

Socio-economic status and hearing loss in chronic suppurative otitis media in Nigeria

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Abstract

Background: Hearing loss is reported in about 50% of cases of chronic suppurative otitis media (CSOM).

Aim: To report the prevalence, type and severity of hearing loss in CSOM and identify risk factors.

Methods: A prospective study of hearing loss in CSOM was undertaken in University College Hospital, Ibadan, two general hospitals and two primary health care centres, all in densely populated, semi-urban areas in south-west Nigeria. Controls were selected from school children, hospital workers' children and children whose parents were visiting the hospitals, all of whom claimed that there had been no episode of otitis media in the past. An oral questionnaire was administered to all, followed by audiometry and examination of the ear, nose and throat in study children.

Results: There were 189 CSOM subjects and 100 controls aged between 4 and 150 months [mean (SD) 59.25 (44.55), 173 girls and 116 boys, M:F 1.5:1]. The prevalence of hearing loss in CSOM was 89/189 (47%) and was conductive in 73/89 (82%) and sensorineural (SHL) in 16/89 (18%). Of the subjects with hearing loss, 72% had had otitis media during the 1st year of life. Of the 89, 61 (69%) were of low social class, 13/37 (35%) were middle class and 15/63 (24%) upper class. The duration of CSOM ranged from 4 weeks to 12 years [mean (SD) 4 yrs (2.04)] and from 5 to 12 years in those with SHL [mean (SD) 9 yrs (6.21)]. There was significant correlation between socio-economic status and hearing loss ($r=0.138$, $p=0.02$) while no correlation was found with upper respiratory infection ($r=0.054$, $p=0.36$), age of onset ($r=0.037$, $p=0.62$) or frequency of attacks ($r=-0.068$, $p=0.35$).

Conclusion: About one fifth of patients with CSOM have SHL. Early diagnosis and management of CSOM is imperative to improve outcome. CSOM is strongly associated with low socio-economic status.

Introduction

Conductive hearing loss is reported in about 50% of patients with chronic suppurative otitis media (CSOM) in the United States of America (USA) and in 13.8–36.2% in developing countries.^{1–5} The degree of hearing loss is typically mild to moderate across the 500–4000 Hz frequency.^{1,3} There are also a few reports of sensorineural

hearing loss (SHL) attributed to the passage of bacterial and host inflammatory mediators from middle ear effusion (MEE) through the round window membrane into the inner ear.^{6–11} This paper reports the prevalence, severity and risk factors associated with hearing loss in CSOM patients in Nigeria.

Subjects and Methods

This was a prospective study of the prevalence and risk factors associated with

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hearing loss in children with recurrent CSOM. All those who had had one or more episode of otorrhoea were included. The definition of CSOM was otorrhoea/perforation of 3 months or longer duration.¹ The study was undertaken in five health facilities in two states: University College Hospital (a tertiary and referral centre for otorhinolaryngology), two general hospitals (Ibadan and Osogbo) and two primary health centres (Ibadan and Osogbo). All five centres are in densely populated suburban areas in south-west Nigeria. Following ethical approval by the Institution Review Board of the College of Medicine, University of Ibadan, consent was obtained from the parents and the questionnaires were administered orally. The children then had examination of the ear, nose and throat and pure tone audiometry was undertaken. This was with a computer audiometer (BA 20 Kamplex) in a sound-proof (acoustic) booth in the otorhinolaryngology outpatient clinics (calibration ISO/DP 389-1983). Hearing was tested at the frequencies 250-8000 Hz for each ear separately.

The controls were fifteen children of hospital workers, 20 of parents visiting the hospitals and 65 school children, all of whom volunteered that they had had no episode of otitis media (OM) in the past, and all of whom had audiometry. Information recorded in the questionnaire included biodata, age at first episode of ear suppuration, frequency of otorrhoea in the past 18 months, upper respiratory infection, parents' socio-economic status and the presence of hearing loss. Based on parents' occupation, income and education, socio-economic class was defined as high (I and II), middle (III) or low (IV and V).¹²

Analysis

Data were entered into Microsoft Excel and analysed using the SPSS program. The prevalence, type and severity of hearing loss, association with age at onset of OM, frequency of recurrence, socio-economic status and recurrent upper respiratory infections were determined.

