

PREVALENCE OF WAX STOPPER IN CHILDREN IN RIO GRANDE DO NORTE

PREVALÊNCIA DE ROLHA DE CERA EM CRIANÇAS NO RIO GRANDE DO NORTE

Henrique de Paula Bedaque¹; Marconi Júlio Ferreira Clemente²; Gabriel Maia Moraes²; Luiz Eduardo Queiroz Cavalcante²; Lidiane Maria de Brito Macedo Ferreira³

1. Médico, Otorrinolaringologista. Universidade Federal do Rio Grande do Norte (UFRN). Natal-RN. Brasil.
2. Estudante de Graduação em medicina, Universidade Federal do Rio Grande do Norte (UFRN). Natal-RN. Brasil.
3. Médica otorrinolaringologista, programa de pós-graduação em Ciências da Saúde da Universidade Federal do Rio Grande do Norte. Natal-RN. Brasil.

Study performed at Otorhinolaryngology and Head and Neck Service at Onofre Lopes University Hospital, Brazil.

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Corresponding author: Otorhinolaryngology and Head and Neck Service at Onofre Lopes University Hospital - Av. Nilo Peçanha, 620 – Petrópolis, Natal – RN CEP: 59012-300.

E-mail: orlhuol@gmail.com.

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ABSTRACT

Introduction: Cerumen, popularly known as earwax, is a substance produced by the sebaceous and ceruminous glands of the outer two thirds of the ear canal. The presence of cerumen is usually asymptomatic, but in symptomatic patients there is an indication of appropriate therapy. **Objectives:** To evaluate the prevalence and associated symptoms of ear cerumen in children from a tertiary hospital.

Methodology: This is an analytical, transversal and observational research, within a quantitative approach. An epidemiological study in which it is expected to obtain, by sampling, the prevalence of the entire pediatric population in the state of Rio Grande do Norte. This research was carried out with an age group, over 5 years old to under 18 years old. Results: A total of 385 children participated in the research, being 51.2% male (n=197) and 48.8% female (n=188), age ranged from 6 to 17 years, with an average 10.05. Among the total number of participants, the presence of wax was verified in 326 (84.7%), with cerumen impaction in 45 children (11.7%). Furthermore, of the total cases of total obstruction, 46.6% were bilateral. **Conclusion:** Cerumen impaction is a common problem observed in Brazilian children. It is evident the importance of increasing accessibility to the health service that is capable of performing otoscopy, in addition to ear lavage, in order to reduce the prevalence and impact of cerumen impaction in children in Brazil.

Keywords: cerumen; child; Cross-Sectional Studies; Otolaryngology.

RESUMO

Introdução: O cerume, conhecido popularmente como cera de ouvido, constitui uma substância produzida pelas glândulas sebáceas e ceruminosas dos dois terços externos do canal auditivo. A presença do cerume é geralmente assintomática, mas nos sintomáticos existe a indicação de terapêutica adequada. **Objetivos:** Avaliar a prevalência e sintomas associados de cerume otológico em crianças de um hospital terciário. **Metodologia:** Trata-se de uma pesquisa analítica, transversal e observacional, dentro de uma abordagem quantitativa. Um estudo de cunho epidemiológico no qual se espera obter, por amostragem, a prevalência de toda a população pediátrica do estado do Rio Grande do Norte. Esta pesquisa transcorreu com um grupo etário, maior de 5 anos até menores de 18 anos. **Resultados:** Um total de 385 crianças participaram da pesquisa, sendo 51,2% do sexo masculino (n=197) e 48,8% do sexo feminino (n=188), a idade variou de 6 a 17 anos, tendo como média 10,05. Entre o número total de participantes, a presença de cera foi verificada em 326 (84,7%), com cera impactada em 45 crianças (11,7%). Ademais, do total de casos de obstrução total 46,6% foram bilaterais. **Conclusão:** Rolha de cera é um problema comum observado em crianças brasileiras. É evidente a importância do aumento da acessibilidade ao serviço de saúde que seja capaz de fazer a otoscopia, além da lavagem otológica a fim de diminuir a prevalência e o impacto da rolha de cera nas crianças do Brasil.

Palavras-chaves: Cerume; criança; otorrinolaringologia; estudo transversal.

