

COMPARATIVE ASSESSMENT OF PREVALENCE AND RISK FACTORS OF CHRONIC OTITIS MEDIA IN RURAL AND URBAN POPULATIONS ATTENDING A TERTIARY CARE HOSPITAL IN NORTH INDIA

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ABSTRACT

Background: Chronic otitis media (COM) is a major cause of preventable hearing loss, particularly in developing countries. Socioeconomic and environmental factors play a crucial role in its occurrence, with disparities observed between rural and urban populations.

Objectives: To assess the prevalence of chronic otitis media and identify associated risk factors among rural and urban populations attending a tertiary care hospital in North India.

Methods: A hospital-based cross-sectional observational study was conducted from July 2022 to December 2022 among 134 participants attending the ENT outpatient department. Data were collected using a pre-tested semi-structured questionnaire and clinical examination. Variables included socio-demographic factors, environmental conditions, and clinical history. Statistical analysis was performed using SPSS version 22.0. Associations were tested using the Chi-square test, with $p < 0.05$ considered statistically significant.

Results: The overall prevalence of COM was 26.9%. A significantly higher prevalence was observed in rural populations (33.3%) compared to urban populations (17.9%). Overcrowding, poor hygiene, recurrent upper respiratory tract infections, and lower socioeconomic status were significantly associated with COM ($p < 0.05$). Children under 15 years showed a higher prevalence compared to older age groups. No significant association was found between gender and COM. A majority of patients reported delayed healthcare-seeking behavior.

Conclusion: Chronic otitis media is more prevalent in rural populations, with multiple modifiable risk factors contributing to its occurrence. Public health interventions focusing on improving living conditions, hygiene, and early healthcare access are essential to reduce disease burden and prevent complications.

Keywords: Chronic otitis media; prevalence; rural population; urban population; risk factors; hearing loss; India

INTRODUCTION

Chronic otitis media (COM) remains a significant global public health concern, particularly in low- and middle-income countries where healthcare access and socioeconomic conditions contribute to its persistence. It is defined as a chronic inflammation of the middle ear and mastoid cavity, often characterized by persistent ear discharge through a perforated tympanic membrane for more than 6–12 weeks [1]. The burden of COM is substantial, with the World Health Organization estimating that it affects 65–330 million individuals globally, of whom a considerable proportion suffer from hearing impairment [2]. Hearing loss secondary to COM can adversely affect speech development, educational performance, and quality of life, especially in children [3].

The epidemiology of COM shows marked geographical variation, with higher prevalence reported in South Asia, Sub-Saharan Africa, and parts of the Western Pacific region [2,4]. Factors such as overcrowding, poor hygiene, malnutrition, recurrent upper respiratory infections, and limited access to healthcare services are consistently associated with increased risk [5]. In contrast, developed countries have witnessed a decline in prevalence due to improved living standards, early diagnosis, and effective management of acute otitis media [6].

In the Indian context, COM continues to be a prevalent condition, contributing significantly to preventable hearing loss. Studies have reported prevalence rates ranging from 4% to 8% in the general population, with higher rates observed in rural communities [7]. Rural populations often face barriers such as lack of awareness, inadequate healthcare infrastructure, and delayed treatment-seeking behavior, all of which may exacerbate disease progression [8]. Urban populations, although relatively better served by healthcare systems, are not exempt from risk due to factors like environmental pollution, population density, and lifestyle-related determinants [9].

Despite existing literature, there remains inconsistency in findings regarding the comparative burden and determinants of COM between rural and urban populations. Many studies have focused on either rural or urban settings independently, limiting direct comparison. Furthermore, variations in methodology, sample size, and diagnostic criteria have contributed to heterogeneity in reported outcomes [5,10]. There is also a paucity of hospital-based comparative studies in North India that systematically evaluate both prevalence and associated risk factors within a unified framework. Understanding the differential burden of COM between rural and urban populations is crucial for targeted public health interventions and resource allocation. Identifying modifiable risk factors can aid in designing preventive strategies, improving early detection, and reducing long-term complications such as hearing impairment.

Therefore, the present study was undertaken to assess the prevalence of chronic otitis media and to identify associated risk factors among rural and urban populations attending a tertiary care hospital in North India. The specific objective was to compare the distribution of COM and its determinants between these populations to provide evidence for context-specific preventive and management strategies.

METHODOLOGY

Study Design: This was a hospital-based cross-sectional observational study conducted to assess the prevalence and risk factors of chronic otitis media (COM) among rural and urban populations.

Study Setting: The study was carried out in the Department of Otorhinolaryngology of a tertiary care teaching hospital in North India, which caters to both rural and urban populations from surrounding regions.

Study Duration: The study was conducted over a period of six months, from July 2022 to December 2022.

