Wax Impaction in Nigerian School Children.

J.A.E. Eziyi[1], Y.B Amusa[1], C.C. Nwawolo[2], B.C. Ezeanolue[3].
[1]Otolaryngology Unit, Department of Surgery, Obafemi Awolowo University Teaching Hospital Ile-ife, Nigeria.
[2]ENT Unit, Department of Surgery, Lagos University Teaching Hospital. Lagos.
[3]ENT Department, University of Nigeria Teaching Hospital. Enugu.
Correspondence to: J.A.E Eziyi, E mail: eni_adeyemo@yahoo.com

Background: **Impacted wax has been classified as an ear disease. It can cause pain, itching, tinnitus hearing loss or otitis externa. The prevalence of cerumen impaction varies. The aim of this study was to determine the prevalence of impacted ear wax in primary school children and to determine, if there is any association between socioeconomic status and the occurrence of wax impaction among these school children.**
Methods: **A multi-staged stratified sampling technique was used to select 630 pupils from 15 primary schools in Ile-Ife using the Local Education Authority (LEA) list for common entrance code as the sampling frame. Pre-tested structured questionnaire was administered on each selected pupil with clarification from parent/ guardian where necessary and were examined. Each pupil was placed in the upper, middle and lower socioeconomic class based on Oyedeji's classification.**
Results: **Three hundred and one (47.8%) were females and three hundred and twenty-nine (52.2%) were males. Forty-two point two percent (42.2%) of the pupils were from the lower socioeconomic class, 31.6% (199) were from the middle class and 26.6% (164) were from the upper class. Wax impaction had a prevalence of 46.7% and significantly higher in the lower socioeconomic status (p=0.036).**
Conclusion: **Wax impaction is a problem amongst Nigerian primary school children. There is a significant relationship between wax impaction and low socioeconomic status. Regular otoscopy of school children is being advocated for early detection and subsequent treatment to prevent the attendant problem of hearing impairment which leads to poor school performance.**

Introduction

Ear wax is a normal product of the ear which is a mixture of secretions from two different types of glands found in the outer third of the human ear canal: sebaceous glands that produce sebum and modified apocrine glands that produce apocrine sweat. Together, these substances make up cerumen, which serves to clean, lubricate, and, to some extent, protect the ear canal from bacteria and fungi due to the bactericidal or bacteriostatic action of lysosymes, glycoproteins, immunoglobulins, lipids and trace elements contained in it[1]. Once secreted, evaporation occurs allowing the now sticky substance to entrap dust, bacteria, fungi and epithelial squames before being expelled by 'migration', a process which is aided by jaw movement. There are two types, the wet and dry, which are inherited. A gene known as ATP-binding casette CII is important in controlling the type of ear wax produced. Without the contribution of this gene, one has dry (rice-bran) ear wax[2]. Dry wax is common in Asia, while wet wax is common in Western Europe. Dry wax, also known as "rice-bran wax", contains by weight about 20% lipid (fat) while wet wax consists of approximately 50% fat[3]. Wet wax can be either soft or hard, the hard wax being more likely to be impacted. The composition of wax varies in different racial

groups, and there are changes in its production and constituents in certain systemic diseases[4,5,6]. Too little ear wax increases the risk of infection[7]. Excessive wax production also increases the incidence of infection and hearing loss. Some people (and some ears) are "wax producers", while others remain wax free without much maintenance.

Wax impaction (Cerumen auris) has been redefined by the American Academy of Otolaryngology–Head and Neck Surgery Foundation as accumulated cerumen that is symptomatic or prevents needed examination of the external auditory canal, tympanic membrane, or both[8]. Impacted wax has been classified as an ear disease, and it can cause pain, itching, tinnitus, hearing loss or otitis externa[9]. It can present with hearing loss and otalgia thereby mimicking other ear conditions. Prevalence of cerumen impaction varies and in the United States has been estimated as affecting 10% of children, 5% of healthy adults, up to 57% of older persons in nursing homes, and 36% of those with mental disabilities[1]. Wax impaction is also known to be common in children and the elderly in Nigerians[10,11]. The effect of age, sex, race and systemic diseases on wax impaction have been amply demonstrated. The aim of this study is to determine the prevalence of impacted cerumen auris in primary school children and to determine, if there is any association between socioeconomic status and occurrence of wax impaction among these school children.

