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PREVALENCE AND RISK FACTORS OF OTITIS MEDIA WITH EFFUSION IN CHILDREN: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Chronic otitis media (COM) is one of the major factors contributing to preventable impaired hearing in young individuals worldwide, particularly in less affluent and moderately affluent nations. To tackle this disease effectively, it is necessary to understand its prevalence and the associated risk factors, for early intervention and the development of more effective public health strategies.

Objective: One of the primary objectives of this research was to determine the prevalence of chronic otitis media and to identify the risk factors that affect children.

Method: We utilized a cross-sectional framework to examine the data involving 250 patients aged 5 to 12 years old in the Department of ENT and Department of Pediatrics at GMERS Medical College, Gandhinagar. The data was collected through questionnaires filled out by parents, which examined demographic and environmental factors. We performed clinical otoscopic examinations and tympanometry to confirm diagnoses. Chi-square tests and logistic regression tests were used to explore the association between risk determinants and COM, setting the significance level at $p < 0.05$.

Result: Our findings revealed that chronic otitis media was commonly found in 14.4% of cases. Significant associations were observed with several factors, including exposure to tobacco smoke (22.7%, $p < 0.001$), recurrent upper respiratory infections (25.0%, $p < 0.001$), overcrowded housing (20.0%, $p = 0.01$), non-exclusive breastfeeding (17.8%, $p = 0.03$), and going to daycare (20 %, $p = 0.008$). A higher prevalence was found in children aged 5-8 and those residing in rural areas.

Conclusion: In summary, chronic otitis media remains a high-priority public health concern for children, mainly attributable to modifiable risk factors. Successful public health practitioners can make significant contributions to improving childcare practices, education, health education, and early screening, all of which are essential to addressing the burden of COM and its long-term consequences for children.

Keywords: Chronic otitis media, children, prevalence, risk factors, otitis media with effusion, hearing loss

I. INTRODUCTION

Chronic Otitis Media (COM), more specifically Otitis Media with Effusion (OME), also known as "glue ear," is one of the most prevalent causes for hearing loss in children worldwide. The disease is characterized by the retention of fluid in the middle ear without evidence of an acute infection, which

can subsequently delay speech development, create educational difficulties, and lower the quality of life for these children (Rosenfeld et al., 2004)[8].

In general, OME is very much a variable entity, with differences based on location, environment, and the SES of the child. In a number of populations (Saudi Arabia, Turkey, Nepal, and Nigeria), the reported prevalence of OME in children has varied between about 8% and > 20% [1-4]. These differences are possibly attributable to local damaging factors, which include the inhalation of tobacco smoke, allergic rhinitis, recurrent upper airway infections, and SES (Erdivanli et al., 2012; Martines et al., 2011) [5,7].

Additionally, longer environmental and living conditions appear to affect the duration of OME. For example, children in rural environments or smoking households appear to have greater numbers of OME episodes (Xenellis et al., 2005; Erdivanli et al., 2012) [5,6]. Some authors have also noted that low access to or delayed access to care can exacerbate chronicity for some groups and populations with OME (Gultekin et al., 2010; Adekanye et al., 2024).

Given the considerable disease burden caused by this public health issue, we still have limited knowledge of the overall burden, the incidence of chronic otitis media (COM), and the risk factors for COM in context. Understanding disease patterns locally is critical in developing evidence-based health interventions and clinical recommendations. This research project aims to evaluate the prevalence of chronic otitis media among children and identify key determinants of this condition through a cross-sectional study. We aim to contribute to the existing medical literature and make a meaningful impact on national health policy.

II. METHODOLOGY

Study Design and Setting

The study was cross-sectional and aimed to establish the prevalence of chronic otitis media (COM) among a cohort of children in the sample, as well as to identify the determinants of COM incidence. The study was conducted over fourteen months in the outpatient departments of ENT and Pediatrics at GMERS Medical College, Gandhinagar. The study hospitals cover urban, semi-urban, and rural areas. Therefore, it provides a representation of a wide range of socioeconomic and environmental backgrounds.