INTRODUCTION

Cerumen is a substance produced by the sebaceous and ceruminous glands of the outer two thirds of the auditory canal. It is a substance rich in saturated and unsaturated fatty acids, long-chain hydrocarbons, cholesterol, alcohol, squalene, ceramides and triglycerides, in addition to being formed by exfoliated epithelial cells¹.

Although the presence of wax is seen by the population as synonymous with poor hygiene, due to its lipophilic character, it represents an important form of protection and natural lubrication of the auditory canal¹. It is also worth mentioning its action as an antibacterial agent, made possible through the maintenance of an acidic environment as well as an effective barrier against foreign substances such as water, insects and dust.

Physiologically, cerumen is expelled by a self-cleaning mechanism aided by the mandible, in which it is directed towards the auditory pavilion, taking with it adhered dirt particles and hairs. However, in situations where this mechanism fails, the accumulation of wax occurs and may even cause a total obstruction of the auditory canal, which can impact the patient's life, leading him to seek medical attention due to

the development of symptoms, such as such as: otalgia, hearing loss, tinnitus, fullness, pruritus, acute or chronic cough, odor and secretion².

The presence of cerumen is usually asymptomatic, but in symptomatic cases there is an indication of adequate therapy. Furthermore, the need to perform an otological examination for diagnosis would be another indication for wax removal procedure, which may be done by washing, aspiration or curettage³.

In this context, the routine physical examination, carried out by the clinician, should include inspection of the auditory canal through otoscopy, which enables the diagnosis and quantification of the wax extension, in addition to other findings (otitis and tympanic membrane perforation). However, when treatment is not effective or the problem is associated with ear diseases, the patient should be referred to an otorhinolaryngologist².

It is estimated that earwax plug affects approximately 10% of the child population.⁴ Thus, the search for medical care due to symptoms associated with earwax is one of the most common causes of discomfort related to the ear in offices, emergency units, totaling an approximate value of 12 million people in the United States seeking care annually in health services, and in almost 8 million earwax removal procedures².

It is noteworthy that between 2% and 6% of the UK population suffers from earwax impaction, which makes its removal the most common ear, nose and throat procedure performed in the UK's primary care setting⁵.

In addition, people with communication difficulties, from intellectual deficits to children with speech delay, should be constantly examined in order to check for the presence of excess cerumen. Thus, the wax stopper impairs the language, intellectual and social development of children, and complaints that may lead to thinking about impacted cerumen go unnoticed by parents or teachers⁶.

In view of the diagnosis and knowledge of the symptoms, it is essential to assess the prevalence of such a finding in people under 18 years of age, in order to optimize care and treatment for this public.

However, although there are numerous descriptive articles in the literature on the pathophysiology and clinic of wax impaction, few address the epidemiology of this pathology with a significant sample of children, especially in the Brazilian scientific spectrum, whose studies are scarce. Therefore, the lack of articles and publications on the subject further emphasizes the importance of this activity.

Thus, the study and development of research on earwax in children and its biological impacts is extremely valid, either because of the social understanding of this substance, which is closely associated with poor hygiene, or because of its physiological importance and its impacts when in disorder.

METHODS

This is an analytical, cross-sectional and observational research, within a quantitative approach. An epidemiological study in which it is expected to obtain, by sampling, the prevalence of impacted cerume wax in the pediatric population of the state of Rio Grande do Norte (RN).

To calculate the sample size, the population of residents of the RN aged less than 18 years (1,012,570 inhabitants by IBGE 2020) was used, with a sampling error of 5% and a confidence interval of 95% being chosen, resulting in a sample of 385 volunteers. The inclusion criteria for the selection of participants were: being users or patients linked to the University Hospital Onofre Lopes, either on an outpatient basis or hospitalized; being in the age group equal to or greater than 05 years old and less than 18 years old. Being the exclusion criteria: patients with auditory canal agenesis; surgical closure of the external auditory canal; presence of acute otitis (external or middle); chronic otitis media.

The Research Project was approved by the Research Ethics Committee (CEP) of HUOL with number CAAE 39732920.3.0000.5292.

