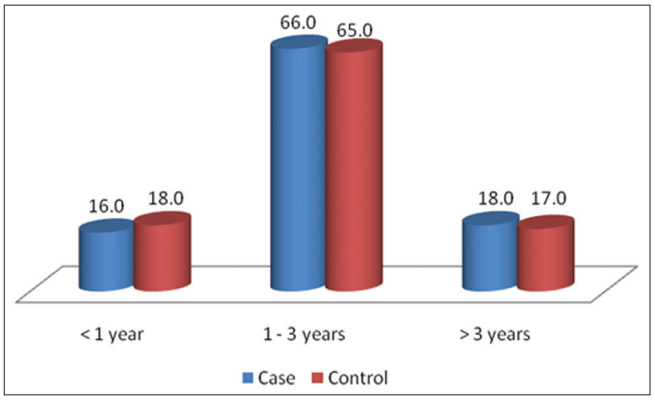

Figure 1: Association acute otitis media with age

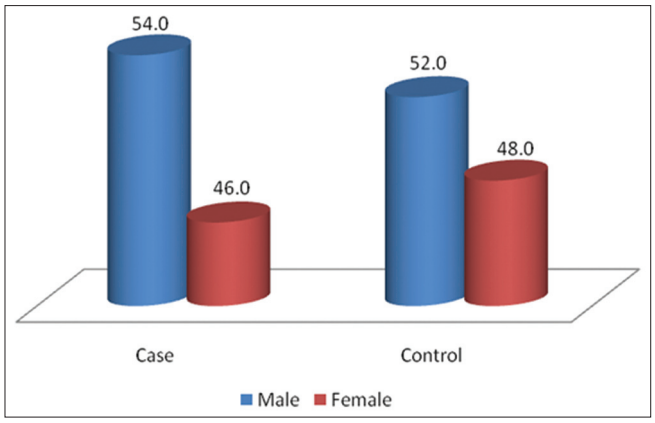

Figure 2: Association acute otitis media with gender

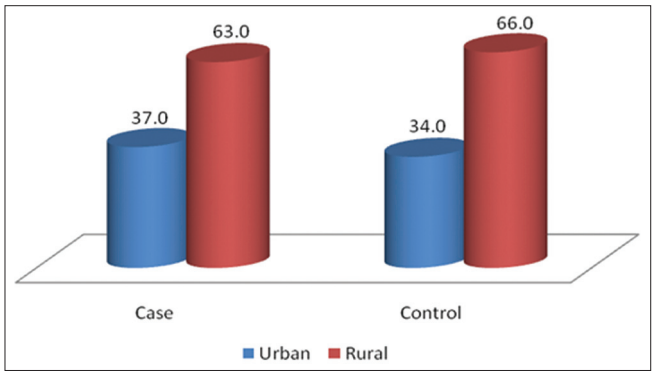

Figure 3: Association acute otitis media with place

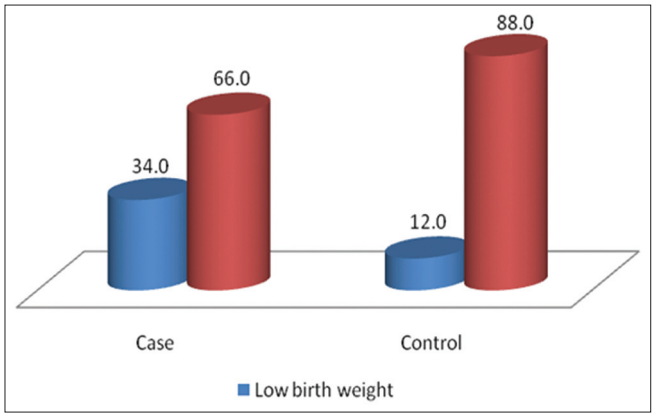

Figure 4: Association acute otitis media with birth weight

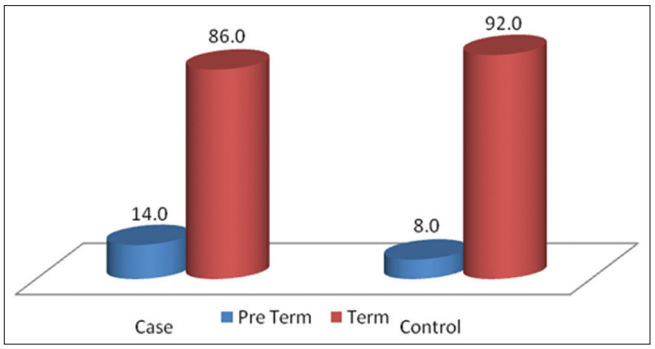

Figure 5: Association acute otitis media with born preterm /term

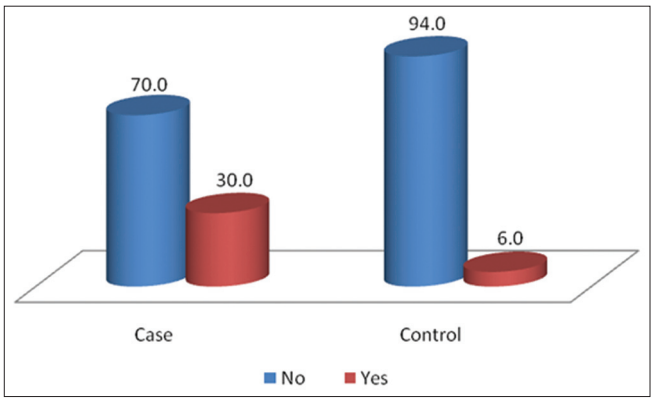

Figure 6: Association acute otitis media with sibling with h/o acute otitis media

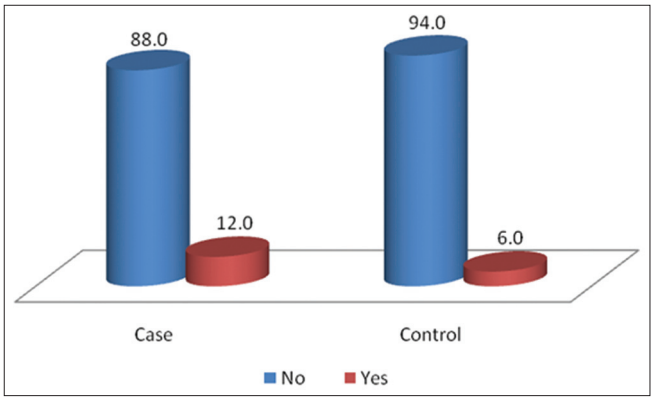

Figure 7: Association acute otitis media with parental h/o acute otitis media

According to this case-control study of 100 cases of AOM and 100 controls, the peak incidence of the first episode of AOM was found to be in children between 1 and 3 years of age.[6] Gender distribution states that males predominated when compared to females.[7] However, both male to female distributions was almost in equal ratio among case and control. Comparing birth weight among cases and controls, it was found that low birth weight (<2.5 kg) was a significant risk factor for otitis media in children (3.77 times increased risk). The findings there is a higher chance of low birth weighed children to develop AOM.[8] Preterm birth (<37 weeks) prematurity was identified not to significantly increase the risk of otitis media in children in this study. The presence of a sibling with otitis media is found to have a statistically significant association with AOM in children.[9] According to the data obtained from this study, parental history of otitis media was found to have no statistically significant association with otitis media in children.