Study Population: The study population comprised patients attending the ENT outpatient department (OPD) during the study period. Individuals from both rural and urban backgrounds presenting with ear-related complaints or attending for general ENT evaluation were considered for inclusion.

Inclusion Criteria

- Patients of all age groups and both sexes attending the ENT OPD
- Patients willing to provide informed consent (or assent with guardian consent in case of minors)
- Patients with clinical findings suggestive of chronic otitis media (for prevalence estimation)

Exclusion Criteria

- Patients with acute otitis media or otitis externa
- Patients with history of ear surgery
- Patients with congenital ear anomalies
- Patients who were unwilling or unable to provide consent
- Severely ill patients not suitable for examination

Sample Size: The sample size was calculated using the formula for prevalence studies:

$$n = \frac{Z^2 \times p \times q}{d^2}$$

Where:

- n = required sample size
- Z = standard normal deviate at 95% confidence level (1.96)
- p = expected prevalence (assumed 10% based on previous regional studies)
- $q = 1 - p$
- d = allowable error (5%)

The calculated sample size was approximately 138. Considering feasibility and non-response, a total of 134 participants were included in the study.

Sampling Technique: A consecutive sampling technique was employed, wherein all eligible patients attending the ENT OPD during the study period were included until the required sample size was achieved.

Data Collection Tools & Procedure: Data were collected using a pre-tested semi-structured questionnaire. Information regarding socio-demographic characteristics (age, sex, residence, socioeconomic status), environmental factors (overcrowding, hygiene practices), and clinical history (upper respiratory infections, ear discharge, duration, and treatment history) was recorded. A thorough clinical examination of the ear was performed using otoscopy by trained ENT specialists

to confirm the diagnosis of chronic otitis media. Rural or urban classification was based on the patient's place of residence as per standard census definitions. All findings were documented systematically.

Study Variables: The dependent variable was the presence or absence of chronic otitis media. Independent variables included demographic factors (age, gender, residence), socioeconomic status, environmental factors (overcrowding, sanitation), behavioral factors (ear cleaning practices), and clinical factors (history of recurrent upper respiratory infections, allergy, and access to healthcare services).

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 22.0. Descriptive statistics were used to summarize the data as frequencies and percentages. The association between COM and various risk factors was assessed using the Chi-square test or Fisher's exact test where appropriate. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations: Written informed consent was obtained from all participants prior to inclusion in the study. For participants below 18 years of age, consent was obtained from parents or legal guardians. The study adhered to the ethical principles outlined in the Declaration of Helsinki. Confidentiality and anonymity of participants were strictly maintained throughout the study.

RESULTS

A total of 134 participants were studied comprising of maximum in age group 15-30 years (31.3%), Males (53.7) more than Females (46.3%) (Table 1).

Table 1: Socio-demographic characteristics of study participants (N = 134)

Variable	Category	Frequency (n)	Percentage (%)
Age group (years)	<15	36	26.9
	15–30	42	31.3
	31–50	34	25.4
	>50	22	16.4
Gender	Male	72	53.7
	Female	62	46.3
Residence	Rural	78	58.2
	Urban	56	41.8
Socioeconomic status	Lower	60	44.8
	Middle	50	37.3
	Upper	24	17.9

Out of 134 participants, 36 were diagnosed with chronic otitis media, yielding an overall prevalence of 26.9% (Table 2).

Table 2: Prevalence of chronic otitis media among rural and urban populations

Residence	Total (n)	COM Present (n)	Prevalence (%)
Rural	78	26	33.3
Urban	56	10	17.9
Total	134	36	26.9

Significant associations were observed between COM and several risk factors (Table 3).

Table 3: Association between selected risk factors and chronic otitis media

Risk Factor	Category	COM Present (n=36)	COM Absent (n=98)	p-value
Overcrowding	Present	22	32	0.012*
	Absent	14	66	
Poor hygiene	Yes	24	38	0.018*
	No	12	60	
Recurrent URTI	Yes	20	28	0.021*
	No	16	70	
Socioeconomic status	Lower	20	40	0.045*
	Middle/Upper	16	58	

*Statistically significant ($p < 0.05$)

Age-wise distribution indicated a higher occurrence of COM among children under 15 years (38.9%), which was statistically significant (Table 4).

Table 4: Distribution of chronic otitis media by age and gender

Variable	Category	COM Present (n)	Percentage (%)	p-value
Age group	<15	14	38.9	0.031*
	≥15	22	61.1	
Gender	Male	20	55.6	0.482
	Female	16	44.4	

*Statistically significant ($p < 0.05$)

Healthcare-seeking behavior is shown in Table 5.