Data were collected by medical students from the Federal University of Rio Grande do Norte (UFRN) in the 4th period, who were previously calibrated up to a Kappa >0.8 (agreement), in relation to the ENT resident, in order to carry out otoscopy-specific physical examination. Upon examination, four situations were identified: absence of earwax in the auditory canal; the presence of wax in the conduit with obstruction of less than 80% and the presence of "impacted wax", when the obstruction of the conduit exceeds 80%.⁷ It is important to inform that in patients with clinical indications for wax removal, treatment was available appropriate at the HUOL otorhinolaryngology outpatient clinic.

After data collection, the information was transferred to an EXCEL table for organization and primary analysis. Subsequently, they were imported into the IBM SPSS 20.0 program, where the relevant statistical analyzes were carried out, such as the Kappa of the evaluators even before the survey and the calculations of the prevalence of cerumen in the sample, the analyzes of association with Chi-square and prevalence ratio.

Initially, a descriptive analysis was performed with data on mean and median age, proportion of each sex and prevalence of cerumen and total obstruction of the conduit (wax plug). As a follow-up, the statistical relationship analysis was started using the chi-square test between all clinical categorical variables and the physical examination in search of association.

Furthermore, the findings found in our research were compared with those found in similar studies, always using a two-tailed p value of less than 0.05 as an

indication of statistical significance. Finally, we use tables and graphs to provide the greatest transmission of knowledge with better visual impact and greater ease of interpretation.

RESULTS

A total of 385 children participated in the survey, 51.2% male (n=197) and 48.8% female (n=188), age ranged from 6 to 17 years, with a median of 10 years and mean 10.05. Among the total number of participants, the presence of wax was verified in 326 (84.7%), with impacted wax in 45 children (11.7%) (as shown in figure 1), thus we have a prevalence of impacted wax in the childhood of 11.7 cases for every 100 individuals younger than 18 years. Furthermore, of the cases of total obstruction, 46.6% were bilateral (as shown in Table 1).

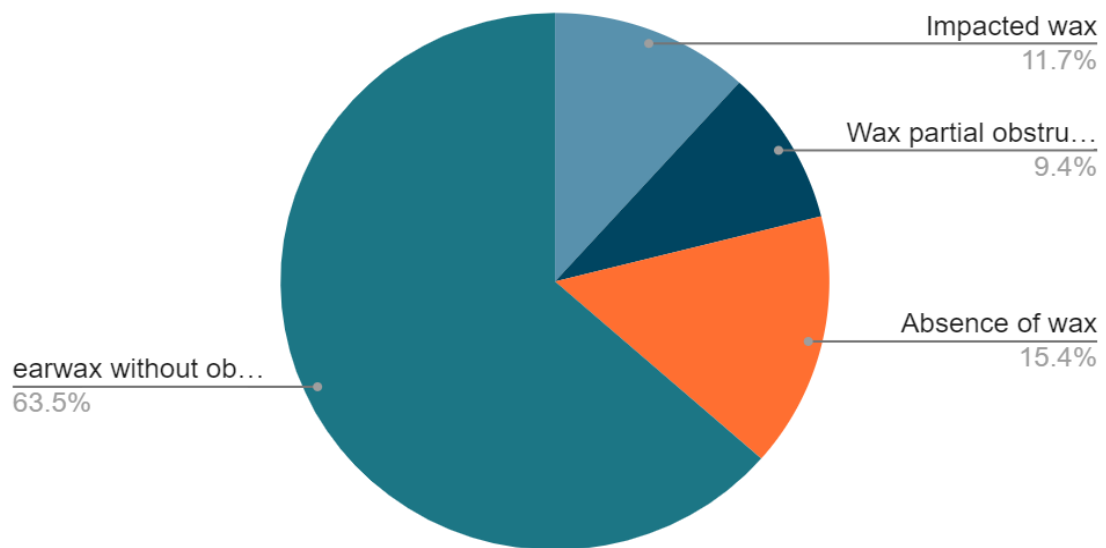


Figure 1 – Otoscopy of children regarding the presence of obstruction. Natal-RN, 2022.

Table 1 – Frequency and description of cerumen obstruction at otoscopy in children. Natal-RN, 2022.

Physical exam	Frequency	Percentage
Presence of wax*	326	84.7%
Presence of wax on the right	302	78.4%
Presence of wax on the left	298	77.4%
Wax plugging**	45	11.7%
Wax plugging on the right	37	9.6%
Wax plugging on the left	30	7.8%
Wax partial obstruction on the right***	25	6.5%
Wax partial obstruction on the left	22	5.7%

*Presence of any wax residue. **Obstruction greater than 80%. ***Obstruction less than 80%
Source: The authors.

