

Significance of Ear Wax Impaction in School Children: A Case of Winneba West Circuit, Ghana

Sesi Collins Akotey¹ Edward Kodzo Adza² Adam Awini¹ Joana Beyebenwo Cobbinah²
 Kenneth Darko² Eric Worlanyo Ador² Lydia Polley Arckertson² Patience Dadzie-Bonney²
 Charles Adzoe² Belinda Asamoah² Anthony Atandigre Agomboka²

1.Department of Special Education, University of Education, Winneba, P. O. Box 25, Winneba Ghana

2.Ghana Education Service, Effutu Municipal Education office, P. O. Box 49, Winneba

The research is financed by authors

Abstract

Cerumen or earwax is a mixture of secretions that is sebum together with secretions from modified apocrine glands and sloughed epithelial cells present in the external auditory canals of humans. Earwax impaction is one of the most common reasons patients seek medical care for ear-related problems such as blockage and conductive hearing impairment. However, in Ghana there is virtually no literature on earwax impaction among school children. The aim of the study was to determine the prevalence of school children with wax impaction in Government assisted basic schools in the Winneba West circuit of the Effutu Municipal. This cross-sectional study included 4407 children between the ages of 5 to 16 years from 11 government assisted basic schools in the Winneba West circuit, of the Effutu municipal, Ghana. The instruments used were otoscopy and interview of randomly selected children on the use of cotton-tipped ear swabs for cleaning their ears. Out of the 4407 children, earwax impaction was found in 988 (22.4%). There was a marginal difference in the prevalence of earwax impaction in females compared to males; that is, of the 988 with earwax impaction 522 (53%) were females and 466 (47%) were males. However, the use of cotton-tipped swab could not be directly associated with earwax impaction. Earwax impaction and its attendant challenges is a problem amongst Ghanaian basic school children. The high prevalence of earwax impaction among basic school children in Winneba (Ghana) can lead to conductive hearing impairment which can affect the academic performance of the children negatively. Regular hearing screening involving processes such as otoscopy at the entry point and at regular intervals is being recommended for early identification and remediation.

Keywords: Ear wax (cerumen) impaction, Cotton-tipped swab

Background

Earwax (cerumen) is composed of secretions, sloughed epithelial cells and hair from the external auditory canal that protects the skin in the canal and is naturally extruded (Brkic 2010; Gelfand 2009; Oron et al. 2011). According to Brkic (2010) there are four types of earwax (cerumen): European, Vietnamese, dried Inuit and dried epithelium. However, Hydri and Siddiqui (2016) report of two types of earwax: wet and dry. They (Hydri & Siddiqui 2016) explained that both the wet and dry earwax is determined by a single nucleotide polymorphism (SNP)/538G>A (Gly180Arg) in the ABCC gene (ABCC11). Dry wax is prevalent in East Asians, whereas wet earwax is common in other population worldwide (Hydri et. al. 2016).

Cerumen in normal amounts is usually asymptomatic, serves as a self-cleaning agent with protective, lubricating and antibacterial properties but, when it becomes impacted it can cause complications such as hearing loss, pain, itching or dizziness, which can interfere with the examination of the tympanic membrane (Gelfand 2009; Hydri et. al. 2016; McCarter, Courtney & Pollart 2007; Saana et al. 2014; Weinstein 2009). However, the unique anatomy and physiology of the external auditory canal allows an efficient self-cleaning system to rid the canal of earwax. While some people have a completely clean ear without ever having them cleaned, others have excessive production of earwax. Brkic (2010) posit that two populations are known to have a high incidence of impacted earwax: individuals with mental retardation and the elderly. Similarly, McCarter et al. (2007), Williams (2008), and Peter et al. (2008) observed that earwax impaction is present in approximately 10% of children, 5% of normal healthy adults, up to 57% of older patients in nursing homes, and 36% of patients with mental retardation.

The COSLPO - Preferred Practice Guideline for Cerumen Management Report (2005), Oron et. al. (2010) indicates that cerumen impaction is the most common ear problem encountered by general practitioners, and the primary cause of conductive hearing loss. Cerumen impaction may affect hearing and decrease hearing acuity by 40-45 dB (Oron et. al. 2010). Such hearing impairment among school children as well as adults is very significant and can have a toll on their academic output, communication, social development and even physical mobility (Oron et. al. 2010).