Results

A total of 189 CSOM subjects and 100 controls were recruited. CSOM patients comprised 173 boys and 116 girls (M:F 1.5:1). Ages ranged from 4 to 150 months [mean (SD) 59.25 (44.55)]. Hearing loss was confirmed by audiometry in 89/189 (47%) subjects and was conductive in 73 (82%) and sensorineural (SHL) in 16 (18%). The duration of CSOM ranged from 4 weeks to 12 years [mean (SD) 4 yrs (2.04)]. However, among those with SHL, the range was 5-12 years [mean (SD) 9 yrs (6.21)]. Hearing loss was mild in 37%, moderate/moderately severe in 10% and in none was it severe or profound (Table 1).

Regarding subjects' socio-economic status, 61/89 (69%) were of low social class, 13/37 (35%) middle class and 15/63 (24%) high social class; 25% of controls were of low social class, 20% middle and 55% high social class (Fig. 1).

Of the 89 patients with hearing loss, 72 (80.9%) had developed OM within the 1st year of life. Hearing loss was detected in 68/133 (51%) of those who developed CSOM within the 1st 6 months of life and in 4/22 (18%) who developed it after 6 months of age (Fig. 2).

The frequency of OM was 0-3 in 54 (29%), 4-6 in 21 (11%) and 7-9 in 14 (7%)

TABLE 1. Pure tone average in CSOM.

Normal (0-25 dB)	Mild (26-45 dB)	Moderate (46-60 dB)	Moderate-severe (61-75 dB)	Severe (76-90 dB)	Profound (>90 dB)	Total
100 (53%)	69 (37%)	14 (7%)	6 (3%)	0	0	189 (100%)

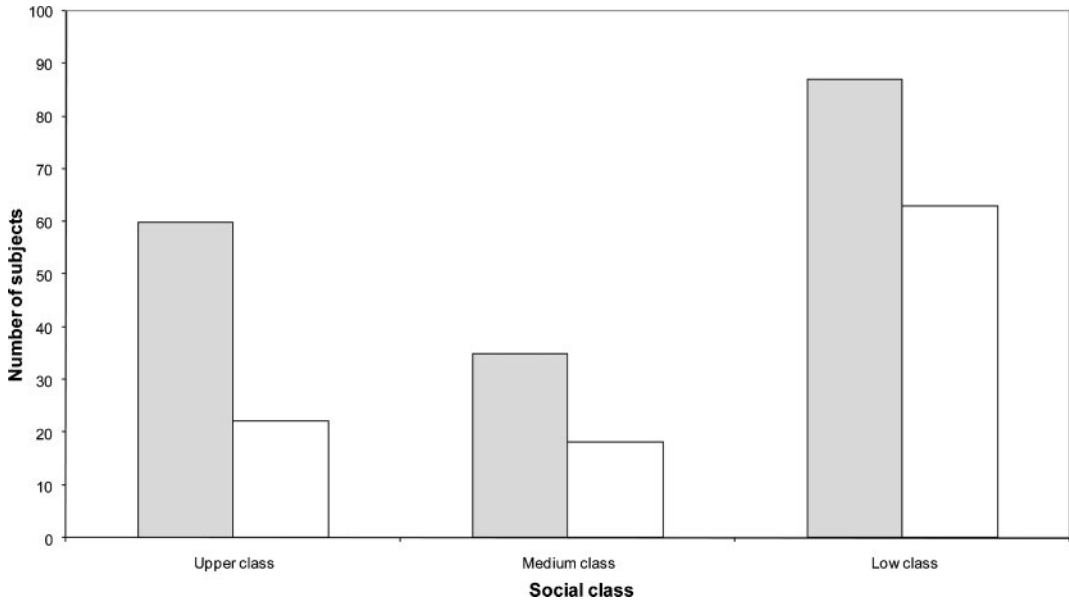


FIG. 1. Hearing loss and social class (■ no, □ yes).

