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Otoscopic and audiological findings in different populations of 5–14 year-old schoolchildren in Colombia

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ABSTRACT

Objective: To present the otoscopic and audiological findings of studies carried out in groups of 5–14 year old schoolchildren in diverse indigenous, White, and African descended communities in the Republic of Colombia.

Materials and methods: The present study is descriptive and cross-sectional. We obtained a convenience sample for the analysis. We define acute otitis media (AOM), (bulging or redness); tympanic perforation (TP), (disruption of continuity in the tympanic membrane) and sequelea (scarring, myringosclerosis, retractions, secrections). Our results are described as frequencies in percentages. Audiometry was performed in every student. Readings were taken at 250, 500, 1000, 2000, 4000, and 8000 Hz for air-conduction and bone-conduction thresholds. Normal hearing is considered up to 20 dB, mild sensorineural hearing loss between 21 and 39 dB, moderate between 40 and 59 dB, severe between 60 and 89 dB and profound more than 90 dB. For conductive hearing loss the air–bone gap is measured.

Results: 3052 otoscopies were conducted in 1526 schoolchildren. Males predominated in each group except in the Wayuu group. Otoscopic abnormalities rates varied between 1.5% in Providencia group, up to 9.6% in the Amazon groups. No perforations were found in the Wayuu Indian schoolchildren and the highest frequency of Tympanic perforations (1.2%) and sequelaes (8.2)% in the Amazon groups. Audiometric findings were normal in 94–98% of cases. Conductive hearing loss (CHL) was found in 5.5% of Amazon groups and the lowest (1.4%) in the Wayuu groups. Slight to moderate Neurosensorial Hearing Loss (NHL) were found in 1.3% in the Arhuaca communities and moderate 0.9% in the Amazon groups.

Conclusions: The present study is the first conducted in Colombia to evaluate the frequency of ear diseases and sequelae in populations of 5–14 year old children.

High prevalences of sequelaes were found in the indigenous groups of the Amazon and the lowest in the Black schoolchildren on the island of Providencia.

It is recommended that medical anthropological studies be conducted in these areas, and evaluation done on the probable connection between these types of diseases and processes of intercultural interaction.

1. Introduction

Otitis media and their sequelae (timpanic membrane perforations, scarring, myringosclerosis, retractions, etc.) are the most frequently occurring disease in children. The prevalence of diseases of the middle ear has been studied in many populations around the world in the last few years. The disease presents in all ages, but generally affects children younger than 3 [1–3]. The frequency of ear infections and their sequelae vary according to racial group; socioeconomic, cultural, and nutritional conditions; and craniofacial and Eustachian tube malformations. Various epidemiological studies have reported different prevalences among risk groups of Australian Aborigines [1,4–12], Inuits of Greenland [4–6], Alaskan [7–9] and North American natives [10,11], and diverse White and Black communities [2,12–16].

If not adequately treated it can cause significant hearing loss, intracranial and extracranial complications and potential language alterations. Intracranial complications of otitis media are uncommon, but are potentially life-threatening and are more likely to occur among indigenous than non-indigenous children. O'Connor

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et al. [11] found that in Australia approximately 60% of extracranial and intracranial complications of otitis media occur in children. A high rate of chronic TM perforation occurs among indigenous children, estimated to be as high as 80%. Cholesteatoma rates among indigenous children in Australia are higher than previously estimated (up to 10% in CSOM).

Our objective is to present the results of the otoscopic and audiological findings in studies carried out in groups of 5–14 years old schoolchildren in diverse indigenous, White, and African descended communities in the Republic of Colombia. This knowledge represents the first step toward making health personnel, policy makers and individuals aware of the magnitude and distribution of acute otitis media (AOM), timpanic membrane perforations (TP), sequelaes like scarring, myringosclerosis, retractions, etc. and the audiological findings in these groups in Colombia.

2. Materials and methods

The present study is descriptive and cross-sectional, exploratory type, and presents otological and hearing tests results conducted in the last 15 years on 5–14 years old schoolchildren in native Indian, African, and urban populations within the Republic of Colombia. All children between 5 to 14 years old were included, regardless of the state of health and place, such as schools, indigenous concentrations or community houses.

Due to cultural factors, many parents didn't authorize the otoscopic examination or many children ran away to the jungle in order to avoid it; furthermore, some of the communities are nomads between Colombia, Brazil and/or Venezuela, and they remain for very short periods of time in a specific place, thus we obtained a convenience sample for the analysis, with its corresponding limitations.