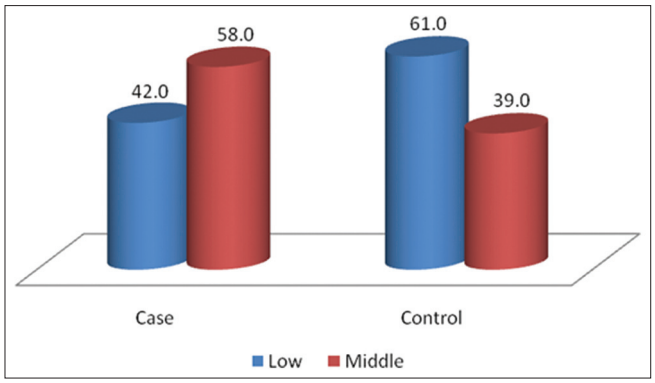

Figure 8: Association acute otitis media with socio-economic status

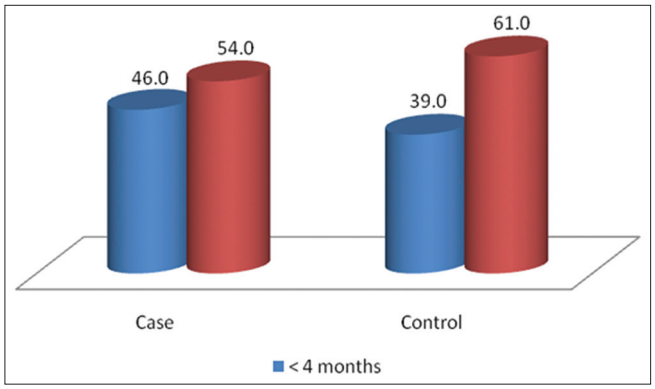

Figure 9: Association acute otitis media with total duration of exclusive breast feeding