The Effutu Municipal is located in the Central Region of Ghana about 56 km west of Accra and 140 km east of Cape Coast. Winneba is its capital town of the Municipal. It has a population of over 60,000. The Educational Directorate of Government Assisted Public Basic schools are manned by a Director under three

circuits: the central, west and east circuits. This study focuses on basic schools in the West circuit. Indeed, the prevalence of earwax impaction has been researched widely and the effect of age, sex, race and systemic diseases on wax impaction have been amply demonstrated. However, in Ghana literature on earwax impaction is virtually non-existent. The aim of this study is therefore to determine the prevalence of impacted earwax (cerumen) in Basic school children in the Winneba West circuit of the Effutu Municipality, Ghana.

Methods

The study was a cross-sectional study in which otoscopy was conducted on all participants and a structured interview conducted on some children who were randomly selected on the usage of cotton-tipped ear swabs to clear / aural toilet their ear. A total of 4407 children (8814 ears) from 11 public schools in the Winneba West circuit were examined between May and June 2015 to determine the prevalence of earwax impaction via otoscopy and 550 interviewed. The sample comprised pupils from basic one to basic six as well as some Kindergarten pupils in schools where kindergarten were available.

The otoscopic examination was performed on all subjects by a team made up of a certified audiologist, a primary earcare expert, and three trained special education resource person with background in hearing impairment and otoscopic examination. The trained resource persons had taken courses on screening modalities and how to conduct otoscopy. Prior to the screening exercise, there were mock-ups or practical sessions for the trained resource persons to perfect their skills in otoscopy. During the mock-up sessions, the trained resource persons were allowed to conduct some otoscopic examinations on some pupils, note down their findings and the audiologist will cross examine the cases for confirmation. Only total obstruction of the outer ear canal by earwax, visible via otoscopy, was considered as earwax impaction. Total occlusion or obstruction in this case is defined as a complete blockage of the ear canal by impacted earwax such that the eardrum is not visible. The interview centered on the use of cotton-tipped swabs, and other foreign objects to clean or toilet the outer ear as well as the frequency of use of the cotton tipped swab. This was conducted by another team of six special education resource teachers.

Clearance for the conduction of the screening exercise and study was secured from the Special Education Unit of the Ghana Education Service, Winneba as well as the Educational directorate, Winneba.

Results

A total of 4407 children were screened in 11 government assisted Basic Schools in the Winneba West educational circuit. Table 1 presents details of the screening results with specifics to each screened. Out of the 4407 children screened, 2147 (49%) were males and 2260 (51%) were females.

Table 1: Details of the screening results

Schools	Total screened	Details		Wax cases	
		Male	Female	Male	Female
School A	634	345	289	55	53
School B	337	141	196	51	58
School C	214	98	116	37	35
School D	300	128	172	24	38
School E	285	132	153	39	49
School F	587	279	308	56	55
School G	172	90	82	24	20
School H	832	408	424	85	94
School I	212	88	124	27	39
School J	154	76	78	23	27
School K	680	362	318	45	54
Total	4,407	2,147	2,260	466	522

Source: Field data, 2015

Prevalence rate of earwax impaction

A total of 988 children out of 4407 children who were examined had impacted earwax. The prevalence is 22.4%. Of the 988 children who were diagnosed of having impacted earwax, 640 children had impacted earwax in both ears, 205 children had impacted earwax in the right ear only, and 143 children had impacted earwax in the left ear only (Figure 1).

Prevalence of earwax

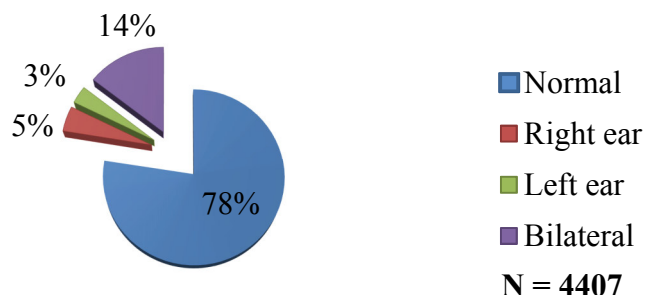


Figure 1: Prevalence of earwax

Additionally, of the 988 children who were diagnosed of having impacted earwax, 522 were females and 466 were males – representing 53% and 47% respectively of the population of children who had impacted earwax (Table 2).