Study Population

The study population consisted of children aged 5 to 12 years who were treated at the participating hospitals during the study period. Exclusion of children with craniofacial deformities, congenital hearing loss, or a history of prior ear surgery was used to eliminate confounding variables. Written and informed consent was taken from the parents or guardians of the children before their inclusion in the study.

Sample Size and Sampling Method

We calculated the required sample size of 250 children, based on an estimated prevalence of COM of 15% based on previous studies, with 95% confidence and a 5% error margin. We used a systematic random sampling approach, where children who were eligible and visiting the sampled hospitals were enrolled in proportion to patient flow. This made the sample representative of diverse socioeconomic and environmental backgrounds.

Data Tools and Collection Procedures

The information was gathered through two primary methods: clinical presentations and standardized questionnaires. The questionnaires filled by parents or guardians documented primary demographic data and data about expected risk factors. This included smoking exposure, history of acute upper

respiratory tract infection, allergy, ear disease, family history, breastfeeding practice, daycare attendance, and dwelling conditions.

Trained otolaryngologists performed clinical examinations using pneumatic otoscopy and otoscopy to look for signs of chronic otitis media, i.e., an infection of the middle ear with fluid accumulation. In cases where required, tympanometry was a confirmatory procedure. All the children were examined in a quiet room with proper lighting to obtain correct findings.

Data Analysis

The data were entered into a secure database and analyzed using SPSS software version 26. We used descriptive statistics, like frequencies and percentages, to describe the prevalence of chronic otitis media (COM). We also conducted bivariate analysis using chi-square tests to study the correlations between COM and various categorical risk factors. Multivariate logistic regression analysis was conducted to examine the independent predictors of chronic otitis media, recognizing that statistical significance typically occurs when the p-value is less than 0.05.

III. RESULT

Prevalence of Chronic Otitis Media

In this cross-sectional study, which included a sample of 250 children, the following parameters were evaluated. Out of 250 children, 36 were found to have chronic otitis media (COM), leading to a prevalence rate of 14.4%. Among those diagnosed, 55% were male, and 45% were female, with no significant difference in prevalence between genders ($p = 0.35$). The highest incidence of COM was observed in the 5–8-year old group at 18.4%, the 9–12-year-olds had a prevalence of 9.2%. Children living in urban areas had a lower prevalence (11.0%) compared to those in rural areas (18.0%).

Table 1. Prevalence of Chronic Otitis Media by Demographic Characteristics

Variable	Total (n)	COM Cases (n)	Prevalence (%)	p-value
Gender				
Male	130	20	15.4%	0.35
Female	120	16	13.3%	
Age Group				
5–8 years	140	26	18.4%	0.02
9–12 years	110	10	9.2%	
Residence				
Urban	120	13	11.0%	0.01
Rural	130	23	17.7%	

Significant at $p < 0.05$

Associated Risk Factors for Chronic Otitis Media

Several predisposing factors showed strong associations with COM. Children exposed to tobacco smoke at home had a prevalence of 22.7%, compared to 9.6% in those not exposed ($p < 0.001$). Similarly, children with recurrent upper respiratory tract infections (URTIs) had a significantly higher prevalence of 25.0% ($p < 0.001$). Other important risk factors included daycare attendance, lack of exclusive breastfeeding, overcrowded housing, and low parental education.

