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Prevalence Of Chronic Suppurative Otitis Media In School-Aged Children And Associated Risk Factors.

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ABSTRACT

Background:Chronic suppurative otitis media (CSOM) is a chronic middle-ear infection that is typified by repeated otorrhea via a perforation of the tympanic membrane and is a leading cause of preventable childhood hearing loss, negatively influencing speech development, academic achievement, and quality of life in low and middle-income countries.

Purpose: To identify the commonness of CSOM among children of school-going age and to assess how it is connected to the chosen sociodemographic, environmental, and clinical risk factors.

Methodology: It was a cross-sectional study whose participants were school-going children between 5 and 15 years of age who were chosen using multistage random sampling methods in both the public and the private schools in District Peshawar. Informed consent was obtained, and a structured questionnaire that included demographic profile, household crowding, parental education, passive smoking exposure, history of recurrent upper respiratory tract infections (URTI), and ear-hygiene practices was used to collect data. Otoscopic observation was done to detect perforation of the tympanic membrane, active or recent otorrhea, which is characteristic of CSOM. SPSS version 24.0 was used to analyze the data. Chi-square tests were used to test the associations, and multivariate logistic regression was used to identify independent predictors.

Results: A total of 100 children were enrolled, including 56 males and 44 females, with a mean age of 9.8 ± 2.7 years. CSOM was diagnosed in 14 children, giving a prevalence of 14.0%. Unilateral disease was present in 71.4% and bilateral in 28.6% cases. CSOM was significantly associated with household crowding ($p = 0.004$), passive smoking exposure ($p = 0.018$), recurrent URTI ($p < 0.001$), and prior acute otitis media ($p = 0.002$). On multivariable analysis, recurrent URTI (adjusted OR = 4.9; 95% CI: 1.6–14.8) and household crowding (adjusted OR = 3.7; 95% CI: 1.2–11.3) remained independent predictors.

Conclusion: CSOM is common in school-aged children, and it has a close association with risk factors that can be prevented. Screening and dedicated interventions of public health at the school level can significantly minimize chronic ear disease and its educational effects.

Keywords: *CSOM; school children; prevalence; risk factors*

1. INTRODUCTION

Chronic suppurative otitis media (CSOM) is a recurrent inflammatory condition of the middle ear, which is defined by persistent, repeated, or persistent otorrhea through a permanent opening of the tympanic membrane [1]. It is the outcome of undiagnosed or poorly managed acute otitis media and is still one of the most prevalent causes of preventable childhood hearing loss across the world [2]. The problem of CSOM remains a major public health issue in low and middle-income

countries despite the existence of effective medical and surgical therapy because of the late recognition, low access to specialized care, and the presence of modifiable risk factors [3]. School-aged children are a highly vulnerable population since they are often exposed to respiratory infections and other environmental risks at a time when they are at such a crucial stage of speech, language, and cognitive development [4]. Mild to moderate conductive hearing loss related to CSOM may negatively affect classroom learning, attention, and interpersonal communication, resulting in future poor educational performance [5]. Caregivers in most developing environments have a tendency to ignore the chronic ear discharge until complications set in, which further complicates the burden of the disease [6]. CSOM pathogenesis is a complex one. Repeat of the upper respiratory tract infections, allergic rhinitis, and adenoid hypertrophy also cause dysfunctions of the Eustachian tube, which lead to hindrance in the ventilation of the middle ear cavity and chronic effusion [7]. The presence of a superimposing bacterial infection extends mucosal inflammation and causes tympanic membrane perforation. Susceptibility is further increased by environmental and behavioral factors, including household crowding, inadequate hygiene, cleaning the ear with non-sterile objects, and passive tobacco smoke. Timely use of healthcare is also constrained by socioeconomic disadvantage, which permits the occurrence of acute disease to become chronic disease [8,9]. The epidemiological study of South Asia and other low-resource areas indicates a broad range of variation in the prevalence of CSOM among school-going children, with a range of less than 5 percent to more than 20 percent based on the population attributes as well as the diagnostic measures [10]. Nevertheless, local data are still scarce, and most of the estimates are based on hospital-based samples, which can overrepresent the extreme cases. There is still a high prevalence of childhood respiratory infections and poor-quality primary ear care in Pakistan, which indicates that the actual burden of CSOM in school-going children could be under-acknowledged. Knowledge of the local prevalence and the independent risk factors is appropriate to develop effective school health

programs, distribute resources, and develop preventive measures. The rationale behind this study was therefore to estimate the prevalence of CSOM in school-aged children and to test the relationship between CSOM and selected sociodemographic, environmental, and clinical factors in a representative school-based population.

