

## Epidemiological study of factors influencing incidence of chronic suppurative otitis media in paediatric age group of rural population

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### Abstract

Chronic suppurative otitis media (CSOM) is one of the most common illnesses encountered in early childhood as well as in adult life hampering the quality of life. The incidence of CSOM has increased in recent years. The present study was carried out with the aim of studying the epidemiological factors contributing to causation of chronic suppurative otitis media in paediatric age group and also to suggest corrective measures for the same. A cross-sectional study was carried out in the department of ENT in a tertiary care hospital in rural area. Total 200 patients suffering from CSOM visiting ENT, Paediatrics and Medicine outpatient departments were selected. High incidence of CSOM in children in rural population was observed in the families having more number of children, illiteracy of the parents, low socioeconomic status, prone to various kinds of allergies. We concluded that the incidence can be controlled or prevented by implementing special measures like health education, awareness and providing proper medical aid at primary level.

**Keywords:** Chronic suppurative otitis media, Rural population, Socioeconomic status, Paediatric age group.

### Introduction

Otitis media is a continuum of conditions that includes acute otitis media, otitis media with residual or persistent effusion, unresponsive otitis media, recurrent otitis media, otitis media with complications and chronic suppurative otitis media. Otitis media may be involved in the development of bacterial meningitis and other central nervous system infections and it often constitute the basis for undertaking one or more of the most frequently performed operations of infancy and childhood, namely myringotomy with or without tympanostomy tube insertion, adenoidectomy and tonsillectomy.<sup>(1)</sup> When a perforation of the tympanic membrane is present, either spontaneously or due to a tympanostomy tube, the middle ear “gas cushion” is lost, resulting in reflux of nasopharyngeal secretions through the Eustachian tube and consequent contamination of the middle ear with potential respiratory pathogens.<sup>(2-4)</sup> Infants and young children are especially at risk for such reflux because their Eustachian tubes are short, horizontal, and “floppy”.<sup>(3-4)</sup> Similarly, Down syndrome and craniofacial anomalies such as cleft palate affect both the anatomy and function of the Eustachian tube and so predispose to Chronic suppurative otitis media.<sup>(5)</sup>

Chronic suppurative otitis media remain one of the most common childhood chronic infectious diseases worldwide. The worldwide prevalence of CSOM is 65-330 million people and 39-200 million (60%) suffer from clinically significant hearing impairment.<sup>(6)</sup> It is typically a persistent disease, insidious in onset, often capable of causing severe destruction and irreversible sequel and clinically manifests with deafness and discharge.<sup>(7)</sup> It is a disease condition characterized by perforation of tympanic membrane with recurrent or persistent muco-purulent otorrhea.<sup>(8)</sup> Soiling of the

middle ear from swimming or bathing also leads to intermittent and unpleasant discharges.

Typical findings may also include thickened granular middle ear mucosa, mucosal polyps, and cholesteatoma within the middle ear. CSOM is highly prevalent in those of low socioeconomic status in developing countries where overcrowding, poor hygiene, lack of breast feeding, passive smoking, high rates of nasopharyngeal colonization with potentially pathogenic bacteria and inadequate or unavailable health care, frequent upper respiratory tract infections, inadequate nutrition, contaminated water and under-resourced or expensive healthcare are important predictors.<sup>(9-14)</sup> These risk factors weaken the immunological defenses, increasing the inoculum and encouraging early infection.<sup>(15)</sup> The incidence of chronic suppurative otitis media has increased in recent years despite improvement in living conditions, awareness, socio-economic status, education and better health services.

The literature available<sup>(5,7,9-13)</sup> on aetiopathogenesis of CSOM mainly concentrates on microbiological aspects and does not take other contributory and epidemiological factors into consideration. This study is carried out to provide local data on the incidence of the disease with its associated epidemiological factors.

### Material and Method

This cross-sectional study was conducted in the Tertiary Health Care Centre, Lata Mangeshkar Hospital, Nagpur of rural area for duration of two months from April 2014 to May 2014 after obtaining approval from Institutional Ethics Committee. Modified Prasad's scale<sup>(14)</sup> was used to assess the socioeconomic status of the family. Total 200 patients suffering from CSOM visiting ENT, Paediatrics or Medicine OPDs

were selected. The written informed consent was obtained from the patients.

A proforma was prepared in which detailed history of the patient and clinical findings were recorded. The factors like socio-economic status, educational level, habits of use of tobacco, smoking, alcoholism, familial incidence of similar disease, feeding methods, other habits such as digital sucking etc. were taken into consideration. A detailed clinical assessment was done to confirm the diagnosis.