Table 2. Association Between Risk Factors and Chronic Otitis Media

Risk Factor	Total Exposed (n)	COM Cases (n)	Prevalence (%)	p-value
Exposure to tobacco smoke	85	19	22.4%	<0.001
Recurrent URTIs	75	18	24.0%	<0.001
Daycare attendance	60	12	20.0%	0.01
No exclusive breastfeeding	90	16	17.8%	0.03
Overcrowded housing	70	14	20.0%	0.02
Low parental education	80	15	18.8%	0.02

Significant at $p < 0.05$

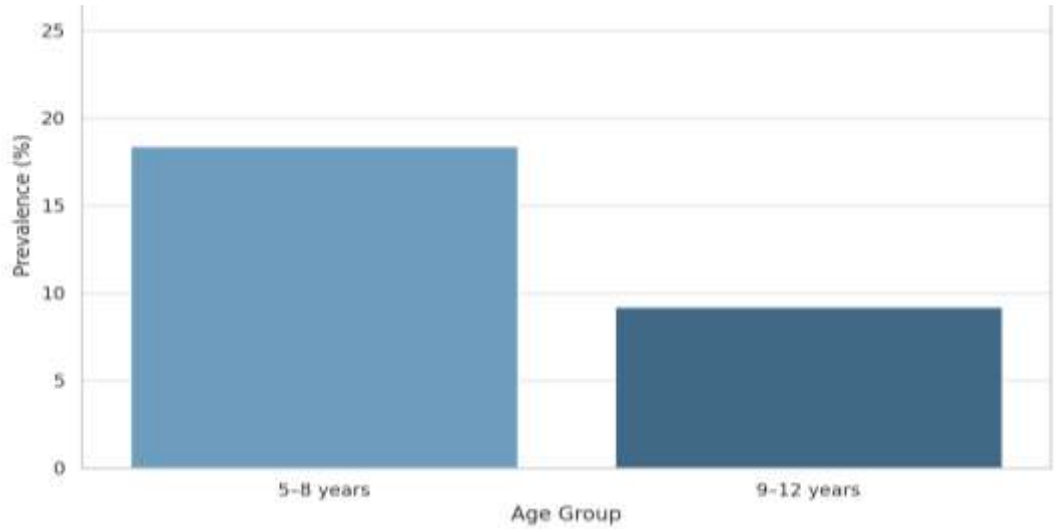

Figure 1. Distribution of Chronic Otitis Media by Age Group

Figure 1 represents the percentage of COM cases in each age group, showing higher prevalence among 5–8-year-olds.

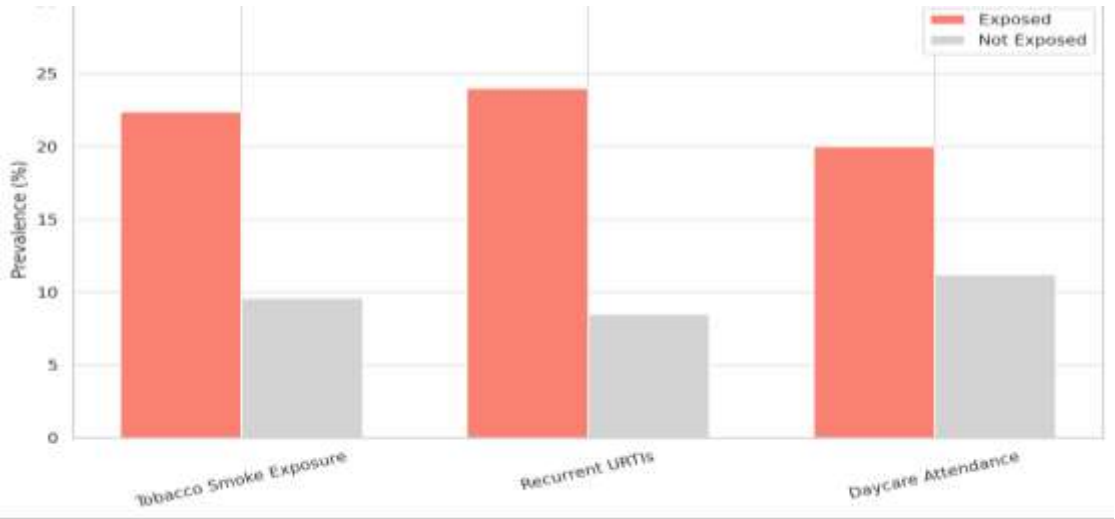

Figure 2. Prevalence of COM in Children with and without Exposure to Risk Factors

Figure 2 *comparing COM prevalence in children vs. without specific risk factors such as tobacco exposure, URTIs, and daycare attendance.*

These findings demonstrate that while COM affects a significant proportion of children, its occurrence is influenced by modifiable risk factors, indicating a call for specialized public health responses.