Table 2: Gender distribution of children with earwax impaction

Male	Female	Total
466 (47%)	522 (53%)	988 (100%)

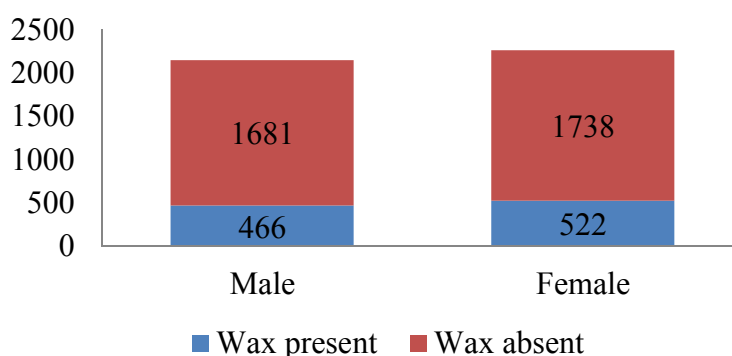


Figure 2: Gender effect on earwax impaction

The effect of gender on the presence of impacted earwax is shown in figure 2. There is just a marginal difference between the earwax impaction of females compared to males.

Table 3 below presents the details of the age groupings of the children screened and prevalence of earwax impaction amongst the various age groupings. Of the total population screened, 1389 (32%) were within the ages of 4 – years, 2307 (52%) were with 8 -11 years and 711 (16%) were within 12 years and beyond. Comparatively, from the 988 earwax cases recorded, 404 (41%) cases were children between 4 – 7 years, 458 (46%) cases were children between 8 – 11 years and 126 (13%) were children aged 12 years and beyond. Figure 3 below shows the graphical representation of this distribution.

Table 3: Age distribution of children with earwax impaction

Age of children (Years)	Number of children	Wax cases
4 – 7	1389	404
8 – 11	2307	458
12+	711	126

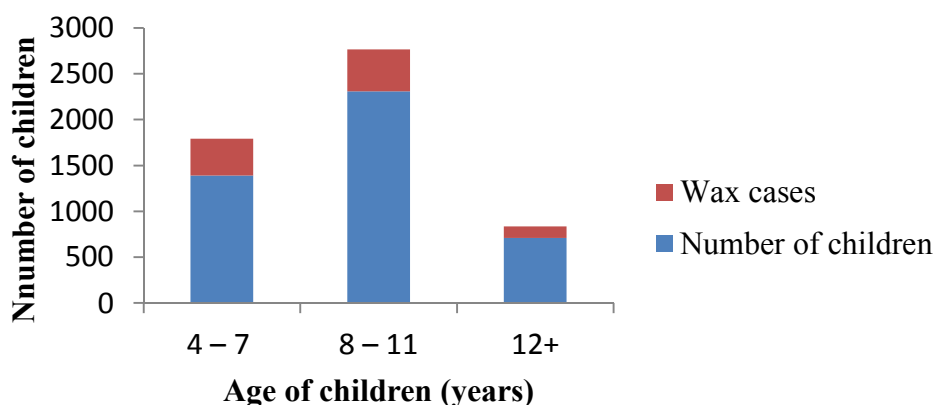


Figure 3: Age distribution of children with earwax impaction

Effect of usage of cotton-tipped swabs and the presence of impacted earwax

Table 4: Effect of usage of cotton-tipped swabs on the presence of impacted earwax

Usage of cotton-tipped swabs	Impacted earwax		Total
	Absent	Present	
Yes	256	52	308
No	80	162	242
Total	336	214	550

Of the 550 interviewed, 308 (56%) admitted using cotton-tipped swabs to clean their ear regularly and 242 (44%) responded otherwise. Out of the 308 who admitted usage of cotton-tipped swab, only 52 (16.9%) had earwax impaction and 256 (83.1%) had clear canals (no earwax impaction). However, of the 242 who declined usage of cotton-tipped earwax, 162 (66.9%) had earwax impaction and 80 (33.1%) had clear ear canals. This showed a high rate of earwax impaction among children who did not even used cotton-tipped swabs compared to those who used it routinely to clean their ears.

