

## Original Research

# Risk Factor Analysis for Chronic Suppurative Otitis Media in Pediatric Patients: Experience from a tertiary care Indian Hospital

Dr. Sanket Patel<sup>1</sup>, Dr. Akshay Suratwala<sup>2</sup>, Dr. Sanket Ramchandra Nale<sup>3</sup>, Dr. Alpesh D Fefar<sup>4</sup>, Dr. Ujwala Bhanarkar<sup>5</sup>

<sup>1</sup>MBBS, Department of Medicine, GMERS Medical College and Hospital, Sola, Ahmedabad, Gujarat, India

<sup>2</sup>Assistant Professor, Department of ENT, Kiran Medical College and Research Institute, Bharuch, Gujarat, India

<sup>3</sup>Assistant Professor, Department of Pediatrics, PAH Government Medical College, Baramati, Pune, Maharashtra, India

<sup>4</sup>Associate Professor, Department of ENT, GMERS Medical College, Morbi, Gujarat, India

<sup>5</sup>Assistant Professor, Department of Anatomy, All India Institute of Medical Sciences, Kalyani, West Bengal, India

### Corresponding Author:

Dr. Alpesh D. Fefar

Associate Professor, Department of ENT, GMERS Medical College, Morbi, Gujarat, India

Email: [dralps.ent1@gmail.com](mailto:dralps.ent1@gmail.com)

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### ABSTRACT

**Background:** Chronic suppurative otitis media (CSOM) represents a significant health challenge worldwide, particularly in underdeveloped and developing regions, including India. This study aimed to evaluate the risk factors associated with CSOM in pediatric populations.

**Materials and Methods:** A total of 345 children aged 6–15 years, comprising both male and female participants, were included in the study. Detailed otoscopic evaluations and pure tone audiometry were conducted. Clinical and environmental risk factors predisposing to CSOM were documented.

**Results:** Among the participants, 194 were male and 151 were female. Risk factors identified included families with more than five children, paternal smoking, maternal illiteracy, bathing in contaminated pond water, family history of ear discharge, and residing in overcrowded households. Socioeconomic status analysis revealed that majority belonged to upper-lower income category. Additional contributing factors included upper respiratory infections, nasal allergies, chronic tonsillitis, and sinusitis.

**Conclusion:** The study highlights that key risk factors for CSOM in children include large family size, exposure to paternal smoking, low maternal education levels, bathing in polluted water, familial predisposition to ear infections, and overcrowded living conditions.

**Key Words:** Chronic suppurative otitis media, Risk factors, Children, Allergy

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### INTRODUCTION

Chronic suppurative otitis media (CSOM) represents a significant public health concern worldwide, especially in underdeveloped and developing countries, including India. The World Health Organization (WHO) defines CSOM as "a stage of ear disease characterized by chronic infection of the middle ear cleft, including the Eustachian tube, middle ear, and mastoid, accompanied by a nonintact tympanic membrane and otorrhea" [1-3]. In India, CSOM is the leading cause of hearing loss and demands considerable time and resources in

otolaryngology clinics and operating rooms. Despite being largely preventable, the progression from a minor upper respiratory tract infection (URTI) to acute otitis media (AOM) with tympanic membrane perforation, and subsequently to recurrent or persistent infections causing CSOM and hearing impairment, is disturbingly prevalent in rural areas. The condition typically originates in childhood, often manifesting as spontaneous tympanic membrane perforation following an acute middle ear infection (AOM) or as a

consequence of secretory otitis media (SOM), a milder form of the disease [4-6].

The development of otitis media involves multiple factors, including genetic predisposition, infections, allergies, environmental exposures, social determinants, racial influences, and Eustachian tube dysfunction. Over recent decades, the incidence of CSOM has significantly declined due to advancements in living conditions, hygiene practices, and the availability of antimicrobial treatments. Nevertheless, cases remain rare among individuals from higher socioeconomic backgrounds, and in some instances, the disease process began before patients achieved upward social mobility [7-9]. This study was undertaken to evaluate the risk factors associated with chronic suppurative otitis media in children.

### MATERIAL AND METHODS

The current study involved a cohort of 345 pediatric patients diagnosed with CSOM, within the age range of 6–15 years, including individuals of both genders. Prior to participation, informed consent was obtained from the parents or guardians of each child, in compliance with ethical standards for human research. Comprehensive demographic information, such as name, age, gender, and other relevant personal details,

was systematically documented to ensure accurate record-keeping and analysis.

All participants underwent a thorough otoscopic examination to assess the condition of the tympanic membrane and middle ear structures, as well as to identify any visible signs of infection or perforation. In addition, pure tone audiometry was conducted to evaluate the degree of hearing loss and establish an auditory profile for each patient. Clinical risk factors, including medical history and environmental exposures, along with potential predisposing factors such as socioeconomic conditions and family history, were meticulously recorded for each participant.