IV. DISCUSSION

The present study estimated a prevalence of 14.4% of children diagnosed with chronic otitis media (COM), consistent with other studies both regionally and internationally. For example, Bamaraki et al. (2022) [9] documented a prevalence of 13.1% in children at a tertiary hospital in Uganda. Likewise, Simões et al. (2016) [10] noted an overall prevalence of 12.3% while studying children in Kenya. Together, these rates suggest a persistent problem of COM in Sub-Saharan Africa and other low-resource areas, likely caused by shared risk factors such as recurrent respiratory infections, access to healthcare, and environmental factors.

Among others, our investigation highlighted four risk factors associated with COM, namely, tobacco exposure, recurrent upper respiratory tract infections (URTIs), overcrowding, and not exclusively breastfeeding their infants. The previous uses of sources strongly suggest that these results align with the education literature in other parts of the world, such as Kırıs et al. (2012) [11], who demonstrated that URTIs and passive smoking were significant predictors of otitis media with effusion (OME) in children from Eastern Anatolia. Aydemir and Ozkurt (2011) [15] also point out that OME was more prevalent in children with smoking parents as well as children who lived in poor environments in Istanbul, reminding us all that geo-social factors contribute equally to the preventable nature of OME. Our results also mirrored the well-established association between daycare attendance and higher risk of COM. The American Academy of Pediatrics (2004) [12] guidelines have noted that children being near one another in group childcare situations increases the likelihood of spreading respiratory viruses, thereby increasing the risk of developing middle ear effusions. Besides this, we also found that the prevalence of COM was age related, with higher prevalence rates occurring in 5-8 year olds, which supports the findings from Yang et al. (2020) [14], who found that younger children were at greater risk of suffering from middle ear pathology because of developmental factors including anatomy and immune systems.

In this study, the finding that chronic otitis media (COM) is higher in rural environments is similar to the findings of Homøe (2001) [13] in Greenland, where limited access to healthcare and numerous environmental factors contributed to the prevalence of otitis media. Interestingly, our group has also found that lower parental education (which may be a surrogate for socioeconomic status) is associated with a greater risk of COM. This finding is consistent with international research, which indicates that social determinants of health play a significant role in pediatric ear diseases (Yang et al., 2020; Simões et al., 2016) [10,14].

In conclusion, the occurrence and risk factors identified in this study are consistent with those found in other areas with low and middle-income populations, demonstrating a need to address modifiable environmental and psychosocial factors. With early detection, improving parents' understanding of otitis media, and public health campaigns focusing on preventable risk factors, such as smoking and poor hygiene practices in daycare centers, it is possible to decrease the incidence of chronic otitis media in children. The limitation of this cross-sectional study on chronic otitis media is its inability to establish causal relationships between identified risk factors and disease prevalence, as data were collected at a single point in time.

V. CONCLUSION

In conclusion, we demonstrate that chronic otitis media is prevalent among children, with an estimated prevalence rate of 14.5% of children with past or present chronic otitis media. We found a significant association for chronic otitis media with multiple modifiable factors, including household exposure to tobacco smoke, recurrent upper respiratory illness, no exclusive breastfeeding, and crowded housing. These findings underline the importance of early detection, parental education, and the need for ongoing public health policies and national programs that address modifiable risk factors that could be averted. Moreover, the expansion of screening programs in schools and access to pediatric ENT (Otolaryngology) services would be particularly effective in geographically rural or underserved

communities. It may be a key factor in minimizing the effects of chronic otitis media on children's optimal childhood development, including academic achievement.

VI. REFERENCES

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