Table 5: Healthcare access and treatment-seeking behavior among COM patients (n = 36)

Variable	Category	Frequency (n)	Percentage (%)
Delay in seeking treatment	>3 months	22	61.1
	≤3 months	14	38.9
First point of care	Primary health center	10	27.8
	Private clinic	16	44.4
	Self-medication	10	27.8

DISCUSSION

The present study assessed the prevalence and risk factors of chronic otitis media (COM) among rural and urban populations attending a tertiary care hospital in North India. The overall prevalence of COM was found to be 26.9%, with a significantly higher burden in rural populations (33.3%) compared to urban counterparts (17.9%). Key risk factors identified included overcrowding, poor hygiene, recurrent upper respiratory tract infections (URTI), and lower socioeconomic status. Additionally, a higher prevalence was observed among children below 15 years of age.

The overall prevalence observed in this study is higher than community-based estimates reported globally, which range from 2% to 8% [2,3]. This difference can be attributed to the hospital-based design of the study, where symptomatic individuals are more likely to be represented. Similar elevated prevalence rates in hospital settings have been reported in previous studies, reflecting a higher disease burden among healthcare-seeking populations [5].

The significantly higher prevalence of COM in rural populations aligns with earlier findings from Indian and international studies [7,8]. Rural populations often face challenges such as limited access to healthcare facilities, poor sanitation, and lower health awareness, which contribute to delayed diagnosis and inadequate treatment. In contrast, urban populations benefit from better healthcare infrastructure and awareness, which may facilitate early intervention and reduce chronicity.

Overcrowding and poor hygiene emerged as significant risk factors in the present study, consistent with prior research [5,10]. These factors contribute to increased transmission of infections, particularly among children, thereby predisposing individuals to recurrent ear infections and subsequent chronicity. Recurrent URTI was also significantly associated with COM, which is biologically plausible given the anatomical and functional connection between the nasopharynx and middle ear via the Eustachian tube [4]. Frequent infections can impair Eustachian tube function, leading to persistent middle ear inflammation.

Lower socioeconomic status was another important determinant identified in this study. This finding corroborates previous literature indicating that poverty-related factors such as malnutrition, overcrowded living conditions, and limited access to healthcare contribute significantly to the development and persistence of COM [3,9]. These determinants often coexist and act synergistically, increasing vulnerability in disadvantaged populations.

The higher prevalence of COM among children under 15 years observed in this study is in agreement with earlier reports [3,8]. Children are particularly susceptible due to anatomical factors such as shorter and more horizontal Eustachian tubes, as well as immature immune responses. Early onset of the disease can have long-term consequences, including hearing impairment and its impact on language development and academic performance. No statistically significant association was found between gender and COM in the present study, which is consistent with several previous studies [5]. This suggests that gender may not be a major determinant in the development of COM, and that environmental and socioeconomic factors play a more prominent role.

Delayed healthcare-seeking behavior observed among a majority of COM patients further highlights gaps in awareness and accessibility. Similar patterns have been reported in other studies, where patients often rely on self-medication or informal healthcare providers before seeking specialized care [8]. Such delays can lead to disease progression and complications.

From a public health perspective, the findings of this study underscore the need for targeted interventions in rural populations. Improving living conditions, promoting hygiene, enhancing awareness regarding early symptoms, and strengthening primary healthcare services can significantly

reduce the burden of COM. School-based screening programs and community outreach initiatives may also facilitate early detection and management.

The strengths of this study include its comparative approach between rural and urban populations and the use of standardized clinical examination for diagnosis. However, certain limitations must be acknowledged. Being a hospital-based study, the findings may not be generalizable to the wider community. The cross-sectional design limits the ability to establish causal relationships. Additionally, reliance on self-reported data for certain variables may introduce recall bias.

CONCLUSION

Chronic otitis media remains a significant health concern in the studied population, with a notably higher prevalence among individuals from rural areas compared to urban counterparts. The study identified key modifiable risk factors, including overcrowding, poor hygiene, recurrent upper respiratory tract infections, and lower socioeconomic status, all of which were significantly associated with the occurrence of COM. Children under 15 years were particularly affected, highlighting the vulnerability of this age group. The findings emphasize the need for targeted public health interventions, especially in rural settings, to address environmental and socioeconomic determinants. Strengthening primary healthcare systems, improving awareness regarding early symptoms, and promoting timely healthcare-seeking behavior are essential steps toward reducing disease burden. Preventive strategies such as improving sanitation, reducing overcrowding, and implementing school-based screening programs may contribute to early detection and management. Overall, a multifaceted approach integrating clinical care with public health measures is required to effectively control and reduce the burden of chronic otitis media in resource-limited settings.

DECLARATIONS

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Conflict of Interest: The authors declare no conflict of interest.

Consent: Written informed consent was obtained from all participants (and guardians in case of minors).

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