Subjects and Methods

This cross-sectional, community based study was carried out in 15 randomly selected primary schools in Ile - Ife (10 public schools and 5 private schools). Ethical clearance was obtained from the ethical committee of the Obafemi Awolowo University Teaching Hospitals complex. Consent was also obtained from the parents/guardians of subjects. A multi-staged stratified sampling technique was used between May and October 2006 to select 630 pupils who satisfied the inclusion criteria from 15 primary schools in Ile-Ife using the Local Education Authority (LEA) list for common entrance code as the sampling frame.

Pre-tested structured questionnaire was administered on each selected pupil with clarification from parent/ guardian where necessary and were examined. Each pupil was placed in the upper, middle and lower socioeconomic class based on the occupation and education attainment of the parents / substitute (Oyedeji's classification)[12]. Analysis was done using SPSS 11.0. Results were presented using tables. p- Value of < 0.05 was accepted as being significant. The diagnosis of ear wax impaction was made if there was presence of visually occluding wax in the external auditory canal preventing view of the tympanic membrane with or without otalgia and complaint of decrease in hearing acuity/hearing impairment.

Results

The age range of the school children enrolled in the study was 6 - 12 years with a mean age of 9.28 years. The sex distribution of the school children studied was 301 (47.8%) females and 329 (52.2%) males. The male to female ratio was 1.1:1.

Table 1. Age and Sex Distribution of the Subjects.

Age of subjects (years)	Sex of subjects		Total
	Female	Male	
6	49(7.8%)	56(8.9%)	105(16.7%)
7	27(4.3%)	36(5.7%)	63(10.0%)
8	34(5.4%)	20(3.2%)	54(8.6%)
9	43(6.8%)	44(7.0%)	87(13.8%)
10	52(8.3%)	61(9.7%)	113(18.0%)
11	34(5.3%)	32(5.1%)	66(10.4%)
12	62(9.8%)	80(12.7%)	142(22.5%)
Total	301 (47.8%)	329 (52.2%)	630(100%)

Table 2. Prevalence of Wax Impaction among the School Pupils in Ile-Ife.

Ear diseases	Number of subjects affected			Total number affected (n =630)	Prevalence
	Right ear only No (%)	Left ear only No (%)	Both ears No (%)		
Wax Impaction	77 (12.2%)	64(10.2%)	153(24.3 %)	294	46.7

Mean age = 9.28 ± 2.14 S.D. Age in years = Age as at last birthday.

A total of 267 (42.4%) participants were from lower social class, 199 (31.6%) were from the middle social class and 164 (26.0%) from the upper class. A very large proportion of subjects examined (294) had wax impacted in their ears with a prevalence of 46.7%. One hundred and fifty-three (52.0%) were bilateral and 141 (48.0%) were unilateral. The right ears were more affected than the left (Table 2). Males were 162 (55.3%) and females accounted for 132 (44.7%) of the study subjects. The male to female ratio of the subjects with wax impaction was 1.2:1. This difference in sex preponderance was not statistically significant (p= 0.305). The prevalence in the upper, middle and lower socioeconomic class were 13.0%, 11.0% and 22.7% respectively and was statistically significant (p = 0.036).

Discussion

Impacted wax is a major cause of primary care consultation, and a common comorbidity in ENT patients. Wax impaction constitutes a significant proportion of health problems in many setting, but their prevalence in many Nigeria communities is unknown. In the UK, some 2.3 million people suffer cerumen problems that is serious enough to warrant

management, with approximately 4 million ears syringed annually while approximately 150,000 cerumen removal take place in the United States per week[13,14]. This community based study was carried out to find the prevalence of wax impaction in Ile – Ife, Nigeria with primary school children as the study population.