The prevalence of wax plugs in females and males under 18 years of age were, in due order, 13.3% and 10.2% (as shown in table 2), with the gender variable not demonstrating an association with the wax stopper variable in the research ($p=0.337$).

Table 2 – Association between gender and cerumen obstruction. Natal-RN, 2022.

Physical exam	Frequency	Percentage
Wax plugging*	20 (10.8%)	25 (13.3%)
Wax plugging on the right	19 (9.6%)	18 (9.6%)
Wax plugging on the left	11 (5.6%)	19 (10.1%)

* Obstruction greater than 80%. Source: The authors.

There was no association between the presence of a wax stopper and the use of flexible cotton swabs ($p=0.439$). With 75.3% of the children claiming to use flexible cotton swabs, and of those who had wax stoppers, 80% reported using them.

In addition, among the 45 patients who had a wax plug, 6 reported frequent dives (13.3%), with a correlation between dives and the presence or absence of a wax plug, with a prevalence ratio of 0.366 (95% CI 0.159 -0.840, $p=0.011$).

As described in Table 3, 16.6% of the children with a wax plug in their left ear reported feeling something in their left ear ($p=0.565$), while 10.8% of those who had a wax plug in their right ear reported feeling something in it. ($p=0.823$). There being no association between the complaint and the wax stopper.

Table 3 – Description of the clinical findings questioned during the interview.

Physical exam	Frequency	Percentage
Hypoacusis on the left	59 (15.3%)	326 (84.7%)
Hypoacusis on the right	57 (14.8%)	328 (85.2%)
Dizziness	76 (19.7%)	309 (85.2%)
Full ear feeling left	60 (15.6%)	325 (84.4%)
Full ear feeling right	60 (15.6%)	325 (84.4%)
Left otalgia	50 (13%)	335 (87%)
Right otalgia	44 (11.4%)	341 (88.6%)
Tinnitus to the left	81 (21%)	304 (79%)
Tinnitus to the right	76 (19.7%)	309 (80.3%)
Itching in the left ear	138 (35.8%)	247 (64.2%)
Itching in the right ear	152 (39.5%)	233 (60.5%)
Sensation of something in left ear	49 (12.7%)	336 (87.3%)
Sensation of something in right ear	46 (11.9%)	339 (88.1%)
Use of cotton swab	290 (75.3%)	95 (24.7%)
Repeat OMA*	71 (18.4%)	314 (81.6%)
Conducting frequent dives	114 (29.6%)	271 (70.4%)
Headphone use	155 (40.3%)	230 (59.7%)
Previous otological lavage	49 (12.7%)	336 (87.3%)

*Acute Otitis Media. Source: The authors.

DISCUSSION

Total earwax obstruction is a common cause of complaint in primary care, a condition that affects 2 to 6% of the general population.⁵ It is an important public health problem since impacted earwax can lead to child presenting ear fullness, hearing loss, otalgia, pruritus, tinnitus and external otitis⁸.

In our study, the prevalence of wax plug was 11.7% in an age group of 6-17 years. This data was below that of other studies carried out in Brazil in schoolchildren that had a prevalence of 26.7% and 18.6%.⁹⁻¹⁰ American children had a 10% prevalence of wax plug, while in developing countries there are levels of up to 60%, on average 50%, as in African countries⁷.

The lower prevalence in this study compared to other studies carried out in Brazil and in other developing countries can be linked to the fact that the research was carried

out in a tertiary care pediatrics department, in which children have access to specialist physicians from different areas. or who usually have gone through primary care. Therefore, although earwax is not a pediatric emergency, when there is greater medical assistance, it is common to obtain solutions for low-complexity diseases.

The annual healthcare cost in the United States with wax plugs in 2012 was estimated at US\$ 46.9 million². Therefore, Brazil, with a view to treating wax plugs and the costs to the SUS, should invest more in training teams Family Strategy for its diagnosis and treatment. As shown by a study on accessibility to health services carried out in Pernambuco, out of 683 Basic Health Units (UBS), only 18.4% (n=126) performed ear washing¹¹, taking patients in search of ear washing, facing long queues for an appointment with an otorhinolaryngologist or moving to emergency care services.