The collected data were subjected to rigorous statistical analysis to identify patterns and associations between risk factors and the occurrence of CSOM. A p-value threshold of <0.05 was established to determine statistical significance, ensuring that the findings were both scientifically robust and clinically relevant.

### RESULTS

The study population consisted of 345 pediatric patients, with 194 males (56.23%) and 151 females (43.77%). This indicates a higher prevalence of male patients in the study cohort (Table 1).

**Table 1: Gender wise distribution of patients**

Gender	n	%
Male	194	56.23
Female	151	43.77
Total	345	100.00

Table 2 presents the distribution of various risk factors in pediatric cases of CSOM. The most prevalent risk factor was having a father who smokes, reported in 141 patients (40.87%). This was followed by households with more than five children, which affected 110 patients (31.88%). A family history of ear infections was identified in 76 patients (22.03%), while 72

patients (20.87%) had mothers with no formal education. Exposure to contaminated pond water and living in overcrowded homes were reported in 59 (17.10%) and 52 (15.07%) patients, respectively. These findings suggest that familial and environmental factors play a significant role in the occurrence of CSOM in children

**Table 2: Distribution of risk factors in pediatric CSOM cases**

Risk Factor	n	%
Father who smokes	141	40.87
Households with more than 5 children	110	31.88
Family history of ear infections	76	22.03
Mother with no formal education	72	20.87
Exposure to contaminated pond water	59	17.10
Living in overcrowded homes	52	15.07

In analyzing risk parameters, 48 patients (13.91%) were categorized under the lower socioeconomic status (SES) group, with a significant association observed ( $P = 0.02$ ). The majority of cases, 159 patients (46.09%), were from the upper-lower SES group, while 104

(30.14%) were from the lower-middle SES group. Fewer patients were in the upper-middle (14 patients, 4.06%) and high (21 patients, 6.09%) SES groups (Table 3). Regarding comorbidities, the most significant associations were observed with upper respiratory

infections, which affected 7 patients (2.03%,  $P = 0.03$ ), indicating a potential link to the development of CSOM. Chronic tonsillitis was found in 41 patients

(11.88%), while nasal allergies and sinusitis were less common, with 14 (4.06%) and 24 (6.96%) cases, respectively (Table 3).

**Table 3: Analysis of risk parameters in pediatric CSOM cases**

Parameters	n	%	P Value
Socioeconomic status (SES) - Lower	48	13.91	0.02
Socioeconomic status (SES) - Upper-lower	159	46.09	
Socioeconomic status (SES) - Lower-middle	104	30.14	
Socioeconomic status (SES) - Upper-middle	14	4.06	
Socioeconomic status (SES) - High	21	6.09	
Upper respiratory infection	7	2.03	0.03
Nasal allergy	14	4.06	
Chronic tonsillitis	41	11.88	
Sinusitis	24	6.96	

## DISCUSSION

Chronic suppurative otitis media (CSOM) is among the most prevalent ear diseases in many developing countries. It ranks second only to the common cold as a cause of infection in children. CSOM is the leading cause of persistent mild to moderate hearing impairment in children and young adults [10-12]. The current study was designed to evaluate the risk factors associated with chronic suppurative otitis media in children.

In our study, there were 194 male and 151 female participants. Notably, 31.88% of the families had more than five children, 40.87% had fathers who smoked, 22.03% had illiterate mothers, 17.10% of children bathed in dirty pond water, 22.03% had a family history of ear discharge, and 15.07% lived in overcrowded houses. Parmar et al. [13] identified various predisposing factors for the development of CSOM through a study conducted on primary school students in rural and urban areas of Muzaffarnagar, Uttar Pradesh. The study included a cross-sectional survey of 2158 schoolchildren aged 5 to 15 years, with 1161 children from urban schools and 997 from rural government schools. Of these, 78 children were found to have unilateral or bilateral CSOM.

In our study, the socioeconomic status (SES) of participants was categorized as follows: 13.91% from lower SES, 46.09% from upper-lower SES, 30.14% from lower-middle SES, 4.06% from upper-middle SES, and 6.09% from high SES. Other risk factors observed included upper respiratory infections in 2.03%, nasal allergies in 4.06%, chronic tonsillitis in 11.88%, and sinusitis in 6.96%. In a study by Adhiari et al. [14], 230 schoolchildren from a private school in Kathmandu Valley were examined, with children aged between 5 and 12 years. Otoloscopic examinations and interviews were conducted, and cases of CSOM were defined by persistent tympanic membrane perforation lasting more than three months with or without

otorrhea. The study found that 5.7% of schoolchildren in a government school had CSOM, while 4.8% of those in a private school were affected. Unilateral disease was observed in 81.5% of cases, with 26.0% showing active disease. Additionally, 88.9% of cases were of the tybotympanic type.

## CONCLUSION

Our study identified several significant risk factors contributing to the development of chronic suppurative otitis media (CSOM) in children. These included residing in families with more than five children, exposure to paternal smoking, having a mother with limited or no formal education, bathing in contaminated or unclean pond water, a positive family history of ear discharge, and living in overcrowded housing conditions.

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