After the completion of study period, all the data was compiled in the master chart for observation.

**Inclusion criteria:**

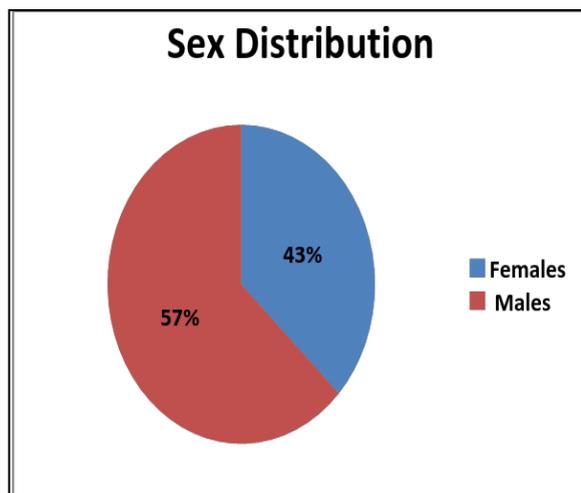
- All patients of paediatric age group (up to 18yrs) hailing from rural area visiting the OPD and diagnosed to be having CSOM.

**Exclusion criteria:**

- Various congenital disorders like cleft palate, cleft lip and autosomal disorders leading to CSOM.
- CSOM secondary to trauma.

**Result**

The present study was conducted in 200 patients suffering from CSOM. Out of which, 57% subjects were males and 43% of the children were female giving male to female ratio of 1.32:1 (Fig. 1).



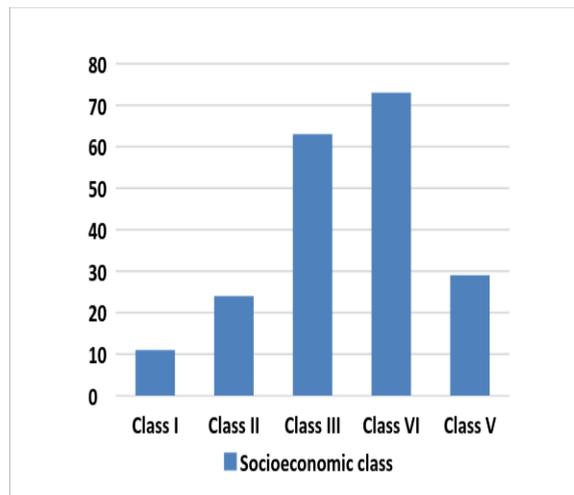
**Fig. 1: Sex distribution**

**Table 1: Distribution of cases according to age**

Age (years)	No. (%)
≤ 1	10(5)
2 – 5	49 (24.5)
6 – 9	59 (29.5)
10 – 13	47 (23.5)
> 14	35 (17.5)
Total	200 (100)

It was observed that 29.5% of the children were belonging to the age group of 6-9 years followed by 24.5% of children who belonged to the age group of 2-5 year old and 23.5% belonged to 10- 13 year old age

group. Children belonging to the age group of more than 14 were found to constitute 17.5%, where as 5% belonged to less than 1 year old age group in this study (Table 1).



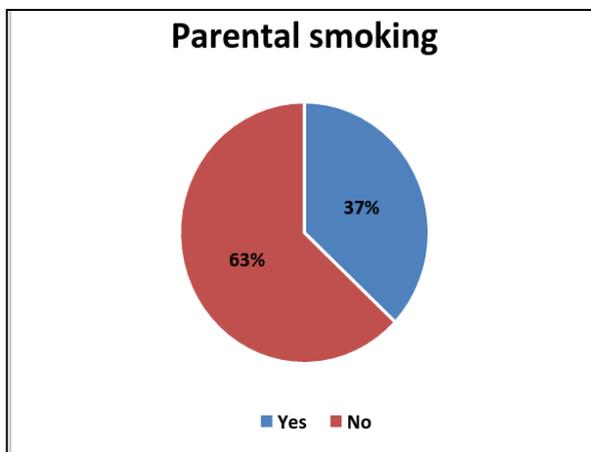
**Fig. 2: Socioeconomic status**

It was observed that 73 (36.5%) participants were situated in class VI (upper lower class), 63 (31.5%) in class III (lower middle class), 29 (14.5%) in class V (lower class), 24 (12%) in class II (upper middle class) and 11(5.5%) in class V (upper class) (Fig. 2). Hence, it was observed that most of the children belonging to class I and class II who were considered to be belonging to higher and upper middle class were less than class III, class VI and class V assume to be belonging to lower middle class, upper lower class, lower class respectively. In the present study, we observed that out of 200 participants 147 (73.5%) children had parents who were non matriculate, 44(22%) were matriculate and 9% were graduates.