Furthermore, there was no relationship between sex and impacted cerumen (p=0.337), which corroborates another study previously carried out in day care centers located in Wuhan, China⁷.

Furthermore, using flexible cotton swabs was not related to the presence of wax plug (p=0.439). This result hypothesizes that, contrary to what most professionals assume, there is no statistical association between users of these rods and the wax stopper, not being able to associate cause and effect between the two variables. This research also obtained a similar result with one carried out in Ohio¹² and another carried out in Glasgow¹³.

Another article analyzed the association between the wax stopper and the use of flexible cotton swabs in children. Performed with 111 children, it identified 41 children with cerumen impaction, and of these, 37 mothers claimed to use flexible cotton swabs, with an association between the variables, but without being able to verify whether the use of flexible swabs would generate a higher prevalence¹⁴.

Furthermore, the data from frequent dives showed that there was an association with the wax stopper, demonstrating a lower frequency in those who dive (p=0.011). Thus, the entry of water into the ear canal, due to diving, can work in a similar way to an ear wash, generating an increase in pressure behind the wax caused by the water and humidification of the wax, making it liquid.⁶ This effect occurring frequently, it contributes to the decrease in the formation of wax plugs in children who dive.

The clinical data questionnaire showed that there was no association between the child noticing hypoacusis or noticing that there was something inside the ear with a wax plug. Therefore, this point reinforces the importance of otoscopy as a diagnostic method and that this should not be an attribute of the otorhinolaryngologist alone. Despite this, a study carried out in two municipalities in the state of Bahia, out of 56 UBS, only 51.7% (n=29) had an otoscope available¹⁵.

In children, cerumen causes a reduction in auditory acuity, which impairs language, intellectual and social development¹⁶. Often, however, this hypoacusis ends up going unnoticed by parents and/or teachers¹⁷.

The fact that the clinical data of our research, such as pain, hypoacusis and ear fullness, do not demonstrate a relationship with the presence or absence of wax plug, corroborates that this common disease is often asymptomatic and that it can harm the development of students and make it difficult to your diagnosis. However, especially with regard to hearing, the absence of hypoacusis does not mean that the child with a cork could not have some degree of hearing loss, with social repercussions¹⁷.

Among the limitations of the study, it is important to highlight that, as this is a cross-sectional study, it is not possible to determine the risk factors for the formation of impacted cerumen, requiring further studies with methodologies aimed at this objective. In addition, it is worth noting the possibility of collection bias, with regard to the presence of clinical data, due to the difficulty in obtaining data from the questionnaire, since children sometimes did not know how to respond, with the intervention responsible for the response. As well as the existence of a selection bias, since the data are only from children in a tertiary hospital.

CONCLUSION

Wax plugging is a common problem observed in Brazilian children, with a prevalence of 11.7% in our study. It is evident the importance of increasing accessibility to the health service that is capable of performing otoscopy, in addition to ear washing, in order to reduce the prevalence and impact of wax stopper in children in Brazil.

REFERENCES

1. SHOKRY, Engy; ANTONIOSI FILHO, Nelson Roberto. Insights into cerumen and application in diagnostics: past, present and future prospective. *Biochemia Medica*, v. 27, n. 3, p. 477-491, 2017. Disponível em: <https://hrcak.srce.hr/file/276524>
2. SCHWARTZ, Seth R. et al. Clinical practice guideline (update): earwax (cerumen impaction). *Otolaryngology–Head and Neck Surgery*, v. 156, n. 1_suppl, p. S1-S29, 2017. Disponível em: <https://journals.sagepub.com/doi/full/10.1177/0194599816671491>
3. DEMIR, Emine et al. Otologic Findings Based on no Complaints in a Pediatric Examination. *International Archives of Otorhinolaryngology*, v. 23, p. 36-40, 2019. Disponível em: <https://www.scielo.br/j/iao/a/xZDTXTYzv3JHNssYkgMnMzh/abstract/?lang=en>
4. MCCARTER, Daniel F.; COURTNEY, A. Ursulla; POLLART, Susan M. Cerumen impaction. *American family physician*, v. 75, n. 10, p. 1523-1528, 2007. Disponível em: <https://www.aafp.org/afp/2007/0515/p1523.html>