(Table 2). Hearing loss was seen in 54/126 (43%) of those who had had 0–3 attacks in the past 18 months, 21/40 (53%) who had had 4–6 attacks and 14/16 (88%) who had had 7–9 attacks.

The treatment offered included aural suction toileting followed by daily topical dressing with an antiseptic (flavine in spirit) gauze wick and a topical nasal vasoconstrictor. Systemic and topical antibiotic ear

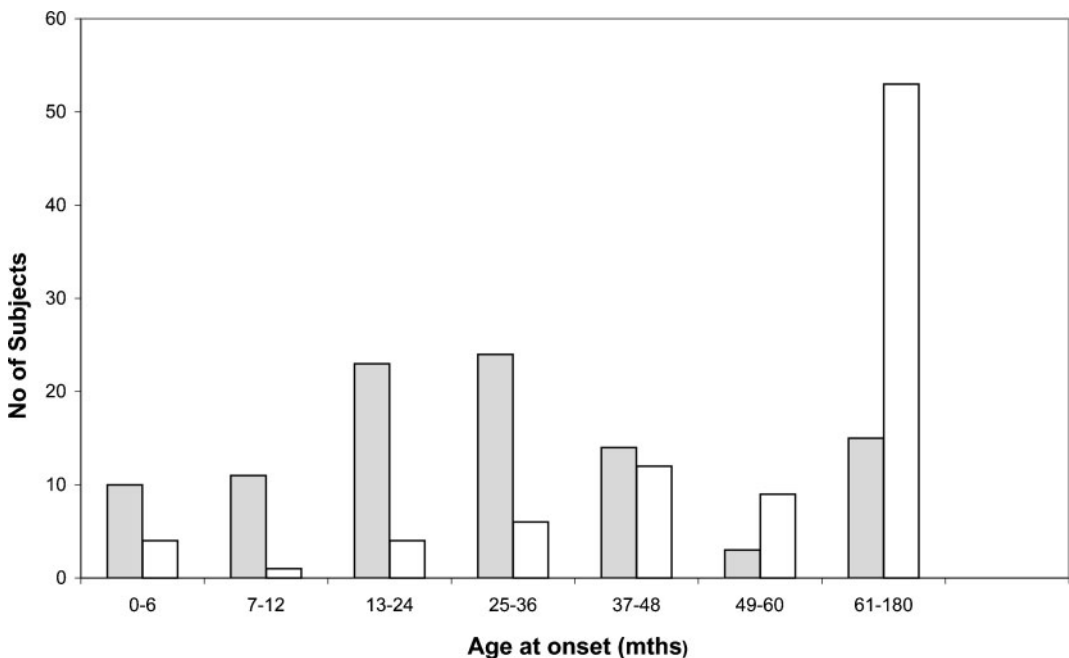


FIG. 2. Hearing loss and age at onset of OM (■ no, □ yes).

TABLE 2. Frequency of attacks of otitis media in 89 patients with hearing loss.

	No. of attacks			
	0-3 (n=126)	4-6 (n=40)	7-9 (n=16)	10-15 (n=7)
Hearing loss	54 (42.8%)	21 (52.5%)	14 (87.5%)	7 (100%)

dressings were added when there was no improvement in the otorrhoea after 2-3 weeks. Cessation of otorrhoea was achieved in 117 (62%) on topical treatment while the remainder received added systemic/topical antibiotic therapy and cessation of otorrhoea was achieved in all of them by 4-10 weeks.

There was a significant correlation between hearing loss and socio-economic status ($r=0.138$, $p=0.02$), but no correlation with upper respiratory infection ($r=0.054$, $p=0.36$), age of onset ($r=-0.037$, $p=0.62$) or frequency of attack ($r=0.068$, $p=0.35$) (Table 3).

Discussion

The 47% prevalence of hearing loss in CSOM in this study compares with reports of 50% from some developed countries.^{1,3} These figures are higher than reports from developing countries of prevalence rates of hearing loss following OM with effusion of 13.8-36.2%.^{2,4,5} This could be owing to the fact that in developing countries CSOM is often reported to be more common and more easily detected than OM with effusion.²⁻⁴ Fortunately, the hearing loss was predominantly conductive and in the majority was mild without functional impairment,

TABLE 3. Correlation between hearing loss and risk factors.