**Table 2: Distribution of cases according to allergy**

Allergy	No. (%)
Yes	88 (44)
No	112 (56)
Total	200 (100)

It was observed that 44% of the children with CSOM had symptoms of allergy (Table 2).



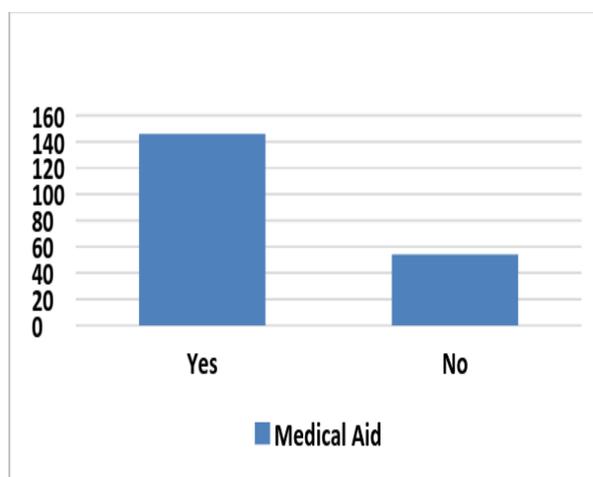
**Fig. 3: Distribution of cases according to parental smoking**

It was seen that out of 200 participants 74 children were exposed to passive smoking (Fig. 3). It was found that 10 patients had a history of CSOM in family. In the present study, 51.5% of mothers were multiparous, 41.5% of children were having a mother with two children, and 7%, were found to be the single child of the mother.

**Table 3: Distribution of cases according to breast feeding and bottle feeding**

Age (<= 1 year)	No. (%)	
	Breast feeding	Bottle feeding
Yes	8 (80%)	2 (20%)
No	2 (20%)	8 (80%)
Total	10	10

Out of the 10 children who were under age group of 1 year, 8 were breastfed while two were fed with a bottle (Table 3). Out of the sample pool 31 participants had the history of pond bathing, while 169 did not have such a history.



**Fig. 4: Medical Aid**

Fig. 4 shows that 54(27%) children did not have medical aid in the vicinity of their residence; whereas 146(73%) were residing in a place where they had medical aid in their surroundings.

**Discussion**

CSOM is an infection commonly associated with poor socio-economic status or poverty-related conditions such as malnutrition, over-crowding, substandard hygiene, frequent upper respiratory tract infections and under-resourced health care.

In the present study of 200 participants, total number of children male and female was 114 and 86; the male female ratio is 1.32:1. In other study based on CSOM showed that male-female ratio is 1.12:1<sup>(16)</sup> and the study done by Adhikari P et al<sup>(17)</sup> found that male female ratio is 1.77:1. Most of the studies conducted in various parts of the world revealed male dominance.

In this study, 29.3% of children suffering from CSOM belonged to 6 to 9 years of age and 24.2 % of subjects were belonging to 2 to 5 years of age group. CSOM typically occurs in the young children, especially the under-fives.<sup>(8,18)</sup> A cross-sectional survey was conducted among 914 children from four primary schools and 12 nurseries found that the disease was equally prevalent in preschool children (5.7%) and primary school children (6.2%) (P = 0.94), and their median age at presentation was 5.9 years.<sup>(16)</sup> In a study by N Kamal et al<sup>(19)</sup> 53.3% children were in 2-5 years age group.

Socioeconomic status was assessed by using modified B. G. Prasad’s scale which indicated that most of the patients in this study belonged to class III and class VI (lower middle and upper lower class). Presuming the fact that the (lower class section) class V might not be having enough awareness about the disease, class VI (upper lower class) dominated in the study. The children belonging to class I and class II (upper class and upper middle class section) might have visited private / corporate hospital setups for treatment.

In this study it was observed that as high as 36.5% of subjects belonged to class VI (upper lower class), 31.5% belonged to class III (lower middle class), whereas 14.5% belonged to class V (lower class), 12% belonged to class II (upper middle class) and as less as 5.5% belonged to class I (higher class).