We used the classification schema suggested by Paradise [17] for the identification of middle ear diseases. Otoscopies were performed (Welch-Allyn otoscope). The presence of bulging or redness was defined as acute otitis media (AOM), any disruption of continuity in the tympanic membrane was defined as tympanic perforation (TP), and sequelea were defined as the presence of scarring, myringosclerosis, retractions, secrections at the moment of the examination. Our results are described as frequencies in percentages, Audiometry (Maico MA-32 audiometer) was performed in every student. Readings were taken at 250, 500, 1000, 2000, 4000, and 8000 Hz for air-conduction and bone-conduction thresholds.

Normal hearing is considered up to 20 dB, mild sensorineural hearing loss between 21–39 dB, moderate between 40–59 dB, severe between 60–89 dB and profound more than 90 dB. In conductive hearing loss the air–bone gap is measured.

The groups of native Indian schoolchildren were drawn from various towns, schools and communities in their respective areas. As seen in Table 1, examinations were conducted on 1526 schoolchildren of age 5–14 years: 272 from indigenous communities in the Colombian Amazon (Cubeos, Desanos, Tucanos,Inga, Kamsa etc.); 87 from the native Kogui Indian community and 121 from the native Arhuaco (Ijka) Indian community in the Sierra Nevada of Santa Marta, 84 of African descent on the island of Providencia in the Caribbean, 93 from the native Wayuu Indian community in the Guajira department, and 869 White students from the neighborhoods of San Luis and San Isidro in the area of La Calera,which are low socioeconomic suburban areas of Bogota. However, due to the cultural differences, difficulties with the native languages and lack of health services, it was impossible to obtain additional health information.

3. Results

In total 3052 otoscopies were conducted in 1526 schoolchildren, distributed as shown in Table 1. The largest number of schoolchildren (869 children, 1738 otoscopies) were in the group from La Calera, followed by the indigenous groups of Amazonas (272 children, 544 otoscopies), and the Indians groups of the Sierra Nevada of Santa Marta (208 children, 416 otoscopies).

Males predominated in each group except in the Wayuu group. Tympanic membrane abnormalities rates varied between 1.5% in Providencia group, up to 9.6% in the Cubeo and Tucano Indians of the Amazonian group. The otoscopic and audiometeric findings can be seen in Table 2.

The highest frequency of otoscopic abnormalities (9.6%) was found in the Amazonian group; 8.2% were sequelaes (scarring, sclerosis, and retractions) in the tympanic membrane (TM) while only 1.2% were tympanic perforations (TP). The Sierra Nevada group also showed a high percentage of abnormal otoscopies (4.5%), comprised of Tympanic perforations in 1.1% of cases, acute otitis media 2.1% and sequelae in 1.3% of cases. In the group from La Calera, (Bogotá), 4.6% had abnormal otoscopies, which were comprised of TP in 0.4% of cases, acute otitis media 0.4% and sequelaes in 3.8% of cases. No perforations were found in the Wayuu Indian schoolchildren, with only 2% showing sequelae (scarring, myringosclerosis, retractions, etc.). The lowest frequency of abnormal otoscopies (1.5%) was found in the group from Providencia, with 0.2% showing TP and 1.3% showing sequelae (scarring) of the TM.

Audiometric findings were normal in 94–98% of cases. Conductive Hearing Loss (CHL) with air–bone gap <25 db, was found in 5.5% of Amazonian Indians, and 3.6% of Sierra Nevada groups (Kogui-Arhuacos). Mild Neurosensorial Hearing Loss (NHL) was found in 0.9% in the Amazonia groups and moderate NHL were found in 1.3% in the Arhuaca communities of the Sierra Nevada.

4. Discussion

4.1. Indigenous Colombian communities

In general, our results correlate with most of the literature showing a predomination of males. In our case, the predominance

Table 1
Demographic characteristics of 5–14 years old schoolchildren in Colombian populations.

Place	Population	Children	Males		Ears		
			No	No		%	No
Sierra Nevada/ Santa Marta	Kogui/Arhuacos	208	126	61	416		
Amazonia	Cubeos/Tucanos/Ingas/Kamsa	272	161	59	544		
Island of Providencia	Afro-Colombian	84	45	54	168		
Guajira	Wayuu	93	35	38	186		
Bogota-Suburban	La Calera	869	443	51	1738		
Total		1526	810	53	3052		