Discussion

Studies into cerumen or earwax has been investigated for different reasons ranging from the effect of earwax impaction on hearing, antimicrobial function of earwax, genetic dimorphism of earwax (Brkic 2010, Hydri et al. 2016, Roeser, Lai, & Clark 2005, Subha et al. 2006). It has been argued that earwax impaction affects up to 6% of the general population and the primary cause of consultation complaints of ENT patients. Records have it that in the United States alone, approximately 150,000 earwax removal is done in a week.

Earwax impaction is a common feature among adults as well as children. Ulaganathan et al. (2015) however, noted that impacted earwax is an innocuous condition, for which a person may not even seek an opinion. According to Brkic (2010), Ulaganathan et al. (2015) there are different data about the prevalence of earwax impaction in children ranging from 12.3%, 15.7% to 23%. Brkic (2010) also stated that, the prevalence of earwax and its relation to age, children in the first year of school have earwax impaction from 11.9% to 74/1000 and appears in 14% of children in their second of schooling.

Impacted earwax accounts for failure of different hearing conversation programmes or ear screening programmes. About 45% of Indian preschool children failed on outer ear tests (Brkic, 2010), and among rural school children in Tanzania, the rate of earwax impaction is 20.45% against 14.8% among urban school children (Minja & Machemba 1996). In a related study in Swaziland et al. (1995) found that earwax impaction was prevalent in 35.86% of rural dwellers and 30.7% of urban respectively. In Nigeria, earwax impaction was found to be the most common ear disorder among school children (Hatcher et al. 1995). Again, Eziyi et al. (2011), Ulaganathan et al. (2015) posit that in Nigeria the prevalence of impacted earwax in school children was 46.7% and was mostly bilateral. Interestingly, studies have found a relationship between earwax impaction and social-economic status, with impaction being significantly higher in the lower social class (Eziyi et al. 2011, Ulaganathan et al. 2015).

This great variability in the percentages of impacted earwax among different reports can be explained by regional factors but on the other hand, there is a difference between the prevalence of impacted earwax in children from same regions in Africa (Brkic, 2010). Brkic (2010) further contrast that, there are some consistencies, which is in agreement with our findings, that wax is more frequently seen bilaterally with a gradual decline in the prevalence with age.

In the present study, the prevalence of impacted earwax among children is 22.4% and it is mostly

bilaterally. We found a strong relationship between the presence of earwax impaction and age and gender. We report of a slightly higher prevalent rate of earwax impaction among female population than their male counterparts i.e. 53 % and 47% respectively. These findings are similar to values provided by Brkic (2010) that the prevalence of earwax impaction in children ranging from 12.3%, 15.7% to 23%. Age wise, the present study found that earwax impaction was relative higher among children aged 8 – 11 years (46%) compared to children aged 4 – 7 years (41%) and children aged 12 years and above (13%). These findings are consistent with studies conducted by Brkic (2010), Ulaganathan et al. (2015). However, unlike most literature search that focused on the general population without attempting to estimate the prevalent rate among males and females, we argue that the prevalence of earwax impaction is significantly higher in females than in male children in the Winneba West Circuit of Ghana. The reason for this variation is not clear but could be attributed to the genetic, anatomical changes and physiology differences (Poulton et al. 2015, Ulaganathan e. al. 2015, Guest 2004) observed that in children earwax impaction is common as the external auditory canal is narrow and the inadvertent use of ‘Q-tip’ or cotton buds since this will push the wax further inside and interrupt the normal self-cleansing process of the ear.

On the whole, the prevalence of children with earwax impaction in the entire population is 22.4%. This figure is similar to Minja et al. (1996) that in Tanzania the prevalence of earwax impaction among rural population is 20.45%. The figure varies slightly though from one African country to the other; from urban dwellers to rural dwellers and from one community to the other.

Conclusion

Earwax impaction and its attendant challenges is a problem amongst Ghanaian basic school children. The high prevalence of earwax impaction among basic school children in Winneba (Ghana) can lead to conductive hearing impairment which can affect the academic performance of the children negatively. Regular hearing screening involving processes such as otoscopy and pure-tone hearing screening at the entry and at regular intervals is being recommended for early identification and remediation. The main strength of this study is that, to the best of our knowledge, this is the first study in Ghana on the prevalence of earwax impaction among school children.

