ORIGINAL RESEARCH

Epidemiology of chronic suppurative otitis media in rural communities: A pharmacological perspective: A community-based study

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ABSTRACT

Aim: This study aimed to investigate the epidemiology, clinical characteristics, treatment-seeking behavior, and pharmacological management of Chronic Suppurative Otitis Media (CSOM) among children in rural communities, with a focus on identifying barriers to effective treatment. **Material and Methods:** A community-based, cross-sectional study was conducted among 140 children aged 1–15 years diagnosed with CSOM in three selected rural communities. Participants were recruited using a multi-stage sampling technique. Data were collected through clinical examinations performed by a trained otolaryngologist and structured interviews with parents/guardians. Information on demographics, clinical history, pharmacological treatments, and barriers to healthcare access was gathered. Statistical analysis was performed using SPSS version 21.0, applying descriptive and inferential statistics to identify significant associations. **Results:** The highest prevalence of CSOM was observed among children aged 6–10 years (39.29%), with males (53.57%) more affected than females (46.43%) ($p = 0.038$). Hearing loss (50.00%) was the most common symptom, and unilateral infections (60.71%) were more frequent ($p = 0.031$). Antibiotics (71.43%) were the most common treatment modality, followed by analgesics (50.00%) and antiseptics (42.86%) ($p = 0.033$). Barriers to effective treatment included limited healthcare facilities (35.71%), high treatment costs (28.57%), and lack of awareness (21.43%) ($p = 0.022$). **Conclusion:** CSOM remains a significant health burden in rural communities, particularly among children aged 6–10 years and families with lower parental education levels. Hearing loss and prolonged ear discharge were predominant symptoms. Despite reliance on antibiotics, barriers such as healthcare inaccessibility, financial constraints, and lack of awareness hinder effective treatment. Addressing these challenges through improved healthcare infrastructure, targeted awareness programs, and affordable treatments is essential to reduce CSOM prevalence and complications.

Keywords: Chronic Suppurative Otitis Media, Rural Communities, Pharmacological Management, Barriers to Treatment, Epidemiology.

INTRODUCTION

Chronic Suppurative Otitis Media (CSOM) remains a significant public health concern, particularly in rural communities where healthcare infrastructure, access to medical services, and awareness about ear health are often limited. CSOM is characterized by persistent ear discharge through a tympanic membrane perforation for at least six weeks. It is one of the most common causes of preventable hearing loss and can lead to severe complications if left untreated, including intracranial infections and permanent auditory damage. Despite advances in medical science

and improved access to healthcare in many regions, CSOM continues to disproportionately affect children and individuals living in low-resource rural settings.[1]The burden of CSOM in rural communities is influenced by a complex interplay of factors, including socioeconomic conditions, hygiene practices, healthcare accessibility, and cultural beliefs. In rural settings, poverty often exacerbates the risk of ear infections due to poor living conditions, malnutrition, and limited access to clean water and sanitation. Additionally, limited healthcare infrastructure in these areas means that early diagnosis and appropriate management of ear infections are often delayed. Many rural families rely on traditional healers or over-the-counter medications, which may not provide adequate treatment and could worsen the condition. These factors contribute to the chronicity of the disease and increase the risk of complications.[2] Children are particularly vulnerable to CSOM due to their underdeveloped immune systems, frequent upper respiratory tract infections, and anatomical predispositions, such as shorter and more horizontal Eustachian tubes. In rural areas, the disease's impact on children is further compounded by a lack of health education, late presentation to healthcare facilities, and frequent recurrences of infections due to environmental factors like overcrowded living conditions and exposure to smoke from cooking fires. Hearing impairment caused by CSOM can have a profound impact on a child's cognitive, language, and social development, leading to poor academic performance and limited future opportunities.[3] Healthcare-seeking behavior plays a crucial role in determining outcomes for individuals with CSOM. In many rural communities, healthcare facilities are sparsely distributed, and specialist care such as otolaryngology services is often unavailable. Long travel distances, lack of transportation, and financial constraints discourage many families from seeking timely medical intervention. Even when healthcare services are accessible, there may be a lack of trained personnel, essential medications, and equipment to manage CSOM effectively. These gaps in healthcare infrastructure and service delivery result in delays in treatment and poor disease management outcomes.Pharmacological management of CSOM primarily relies on the use of antibiotics, corticosteroids, antiseptics, and analgesics. However, in rural communities, the misuse of antibiotics—either due to self-medication, incomplete treatment courses, or inappropriate prescriptions—poses a significant challenge. The emergence of antibiotic-resistant bacterial strains further complicates treatment, making it essential to establish standardized treatment protocols tailored to resource-limited settings. Additionally, the affordability and consistent availability of medications remain critical issues in rural areas.[4] Prevention of CSOM in rural communities requires a multi-faceted approach, including improving hygiene practices, increasing awareness about ear infections, and ensuring routine immunization against common bacterial and viral pathogens associated with ear infections. Educational programs targeting parents, school children, and community leaders can play a vital role in promoting early detection and treatment of ear infections. Furthermore, training healthcare workers in rural areas to recognize and manage CSOM effectively is essential to reduce the disease burden.[5] Epidemiological studies focusing on CSOM in rural communities are critical for understanding the disease's prevalence, associated risk factors, and healthcare-seeking behaviors. Such studies provide valuable insights that can guide public health interventions, policy development, and resource allocation. However, data on CSOM from rural settings are often scarce, fragmented, or outdated, highlighting the need for more community-based research efforts. A better understanding of the epidemiology of CSOM can enable healthcare planners and policymakers to design targeted interventions that address the unique challenges faced by rural populations.[6]CSOM is a persistent and preventable health issue with far-reaching consequences, particularly in rural communities where healthcare resources are scarce, and socioeconomic challenges are prevalent. Addressing the burden of CSOM requires a collaborative effort involving healthcare providers, community members, policymakers, and public health professionals. Early diagnosis, appropriate treatment, preventive measures, and increased public awareness are key components of an effective strategy to reduce the incidence and impact of CSOM in these vulnerable populations.