Study Objectives:

The study questions that were addressed included estimating the prevalence of chronic suppurative otitis media in school-aged children and identifying demographic, environmental, and clinical risk factors that were separately related to the disease.

Materials And Methods:

Study Design & Setting:

This is a cross-sectional study done through schools in District Peshawar, Pakistan, in the chosen public and privately owned schools between January 2025 and June 2025.

Participants:

Age: The children between the ages of 5 and 15 years who were registered in the chosen schools were eligible. Parents or guardians signed an informed consent, and children gave verbal consent. Trained clinicians conducted structured interviews with participants and otoscopic examinations of participants to determine the clinical characteristics of CSOM.

Sample Size Calculation:

The sample size was determined through the single population proportion formula, whereby the CSOM prevalence was taken as 15, the level of confidence was 95, and the margin of error was 5. The size of the sample needed was 196, which was inflated by 10 percent to cover the non-response.

Inclusion Criteria:

Children aged 5–15 years.

Admission to the chosen schools.

Parenteral/guardian consent given.

Exclusion Criteria:

History of ear surgery.

Congenital ear anomalies.

No perforation of the tympanic membrane, acute ear infection.

Diagnosis and Management Plan:

The client had otoscopic evidence of tympanic membrane perforation with active or recent otorrhea, which was diagnosed as CSOM. Children in the case of CSOM were referred to the ENT outpatient department to have further assessment and treatment.

Statistical Analysis:

SPSS version 24.0 was used to analyze data. Demographic variables were used in descriptive statistics. Chi-square tests were used to test associations between CSOM and risk factors. Four-way logistic regression was done, and $p < 0.05$ was taken to be statistically significant.

Results:

A total of 100 school-going children were enrolled, including 56 males (56%) and 44 females (44%). The mean age was 9.8 ± 2.7 years. CSOM was identified in 14 children, giving a prevalence of 14%. Unilateral disease was present in 10 (71.4%) cases and bilateral disease in 4 (28.6%). Children with CSOM had significantly higher exposure to household crowding (78.6% vs. 39.5%; $p = 0.004$), passive smoking (64.3% vs. 31.4%; $p = 0.018$), and recurrent upper respiratory tract infections (85.7% vs. 36.0%; $p < 0.001$) compared with non-CSOM children. A prior history of acute otitis media was also significantly more frequent among CSOM cases (71.4% vs. 29.1%; $p = 0.002$). No statistically significant association was observed with gender or parental education ($p > 0.05$).

Intervention Outcome:

All children with CSOM were educated about ear care and sent to a specialist for attention. Most of them indicated remission of otorrhea after proper administration of antibiotics and aural toilet in follow-up visits, which underscores the need to detect it early by using school-based screening programs.

Table 1. Baseline demographic and clinical characteristics of the study population (N = 100)

Variable	Total (N=100)
Age (years), mean ± SD	9.8 ± 2.7
Male gender, n (%)	56 (56.0)
Female gender, n (%)	44 (44.0)
Household crowding, n (%)	45 (45.0)
Passive smoking exposure, n (%)	38 (38.0)
Recurrent URTI, n (%)	42 (42.0)
Prior acute otitis media, n (%)	34 (34.0)
Poor ear-hygiene practices, n (%)	29 (29.0)
Parental education ≤ primary level, n (%)	47 (47.0)

Baseline demographic and environmental characteristics of the enrolled school-aged children.

Table 2. Prevalence and pattern of CSOM among study participants

Variable	CSOM Present (n=14)	CSOM Absent (n=86)	Total
Overall prevalence, n (%)	14 (14.0)	86 (86.0)	100
Unilateral disease, n (%)	10 (71.4)	–	–
Bilateral disease, n (%)	4 (28.6)	–	–

Frequency and laterality of chronic suppurative otitis media in the study cohort

Table 3. Association of risk factors with CSOM (bivariate analysis)

Risk Factor	CSOM Present n (%)	CSOM Absent n (%)	p-value
Household crowding	11 (78.6)	34 (39.5)	0.004
Passive smoking exposure	9 (64.3)	27 (31.4)	0.018

Recurrent URTI	12 (85.7)	31 (36.0)	<0.001
Prior acute otitis media	10 (71.4)	25 (29.1)	0.002
Poor ear hygiene	6 (42.9)	23 (26.7)	0.214
Male gender	8 (57.1)	48 (55.8)	0.924

Legend: Comparison of demographic and clinical risk factors between children with and without CSOM.