5. GUEST, J. F. et al. Impacted cerumen: composition, production, epidemiology and management. *Qjm*, v. 97, n. 8, p. 477-488, 2004.
6. MICHAUDET, Charlie; MALATY, John. Cerumen impaction: diagnosis and management. *American Family Physician*, v. 98, n. 8, p. 525-529, 2018. Disponível em: <https://www.aafp.org/pubs/afp/issues/2018/1015/p525.html>
7. PING, Chen et al. Epidemiology of cerumen impaction among municipal kindergartens children in Wuhan, China. *International Journal of Pediatric Otorhinolaryngology*, v. 100, p. 154-156, 2017. Disponível em: <https://doi.org/10.1016/j.ijporl.2017.07.006>
8. HORTON, Garret A.; SIMPSON, Matthew T. W.; BEYEA, Michael M.; BEYEA, Jason A.. Cerumen Management: an updated clinical review and evidence-based approach for primary care physicians. *Journal Of Primary Care & Community Health*, [S.L.], v. 11, p. 1-5, jan. 2020. SAGE Publications. <http://dx.doi.org/10.1177/2150132720904181>.
9. VASCONCELOS, Rosângela Melo; MONTE, Márcia de Oliveira; ARAGÃO, Vânia Maria de Farias; SILVA, Barbara Tereza Fonseca da. ALTERAÇÕES AUDITIVAS EM CRIANÇAS DE 7 A 9 ANOS DE IDADE DE UMA ESCOLA PÚBLICA DE ENSINO FUNDAMENTAL EM SÃO LUÍS, MARANHÃO: hearing alterations in children aged 7 to 9 years old from an elementary public school in são luís, maranhão. *Rbps*, São Luís, v. 3, n. 20, p. 155-160, 29 maio 2007.
10. Vasconcelos RM, Serra LSM, Aragão VMF. Emissões otoacústicas evocadas transientes e por produto de distorção em escolares. *Rev. Bras. Otorrinolaringol.* 2008; 74(4):503-7.
11. ALBUQUERQUE, Maria do Socorro Veloso de; LYRA, Tereza Maciel; FARIAS, Sidney Feitosa; MEDEIROS, Marina Ferreira de; MARTELLI, Mendes Petrônio José de Lima. Acessibilidade aos serviços de saúde: uma análise a partir da atenção básica em pernambuco. *Saúde em Debate*, [S.L.], v. 38, p. 1-5, 2014. GN1 Genesis Network. <http://dx.doi.org/10.5935/0103-1104.2014s014>.
12. MACKNIN, M. L.; TALO, H.; VANDERBRUG MEDENDORP, S. Effect of Cotton-Tipped Swab Use on Earwax Occlusion. *Clinical Pediatrics*, v. 33, n. 1, p. 14–18, jan. 1994.
13. SIM, D. W. Wax plugs and cotton buds. *The Journal of Laryngology & Otology*, v. 102, n. 7, p. 575–576, jul. 1988.
14. BAXTER, P. Association between use of cotton tipped swabs and cerumen plugs. *British Medical Journal*, v. 287, n. 6401, p. 1260–1260, 29 out. 1983.
15. MOURA, Bárbara Laisa Alves; CUNHA, Renata Castro da; FONSECA, Ana Carla Freitas; AQUINO, Rosana; MEDINA, Maria Guadalupe; VILASBÔAS, Ana Luiza Queiroz; XAVIER, Aline Lima; COSTA, Amanda Fortes. Atenção primária à saúde: estrutura das unidades como componente da atenção à saúde. *Revista Brasileira de Saúde Materno Infantil*, [S.L.], v. 10, n. 1, p. 69-81, nov. 2010. FapUNIFESP (SciELO). <http://dx.doi.org/10.1590/s1519-38292010000500007>.
16. Donadel LMP, Satoni CB, Bernardi APZ. Achados audiológicos em candidatos ao uso de prótese auditiva com obstrução total do meato acústico externo por cerume. *Rev. CEFAC.* 2005; 7(3): 371-5.

17. Swart SM, Lemmer R, Parbhoo JN, Prescott CA. A survey of ear and hearing disorders amongst a representative sample of grade 1 schoolchildren in Swaziland. *International Journal of Pediatric Otorhinolaryngology*. 1995; 32(1):23–34. doi: 10.1016/0165-5876(94)01109-B.