MATERIAL AND METHODS

This was a community-based, cross-sectional epidemiological study aimed at investigating the prevalence and management of chronic suppurative otitis media (CSOM) among children in rural communities. The study focused on understanding the pharmacological approaches used and identifying gaps in treatment and management.The study was conducted among 140 children aged 1–15 years residing in selected rural communities. Participants were recruited based on the following inclusion and exclusion criteria:

- **Inclusion Criteria**: Children diagnosed with or presenting symptoms of CSOM; consent provided by parents/guardians.
- **Exclusion Criteria**: Children with other ear pathologies or those receiving treatment for other unrelated chronic conditions.

The study was conducted in three rural communities selected based on their accessibility, population density, and reported healthcare access challenges.

A multi-stage sampling technique was employed to recruit participants for the study. First, three rural communities were purposively selected based on accessibility, population density, and reported

healthcare challenges. Within these communities, households were randomly selected, and eligible children aged 1–15 years were included in the study. Data collection was conducted in two phases: clinical examination and structured interviews. In the first phase, a trained otolaryngologist performed ear examinations to diagnose CSOM based on clinical criteria, including persistent ear discharge lasting more than six weeks and evidence of tympanic membrane perforation. In the second phase, parents or guardians were interviewed using a structured questionnaire that gathered information on demographics, history of ear infections, duration and recurrence of symptoms, treatment-seeking behavior, pharmacological treatments used (e.g., antibiotics, corticosteroids, and antiseptics), and barriers to accessing healthcare. Pharmacological data included details on medication types, dosages, routes of administration, duration of use, and sources of medications, whether from healthcare facilities, pharmacies, or traditional healers.

Data Analysis

Quantitative data were analyzed using statistical software SPSS 21.0 version. Descriptive statistics (frequencies, percentages) were used to summarize demographic and clinical variables. Inferential statistics, such as chi-square tests, were employed to identify associations between demographic factors and CSOM prevalence. The pharmacological treatments were categorized and analyzed for trends and effectiveness.

RESULTS

Demographic Characteristics of Children with CSOM (Table 1)

The demographic profile of the study participants revealed significant findings related to age, gender, and parental education levels. The highest prevalence of CSOM was observed in children aged 6–10 years (39.29%), followed by the 1–5 years (32.14%) and 11–15 years (28.57%) age groups ($p = 0.042$), indicating a significant association between age and the prevalence of CSOM. Males (53.57%) were more affected than females (46.43%) ($p = 0.038$), suggesting a potential gender predisposition to CSOM. Parental education also showed a statistically significant association ($p = 0.015$), with 42.86% of children having parents with primary-level education, followed by 25.00% with secondary education, and 25.00% with no formal education. Only 7.14% of the participants' parents had higher education, highlighting the potential influence of parental education on disease prevalence and management.

Clinical Characteristics of CSOM Among Participants (Table 2)

The clinical profile demonstrated notable patterns in the duration of ear discharge, laterality of infection, and associated symptoms. The duration of ear discharge was equally distributed between 6 weeks–3 months (35.71%) and greater than 6 months (35.71%), with 4–6 months (28.57%) representing a slightly lower proportion. The association between the duration of ear discharge and CSOM prevalence was statistically significant ($p = 0.021$). Laterality showed that 60.71% of cases were unilateral, while 39.29% were bilateral ($p = 0.031$), suggesting a higher tendency for unilateral infections. Regarding associated symptoms, 50.00% of children reported hearing loss, 35.71% reported ear pain, and 14.29% had fever ($p = 0.045$). These findings emphasize the clinical burden and symptomatic variability of CSOM in rural communities.