The prevalence of wax impaction in this study was 46.7% and mostly bilateral. Wax impaction was relatively common in this study. The majority of the cases seen were asymptomatic and therefore subjects did not have an indication for seeking medical care. Impacted wax in the external canal is an innocuous condition, for which a person may not even seek an opinion. Olusanya and Adhikari et al found wax impaction to be a common ear disease amongst school children in Nigeria, Nepal, and Kathmandu valley with a comparable high prevalence of 52.6%, 62% and 60.6% respectively[11,15,16]. These school children are also within the same age group with those of this study. Hatcher et al, Minja et al, Elango et al and Mann et al studies however reported lower prevalence rates of impacted wax ranging from 8.6% to 28.2% in children of higher age groups than the one in this study[17-20]. There is a wide variability in the percentage of impacted cerumen from different studies. The reason for this could be as a result of regional factors even though; there is also a difference between the prevalence of impacted ear wax in the children from the same regions[11,17,18].

There was no statistically significant sex preponderance in our study though the male to female ratio of the subjects with wax impaction was 1.2:1. The quality and quantity of cerumen is the same in both sexes. Brkić and Sethu et al also did not find a relationship between cerumen impaction and sex[21,22]. Stone in his study reported wax to be more common in males than females despite the same chemical make up and this has been attributed to the tragic or hairs in the external auditory meatus of males being larger and coarser thus impairing the natural dislodgement of Cerumen[23].

In our study, we found a relationship between wax impaction and socio – economic status with wax impaction being significantly higher in subjects from the low social class. Different factors which include age, sex, some systemic diseases, race/genetics, rural-urban dwelling, humidity and temperature have been implicated in the predisposition to wax impaction but none to our knowledge has implicated low social status. The reason for this is not readily obvious, but the effect of personal habits on prevalence of wax impaction could be a future study to determine if low socioeconomic status is a primary or a secondary cause.

The consequences of wax impaction have been classified as medical and audiological. The medical complications includes otalgia, hearing impairment, tinnitus, vertigo, otitis externa apart from preventing the needed examination of the external auditory meatus and the tympanic membrane while audiologically, it affects audiometric test results or prevent testing. Studies from the developing world have documented impacted cerumen as the commonest ear disease or aetiology of hearing impairment, with prevalence rates of 8.4% to 52.6% [9,11,18,24,25]. The impacted earwax has also been shown to cause noticeable hearing problems in school children and this is a common finding in health surveys[18, 21,26,27]. Sharma et al and Jacob et al studies reported wax as the most common cause of hearing impairment, which accounted for 50.0% and 29.8% of cases respectively[28,29]. In this study, sixty-five (22.0%) subjects out of those with wax

impaction had associated complaint of decrease in hearing acuity that affects normal conversation. Olusanya et al reported Impacted cerumen (52.6%), as the most common disorder in school children which has a significant association with hearing loss ($P<0.001$) and school performance ($P<0.01$)[11].

Conclusion

Cerumen impaction is a problem amongst Nigerian primary school children. The high prevalence of wax impaction in Nigeria with its attendant problem of hearing impairment which leads to poor school performance is a significant health problem. Otoscopy for children at school entrance and at regular interval is being proposed for the early detection. Health education to improve the low level of awareness among parents and school authorities on the consequences of wax impaction should also be embarked upon.