		Age at onset (group)	Social class (group)	No. of attacks (group)	URTI	Hearing loss	No. of people in household
Age at onset (group)	Pearson correlation	1.000	-0.042	0.090	-0.012	-0.037	0.007
	Sig. (2-tailed)	-	0.570	0.219	0.868	0.618	0.925
	No.	189	185	189	189	189	189
Social class (group)	Pearson correlation	-0.042	1.000	0.116	0.046	0.138*	0.229†
	Sig. (2-tailed)	0.570	-	0.115	0.439	0.020	0
	No.	185	285	185	285	285	285
No. of attacks (group)	Pearson correlation	0.090	0.116	1.000	0.348†	0.069	0.105
	Sig. (2-tailed)	0.219	0.115	-	0	0.346	0.150
	No.	189	185	189	189	189	189
URTI	Pearson correlation	-0.012	0.046	0.348†	1.000	0.054	-0.104
	Sig. (2-tailed)	0.868	0.439	0	-	0.362	0.077
	No.	189	285	189	289	289	289
Hearing loss	Pearson correlation	-0.037	0.138*	0.069	0.054	1.000	0.049
	Sig. (2-tailed)	0.618	0.020	0.346	0.362	-	0.411□
	No.	189	285	189	289	289	289
No. of people in household	Pearson correlation	0.007	0.229†	0.105	-0.104	0.049	1.000
	Sig. (2-tailed)	0.925	0	0.150	0.077	0.411	-
	No.	189	285	189	289	289	289

* Correlation significant at the 0.05 level (2-tailed); † correlation significant at the 0.01 level (2-tailed); sig., significance; URTI, upper respiratory tract infection. Controls had audiometry and are also included in the social class, URTI and no. of people in household data.

hence not requiring further management. In this study, we used the 3-month cut-off as the reference for selecting OM and CSOM, similar to studies in the USA, although the WHO definition of CSOM is 2 weeks aural discharge associated with perforation.¹³ The sequelae of CSOM, such as fibrosis of the middle ear, ossicular erosion, ankylosis of the ossicular joints and labyrinthitis owing to diffusion of toxins and bacterial breakdown products have been reported to cause deafness in these patients. Eighteen per cent had SHL. The potentially deleterious effects of moderate-to-severe conductive deafness and SHL on language and education make it imperative to implement early management of CSOM. Clinical and histopathological evidence has linked SHL in CSOM to entry of toxic materials through the round-window membrane into the inner ear, leading to biochemical alteration of the inner-ear fluids, serofibrinous precipitates and inflammatory cells in the scala tympani, all of which result in gradual end-organ dysfunction and accentuated threshold shift.^{6-11,14} Similar to other reports,^{7,14} the mean duration of CSOM is greater in patients with SHL, suggesting that the severity of hearing loss may be associated with increasing duration of the disease,^{7,14,15} although the association between duration of disease and degree of SHL has not been confirmed by all.¹⁶

Socio-economic status was the only risk factor which showed a statistically significant association with development of hearing loss ($p=0.02$). This is similar to reports from Britain¹⁶ and the USA¹⁷⁻²⁰ of greater severity of OM in children from lower social classes with less formal education and parents who are unemployed.¹⁷⁻²⁰ The contribution of low socio-economic status to increased severity of OM might be multifactorial. Families of a lower social class often have more children and live in more congested homes with poor sanitation and hygiene, all of which create environmental conditions conducive to transmission of infectious agents.^{5,15,16} In addition,

malnutrition, which commonly accompanies low socio-economic status, suppresses the immune system and places poor children at greater risk of disease.^{7,9,20,21} Such children also have diminished access to appropriate health services and immunisation.

Although causality cannot be inferred from these data, the accuracy of parents' recollection of the number of attacks of OM might also be a limitation. However, the findings suggest a need for more basic research on the social correlates of CSOM and the need to identify the impact of socio-economic and nutritional status on hearing outcome and the course of disease.

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