Some of the studies mentioned below, which were conducted in various parts of the world including the subcontinent yielded similar results. Poverty and poor medical seeking behavior may have contributed to the dominance of this socioeconomic group in the epidemiology of CSOM in this locality. Paradoxically, fewer subjects (two subjects only) fell into the social class V which is the lowest class. The reason may be due to extreme poverty and lack of education which characterizes this group thereby hindering them from seeking and utilizing orthodox care in hospitals. Other

studies also reveal the significance of CSOM with socioeconomic status.

The study which was conducted in Bangladesh observed that about 63.6% of students with CSOM were from this less income group<sup>(14)</sup> and low socioeconomic class in 153 (81%).<sup>(20)</sup> In the first cross sectional examination out of 4104 students 123 (3%) students were having CSOM out of which 96 belonged to low income group, 23 to middle income group and 4 to high income group. When compared this difference was statistically significant ( $P < 0.001$ ).

It was observed that the majority of the children who visited the OPD with CSOM were belonging to the parents who were non matriculate i.e. 73.5%, supporting the fact that the educational status and literacy were factors influencing the prevalence.

In this study allergy due to various factors was seen in 44% of children with CSOM. Although in some studies as mentioned below, allergy was observed to be one of the main contributing factors ranging from 24% to 89%.<sup>(21)</sup> It is assumed that it depends upon the type of study and the number of subjects involved. In a meta-analysis of contributing factors for chronic and recurrent otitis media, it was concluded that allergy significantly influences the incidence. A survey of children with CSOM, 28% was allergic.<sup>(20)</sup>

Passive smoking has been considered to be one of the factors influencing the incidence of CSOM. Hence, it was assessed if the parent was a smoker or not. It was observed that 37% of the children had had a smoker in their residence. In a study conducted by Lassisi AO *et al.*,<sup>(20)</sup> clinical and demographic risk factors associated with CSOM, it was observed that 18% people had a smoking father at home. The study which was conducted in Nigeria the result is different.

By assessing the presence of CSOM in family as a factor influencing the prevalence, mother, father and siblings were taken into consideration whether any of them had CSOM. It was found that 10% of the children had at least one member of family with history of CSOM.

Multiparity of mother would indirectly lead to overcrowding in the living place of the child. In this study it was observed that 51.5% of mothers were multiparous, i.e. 103 children were a part of family where their mother had more than two children where as 41.5% of children, i.e. 83 children were having a mother with two children and 7%, i.e. 14 children were found to be the single child of the mother.

Breast-feeding is believed to provide antimicrobial, anti-inflammatory, and immunomodulatory agents that contribute to an optimal immune system.<sup>(21-22)</sup> The relative contribution of breast-feeding to preventing middle ear infection otitis media risk has been reported in numerous studies.<sup>(23-25)</sup> It is reported that breast-feeding, even for only 3 months, could decrease the risk for acute otitis media in children.<sup>(26)</sup> In this study the children belonging to the age group of less than one

year were included to assess whether the baby is breast fed or bottle fed. It was observed that 80% of the children below one year were breastfed and the rest of 20% were bottle fed. In another study, bottle feeding was 61%.<sup>(20)</sup>

Considering the fact that in the rural areas some children take bath in ponds where there is no availability of municipal tap water, pond bathing was considered as a factor contributing to the prevalence of CSOM. It was observed that 15.5% of the children had the history of pond bathing.

In a few studies done in other developing countries other than India, it was seen that in rural pediatric population of Indonesia in Bali and Budang regions a significantly high prevalence of CSOM than rest of the Indonesia.<sup>(27)</sup> The burden of CSOM in the children studied indicates a high level of DHI in these communities within Yemen. A history of ear discharge, swimming in local pools, recurrent respiratory infections, and overcrowded housing were the strongest predictors for CSOM. There is a need for better ear care and screening programs for early detection and management of this disease.<sup>(28)</sup>

The study was conducted in a tertiary centre including rural population, so it was assessed whether the children presenting with CSOM had any health care centre in the vicinity of their residence. It was observed that 27% of the children were hailing from a place where they had no medical facility available.

Chronic suppurative otitis media like any chronic disease, can limit an employability and quality of life. They are particularly disadvantaged because of scarcity of work, poor living conditions and limited health care.<sup>(15)</sup> As per as health care delivery fails to target high-risk groups in developing countries, infections like CSOM will persist. Therefore, improving equal access to good health needs is a critical factor to ultimately ridding the world of the disease.

## Conclusion

Higher incidence of CSOM in children of rural population can be controlled by implementing the following specific measures which are Health education, making the parents aware about various contributing factors and their prevention, antismoking/alcoholism campaigns, improving health care system in rural areas. Training the medical and paramedical staff to provide health education and basic medical will aid to the rural population.

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