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References

1. Roeser RJ, Ballachanda BB. Physiology, pathophysiology, and anthropology /epidemiology of human ear canal secretions. J Am Acad Audiol. 1997; 8(6): 391-400
2. Yoshiura K, Kinoshita A, Ishida T et al. "A SNP in the ABCC11 gene is the determinant of human earwax type." Nat Genet. 2006; 38 (3): 324-30.
3. Burkhart et al. In pursuit of ceruminolytic agents: a study of ear wax composition. Am J Otol. 2000; 21:157-160.
4. Srsen S. Dark pigmentation in ear cerumen in alkaptonuria. Lancet 1978; 2: 577
5. Onnaguluchi G. Crises in post encephalitic parkinsonism. Brain 1961; 84:39
6. Brand-Auraban A, Kopito L, Shwachman H. Chemical analysis of some inorganic elements in cerumen from patients with cystic fibrosis. J Invest Dermatol 1972; 58:14-15.
7. Fairey A, Freer CB, Machin D. Ear wax and otitis media in children. Br Med J. Clin Res Ed 1985:291:387-8.
8. The American Academy of Otolaryngology–Head and Neck Surgery Foundation. Clinical practice guidelines issued for managing earwax impaction. Otolaryngol–Head Neck Surg. 2008; 139: S1-S21.
9. Bricco E. Impacted cerumen as a reason for failure in hearing conservation programs. J. Sch Health 1985; 55(6): 240-1.
10. Ologe FE, Segun-Busari S, Abdulraheem IS, Afolabi AO. Ear diseases in elderly hospital patients in Nigeria. J Gerontol A Biol Sci Med Sci 2005; 60 (3): 404-406.
11. Olusanya BO, Okolo AA, Ijaduola GT. The hearing profile of Nigerian school children. Int J Pediatr Otorhinolaryngol 2000; 55(3):173-9.
12. Oyedeji GA. Socioeconomic and cultural background of hospitalized children in Ilesha. Nig J Paediatr.1985; 12(4):111-117.
13. Guest JF, Greener MJ, Robinson AC, Smith AF. Impacted cerumen: composition, production, epidemiology and management. QJM. 2004 Aug; 97(8):477-88.

14. Grossan M. Cerumen removal- current challenges. Ear Nose Throat J. 1998; 77(7): 541-8.
15. Adhikari P. Pattern of ear diseases in rural school children: Experiences of free health camps in Nepal. Int. J. Otorhinolaryngol. 2009; 73(9): 1278-1280.
16. Adhikari P , Kharel DB, Ma J, Baral DR , Pandey T, Rijal R et al. Pattern of otological diseases in school going children of Kathmandu valley. Arq. Int. Otorrinolaringol. 2008; 12: (4): 502-505.
17. Minja BM, Machemba A. Prevalence of otitis media, hearing impairment and cerumen impaction among school children in rural and urban Dar es Salaam, Tanzania. Int J. Pediatr Otorhinolaryngol. 1996; 37(1):29-34.
18. Hatcher J, Smith A, Mackenzie I, Thompson S, Bal I, Macharia I, *et al*. A prevalence study of ear problems in school children in Kiambu district, Kenya, 1992. Int J. Pediatr Otorhinolaryngol. 1995; 33(3):197-205.
19. Mann SB, Bhardwaj A, Gudi SP, Mehra YN. Incidence of speech, hearing and ENT problems in school-going children. Hearing Aid J. 1985, 2:39-42.
20. Elango S, Purohit GN, Hashim M and Hilmi R. Hearing loss and ear disorders in Malaysian school children. Int J Pediatr Otorhinolaryngol. 1991. 22:75-80.
21. Subha ST, Raman R. Role of impacted cerumen in hearing loss. Ear, Nose Throat J 2006; 85 (10): 650, 652- 653.
22. Brkić F. Significance of ear wax impaction in school children. Acta Med Sal 2010; 39 (1): 23-25.
23. Stone M, Fulghum RS. Bacteriocidal activity of wet cerumen. Ann Otol Rhinol Laryngol 1984; 93:183-6.
24. Olusanya BO. Hearing impairment in children with impacted cerumen. Ann Trop Paediatr 2003; 23:121-8.
25. Olusanya BO, Okolo AA, Adeosun AA. Predictors of hearing loss in school entrants in a developing country. J Postgrad Med 2004; 50(3): 73-79.
26. Al Khabori M, Khandekar R. The prevalence and causes of hearing impairment in Oman: A community-based cross-sectional study. Int J Audiol 2004; 43:486-92.
27. Swart SM, Lemmer R, Parbhoo JN, Prescott CA. A survey of ear and hearing disorders amongst a representative sample of grade 1 school children in Swaziland. Int J Pediatr Otorhinolaryngol 1995; 32:23-34.
28. Jacob A, Rupa V, Job A, Joseph A. Hearing impairment and otitis media in a rural primary school in south India. Int J. pediatr. Otorhinolaryngol. 1997; 39(2): 133-138.
29. Sharma H, Bhusan V, Dayal D and Mishra SC. Preliminary study of hearing handicap in school-going children. Indian J Otolaryngol Head Neck Surg. 1992, 30:119-24.