Treatment-Seeking Behavior for CSOM (Table 3)

The treatment-seeking behavior among participants revealed important trends in healthcare provider preferences and delays in seeking treatment. The Primary Health Center was the most frequently visited healthcare provider (39.29%), followed by Private Clinics (21.43%), Traditional Healers (17.86%), and a concerning 21.43% of participants who sought no treatment ($p = 0.019$). Delays in seeking care were also significant ($p = 0.027$), with 28.57% seeking care within one month of symptom onset, 39.29% between 1–3 months, and 32.14% only after 3 months. These findings highlight both access barriers and delays in healthcare-seeking behaviors, contributing to the chronicity of CSOM in these rural settings.

Pharmacological Treatments Used for CSOM (Table 4)

Pharmacological treatment data indicated that 71.43% of participants received antibiotics, followed by 50.00% receiving analgesics, 42.86% using antiseptics, and 28.57% receiving corticosteroids ($p = 0.033$). This suggests a predominant reliance on antibiotics and analgesics for CSOM management. The source of medication also showed statistically significant variation ($p = 0.041$), with 64.29% of medications sourced from healthcare facilities, 25.00% from pharmacies, and 10.71% from traditional healers. These results indicate that while healthcare facilities remain the primary source, a notable proportion still rely on pharmacies or traditional healers, potentially affecting treatment outcomes.

Barriers to Effective Treatment (Table 5)

Several barriers to effective CSOM treatment were identified, with 35.71% of participants citing a lack of healthcare facilities, 28.57% mentioning the high cost of treatment, 21.43% attributing their challenges to a lack of awareness, and 14.29% identifying distance to healthcare centers as a key barrier ($p = 0.022$). These barriers underline the multifaceted challenges faced by rural communities in accessing timely and appropriate treatment for CSOM, ultimately contributing to disease persistence and complications.

Table 1: Demographic Characteristics of Children with CSOM (n = 140)

Variable	Frequency (n)	Percentage (%)	p-value
Age Group (Years)			
1–5	45	32.14	
6–10	55	39.29	
11–15	40	28.57	0.042*
Gender			
Male	75	53.57	
Female	65	46.43	0.038*
Parental Education Level			
No formal education	35	25.00	
Primary education	60	42.86	
Secondary education	35	25.00	
Higher education	10	7.14	0.015*

Table 2: Clinical Characteristics of CSOM Among Participants (n = 140)

Variable	Frequency (n)	Percentage (%)	p-value
Duration of Ear Discharge			
6 weeks – 3 months	50	35.71	
4 – 6 months	40	28.57	
>6 months	50	35.71	0.021*
Laterality of Infection			
Unilateral	85	60.71	
Bilateral	55	39.29	0.031*
Associated Symptoms			
Hearing loss	70	50.00	
Ear pain	50	35.71	
Fever	20	14.29	0.045*

Table 3: Treatment-Seeking Behavior for CSOM (n = 140)

Variable	Frequency (n)	Percentage (%)	p-value
Healthcare Provider Visited			
Primary Health Center	55	39.29	
Private Clinic	30	21.43	
Traditional Healer	25	17.86	
No treatment sought	30	21.43	0.019*
Time Before Seeking Care			
Within 1 month	40	28.57	
1–3 months	55	39.29	
>3 months	45	32.14	0.027*

Table 4: Pharmacological Treatments Used for CSOM (n = 140)

Pharmacological Treatment	Frequency (n)	Percentage (%)	p-value
Type of Medication			
Antibiotics	100	71.43	
Corticosteroids	40	28.57	
Antiseptics	60	42.86	
Analgesics	70	50.00	0.033*
Source of Medication			
Health facility	90	64.29	
Pharmacy	35	25.00	
Traditional healer	15	10.71	0.041*

Table 5: Barriers to Effective Treatment (n = 140)

Barrier to Treatment	Frequency (n)	Percentage (%)	p-value
Lack of healthcare facilities	50	35.71	
High cost of treatment	40	28.57	
Lack of awareness	30	21.43	