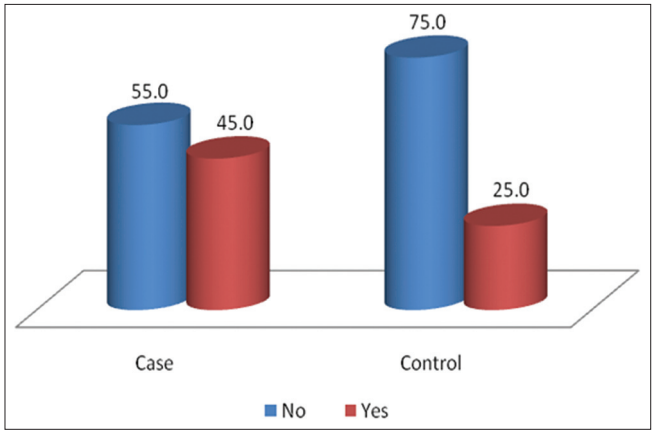

Figure 10: Association acute otitis media with h/o bottle feeding

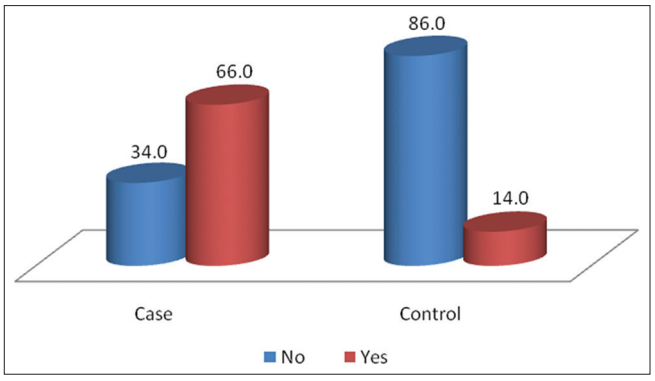

Figure 11: Association of acute otitis media with recumbent feeding

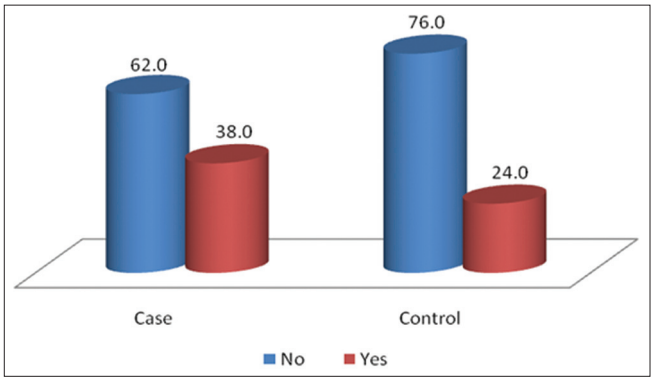

Figure 12: Association acute otitis media with day care attendance

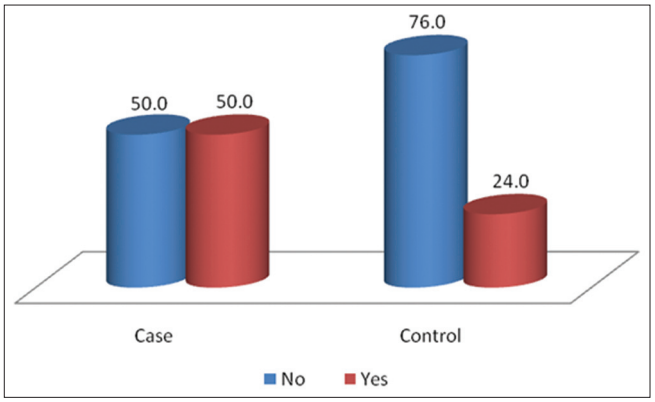

Figure 13: Association acute otitis media with passive smoking

Evaluation of breastfeeding characteristics in both groups revealed that long duration of exclusive breastfeeding had no definite protective effect on AOM,[10] but bottle feeding (odds ratio – 2.45) and recumbent feeding (odds ratio – 11.92) were identified to be highly significant risk factors for otitis media in infancy.[11]

Passive smoking at home is found to increase the risk of infantile otitis media by 3.16 times in this study.[12,13] Family history of atopy was not found to be an independent risk factor for AOM. It was also noted that children sent to daycare also had significant chance to develop AOM nearly accounting for 1.94 times high risk. Socio-economic status and access to health care are factors that affect the incidence of otitis media. In the case-control study, there was an increased incidence of AOM among middle-class family accounting nearly 2.16 times the low-class family. Adenoid hypertrophy was not found to be an independent risk factor in the study. Furthermore, the study showed that chronic tonsillitis as a significant risk factor in AOM.

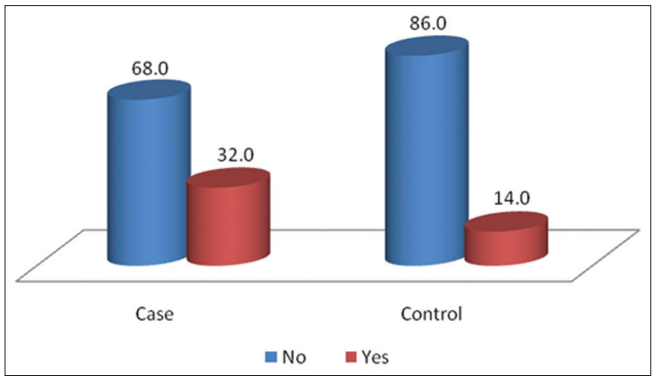

Figure 14: Association acute otitis media with chronic tonsillitis

CONCLUSION

Prevention is Better than Cure

The data from the study suggest that there are significant risk factors associated with single or recurrent episodes of AOM in children, which can give rise to serious complications or sequelae. By identifying the modifiable risk factors, the clinician could inform the parents and caretakers regarding the measures that can be instituted to avoid these factors. These include:

- Proper antenatal care to reduce the incidence of low birth weight babies
- Encouraging breastfeeding and avoiding bottle feeding
- Proper and hygienic infant feeding practices; avoid recumbent feeding
- Eliminating smoking exposure at home
- Protective effect of pneumococcal vaccine.

Furthermore, parents can be informed about the non-modifiable risk factors such as Eustachian tube dysfunction and craniofacial anomalies so that they can better understand their child's recurrent middle ear infections.

By properly identifying and avoiding these risk factors, long-term sequelae such as middle ear effusion and chronic otitis media and effect on cognitive, linguistic, auditive, and communication skills of the child can be prevented.

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How to cite this article: Pawathil MM, Rajamma KB. Risk Factors Responsible for Acute Otitis Media in Infancy and Children less than Five Years: A Case-control Study. Int J Sci Stud 2016;4(2):95-99.

Source of Support: Nil, **Conflict of Interest:** None declared.