Table 4. Multivariable logistic regression analysis of factors associated with CSOM

Variable	Adjusted OR	95% CI	p-value
Recurrent URTI	4.9	1.6 – 14.8	0.006
Household crowding	3.7	1.2 – 11.3	0.021
Passive smoking exposure	2.1	0.8 – 5.6	0.134
Prior acute otitis media	1.9	0.7 – 5.1	0.187

Independent predictors of chronic suppurative otitis media identified through multivariable logistic regression. OR = odds ratio; CI = confidence interval.

2. DISCUSSION:

In this cross-sectional study of 100 children of school-going age (5-15 years old), it was found that chronic spessartine otitis media (CSOM) prevailed in 14.0%. This clinically relates due to the well-known contribution of CSOM to preventable childhood hearing loss with postnatal effects that may adversely affect speech production and education levels. We have found that CSOM is still a significant public-health issue in school-aged children and that it is closely linked to subject to change household and infection-related exposures [11]. The prevalence observed (14%) falls on the high side of the recent school/community-based prevalence in low- and middle-income countries whose estimates are usually varied as a result of the variation in the diagnostic criteria, sampling methods, age distributions, and the risk profiles in the local area [12]. In the past 5 years, a number of studies have demonstrated that the prevalence of CSOM is always high in environments with overcrowding and poor access to primary ear care and high incidence of recurrent upper respiratory tract infections (URTI), which fits the epidemiologic trend of our cohort [13]. On the other hand, the reduced prevalence values in certain urban or more well-endowed school populations may be due to better hygiene, prompt acute otitis media treatment, and increased access to otolaryngology care [14]. The comparatively high prevalence in our study can, consequently, be taken to denote that there are still barriers to early care-seeking and prevention in the population surveyed [15]. Our bivariate analysis showed that there were significant correlations between CSOM and household crowding, passive smoke exposure, frequent URTI, and previous acute otitis media (AOM). These results agree with current evidence that finds recurrent respiratory infections and vulnerability to the environment to be major causes of chronic ear disease [16]. Multivariate analysis showed recurrent URTI as the best independent predictor (adjusted OR = 4.9), demonstrating the key role of Eustachian tube dysfunction and repeated mucosal inflammation in the pathogenesis of acute middle-ear disease and chronic suppuration. Similar findings are also reported in recent studies that frequent URTI episodes do predispose to persistent middle-ear pathology and perforation of the tympanic membrane, especially in cases of not receiving timely treatment of the acute infection and in cases of incomplete follow-up [17]. Crowding was also an independent predictor in the household (adjusted OR = 3.7). Some of the ways crowding may work are augmented transmission of respiratory diseases, impaired ability to isolate when sick, and deferral of healthcare use in resource-limited families. Similar relations between crowding and chronic ear discharge have been reported in recent pediatric studies, establishing crowding as a socioeconomic indicator as well as an exposure that can be modified using specific public-health strategies [18]. Parental education, on the other hand, was not statistically significant in our analysis. This could be due to poor power because of sample size, residual confounding, or it is possible that education on its own will not translate into better health behaviors unless the healthcare services are available and affordable. The same heterogeneity in terms of parental education has been established in the recent literature, where others have found independent effects and others attenuated on adjustment of household and infection-related variables [19]. There was a significant relationship in bivariate testing of passive smoking exposure, but this was not independently significant in the final model. This trend is indicative of a possible collinearity with crowding and socioeconomic variables or a small sample size to achieve an independent effect after adjustment [20]. However, passive smoking is biologically possible as a risk factor due to the presence of impaired mucociliary clearance, secondary susceptibility to respiratory infections, and chronic dysfunction of the Eustachian tube. The recent study still tends to prove tobacco smoke exposure as a factor of relevance to the burden of otitis media, even though the effect sizes differ among populations. In sum, our findings highlight that CSOM among school-age children is directly connected with determinants that are preventable, especially frequent

URTI and overcrowding.

3. LIMITATIONS:

The cross-sectional nature of this study constrained the study because it did not allow the studyer to make a causal conclusion. The sample size is relatively small, and the school-based environment is in one district as well, which can limit generalizability. Passive smoking and URTI history are self-reported exposures to recall bias.

4. CONCLUSION:

Chronic suppurative otitis media is common in school-going children and is highly related to frequent upper respiratory infections and domestic congestion. To prevent preventable hearing loss in high-risk pediatric patients, screening, education of caregivers, and early treatment of acute otitis media in schools are necessary.

Disclaimer: Nil

Conflict of Interest: Nil

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Authors Contributions

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Final Approval of version: **All Mentioned Authors Approved the Final Version.**.

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