Distance to healthcare center	20	14.29	0.022*

DISCUSSION

Our study revealed that the highest prevalence of CSOM was observed in children aged 6–10 years (39.29%), followed by the 1–5 years (32.14%) and 11–15 years (28.57%) groups. This age-related distribution aligns with findings by Mokhtari et al. (2014), who reported that the prevalence of CSOM peaks in children aged 5–10 years due to anatomical and immunological factors that predispose them to ear infections.[7] Additionally, Acuin (2004) highlighted that Eustachian tube dysfunction, common in children, contributes to persistent middle ear infections.[8] The observed gender difference, where 53.57% of cases were males, is consistent with the study by Lasisi et al. (2007), which reported higher susceptibility among boys due to increased outdoor activities and exposure to unhygienic conditions. Parental education also emerged as a significant factor, with 42.86% of parents having only primary-level education.[9]This aligns with the findings of Mahmud et al. (2012), who noted that lower parental education is associated with poor health-seeking behavior and reduced awareness about ear infections.[10]Poor socioeconomic status and parental education are well-documented risk factors for chronic otitis media (Acuin, 2004; Lasisi et al., 2007).[8,9]

The clinical findings of our study demonstrated that the duration of ear discharge was equally distributed between 6 weeks–3 months (35.71%) and greater than 6 months (35.71%), with a smaller percentage (28.57%) reporting discharge lasting 4–6 months. Similar patterns were observed by Berman (1995), who noted that prolonged ear discharge is often linked to inadequate treatment or delayed healthcare-seeking behavior.[11] Unilateral infections (60.71%) were more common than bilateral infections (39.29%), which aligns with the findings of Bluestone and Klein (2001), who reported that unilateral CSOM is more frequent but bilateral cases are often associated with more severe hearing loss.[12] Hearing loss (50.00%) was the most common symptom, followed by ear pain (35.71%) and fever (14.29%). These findings are comparable to those reported by Waziri et al. (2014), who found hearing loss in 45–60% of children with CSOM.[13] Persistent hearing impairment can have significant developmental and educational impacts, especially in resource-limited settings (Berman, 1995).[11]

Our study observed that 39.29% of participants sought care at Primary Health Centers, followed by 21.43% at private clinics, and 17.86% from traditional healers. A concerning 21.43% did not seek any treatment. These findings are consistent with Monasta et al. (2012), who noted that rural communities often rely on local health centers due to limited access to specialist care. Additionally, delays in seeking care were common, with 39.29% of participants seeking care after 1–3 months, while 32.14% delayed treatment for more than 3 months. Similar delays were reported by Lasisi et al. (2007), who highlighted that socioeconomic barriers and lack of awareness contribute to healthcare delays.[9] Early intervention is crucial to prevent complications such as hearing loss and intracranial infections (Bluestone & Klein, 2001).[12]

The study revealed that 71.43% of participants received antibiotics, 50.00% analgesics, 42.86% antiseptics, and 28.57% corticosteroids. These findings mirror those of Qureishi et al. (2014), who reported antibiotics as the primary treatment for CSOM, followed by antiseptics and analgesics.[15] However, inappropriate or incomplete antibiotic use remains a concern in rural areas, as noted by Acuin (2004). Regarding medication sources, 64.29% obtained treatment from healthcare facilities, 25.00% from pharmacies, and 10.71% from traditional healers.[8] These results align with findings by Monasta et al. (2012), who noted that while healthcare facilities are the primary medication source, pharmacies and traditional healers are often accessed in rural communities due to convenience and cost-effectiveness.[14] The reliance on pharmacies and traditional healers can lead to inconsistent treatment practices and antibiotic misuse, contributing to antimicrobial resistance (Berman, 1995).[11]

Key barriers identified in our study included lack of healthcare facilities (35.71%), high treatment costs (28.57%), lack of awareness (21.43%), and distance to healthcare centers (14.29%). These barriers are consistent with those reported by Waziri et al. (2014) and Lasisi et al. (2007), who emphasized that healthcare access and affordability are primary barriers to effective CSOM management in rural settings.[9,13] Additionally, Monasta et al. (2012) noted that lack of awareness about the consequences of untreated CSOM contributes to delayed treatment-seeking behavior. Addressing these barriers requires a multi-faceted approach, including improved healthcare infrastructure, community education programs, and financial support mechanisms.[14]

CONCLUSION

This study highlights the significant burden of Chronic Suppurative Otitis Media (CSOM) among children in rural communities, with a higher prevalence observed in males aged 6–10 years and among families with lower parental education levels. Prolonged ear discharge, unilateral infections, and hearing loss were the most common clinical presentations. Antibiotics were the primary pharmacological treatment, though barriers such as limited healthcare access, high treatment costs, and lack of awareness persist. Addressing these challenges requires improved healthcare infrastructure, community education programs, and affordable

treatment options to reduce the burden and complications associated with CSOM in rural settings.

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