References

- Brkic, F 2010, ‘Significance of earwax impaction in school children’, *Acta Medical Saliniana*, 39 (1). College of Audiologists and Speech-Language Pathologists of Ontario (COSLPO), 2005. *Preferred Practice Guideline for Cerumen Management*. Available from: http://www.caslp.com/sites/default/uploads/files/PPG_EN_Cerumen_Management.pdf [12 October 2014].
- Eziyi, JAE, Amusa, YB, Nwawolo, CC & Ezeanolue, BC, 2011, Wax impaction in Nigerian school children, *East and Central African Journal of surgery*, 2011; 6(2): 40-45.
- Gelfand, SA 2009, *Essentials of audiology (3rd ed)*, New York: Thieme Medical Publishers, Inc.
- Guest, JF, Greener, MJ, Robinson, AC & Smith, AF 2004, Impacted cerumen: composition, production, epidemiology and management. *Q J Med*, 97:477 – 488.
- Hatcher, J, Smith, A, Mackenzie, I, Thompson, S, Bal, I, Macharia, I, et al. 1995, A prevalence study of ear problems in school children in Kiambu district, Kenya, 1992. *Int J. Pediatr Otorhinolaryngol*. 33(3):197-205.
- Hydri, AS & Siddiqui, F 2016, Hearing loss due to different types of impacted cerumen, *Ann Otolaryngol Rhinol* 3(2): 1087.
- McCarter, DF, Courtney, AU & Pollart, SM 2007, Cerumen impaction. Virginia: *American Academy of Family Physician*, Available from: www.aafp.org/afp. [4 September 16].
- Minja, BM & Macheмба, A 1996, Prevalence of otitis media, hearing impairment and cerumen impaction among school children in rural and urban Dar es Salaam, Tanzania, *Int J. Pediatr Otorhinolaryngol*. 37(1):29-34.
- Oron, Y, Zwecker-Lazar, I, Levy, D, Kreitler, S & Roth, Y 2011, Cerumen removal: Comparison of cerumenolytic agents and effect on cognition among the elderly. *Archives of Gerontology and Geriatrics*, 52(2)228-32.
- Peter, S, Roland, PS, Smith, TL, Schwartz, SR, Rosenfeld, RM, Ballachanda, B, Earll, JM, Fayad, J, Harlor Jr, AD, Hirsch, BE, Jones, SS, Krouse, HJ, Magit, A, Nelson, C, Stutz, DR & Wetmore, S 2008, Clinical practice guideline: Cerumen impaction. *Otolaryngology–Head and Neck Surgery*, 139, S1-S21
- Poulton, S, Yau, S, Anderson, D, Bennett, D 2015, Ear wax management. *Aust fam physician*, 44 (10); 731-4.
- Roeser, RJ, Lai, L & Clark, JL 2005, Effect of ear canal occlusion on pure-tone threshold sensitivity, *J Am Acad Audiol* 16:740-746
- Saana, E, Eila, S, Kaisla, J, Matti, H & Jaana, S 2014, Cerumen impaction in patients with schizophrenia, *Clinical Schizophrenia & Related Psychoses*, 8(2),110-2

- Subha, ST & Raman, R 2006, Role of impacted cerumen in hearing loss. *Ear Nose Throat J* 85(10):650, 652-653.
- Swart, SM, Lemmer, R, Parbhoo, JN & Prescott, CA 1995. A survey of ear and hearing disorders amongst a representative sample of Grad 1 school children in Swaziland, *Int J Pediatr Otorhinolaryngol*; 32:23-34.
- Ulaganathan, M & Shalini, R 2015, A descriptive study of prevalence of impacted wax and its predisposing factors in children, *International J. of Healthcare and biomedical research*, Vol 04; Issue 01: 136-143.
- Weinstein, B 2009, Hearing loss in the elderly: A new look at an old problem. In Kutz, J., Medwetsky, L., Burkard, R., and Hood, L., eds. *Handbook of clinical audiology* (6th ed). Baltimore: Lippincott Williams and Wilkins.
- Williams, R, 2008, *Earwax: friend or foe?* Available from: <http://www.tkontheweb.com>, [5 September 2016].