

OCCURRENCE OF HEARING SCREENING FAULTS IN STUDENTS

Ocorrência de falhas na triagem auditiva em escolares

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ABSTRACT

Purposes: to determine the occurrence of failures in the hearing screening in students and compare the results obtained in public schools with the particular ones. **Method:** 90 students enrolled in a public and private school took part in this study. The students were submitted to otoscopy and otoacoustic emissions, checking the influence of gender and education network as for the results of hearing screening. **Results:** we observed that 62.2% of the students passed the hearing screening and 37.8% failed, and we observed higher failure rate among students from public schools. **Conclusion:** we may conclude that in the studied population, the occurrence of failed hearing screening in school is 37.8% and this was significantly higher in students from public schools.

KEYWORDS: Hearing; Child, Preschool; Triage

■ INTRODUCTION

Hearing loss in infancy has a major impact on the child, which also reflects on the family and on the environment. Such alterations interfere with language and verbal skills development, and might cause learning difficulties and deleterious effects on the emotional, cognitive, academic and social development of the child ^{1,2}.

Hearing screening programs (HSP) with children enrolled in Early Childhood Education aim to prevent difficulties in the development of oral and written language as both are directly related to hearing¹⁻³. Approximately 50% of hearing losses could be avoided or have their consequences reduced if early measures of identification, diagnosis and rehabilitation were conducted, especially in school-age children^{4,5}.

The sensory deprivation associated with the lack of stimulation, often related to the unfavorable socio-cultural environment of the child, can be a limiting factor for good academic performance, mainly for children in the early literacy process ⁶.

The term screening refers to the process of applying fast and simple measures to a large number of individuals in order to identify a high probability of disease in individuals tested. Screening is not a diagnostic procedure, but a way to identify, among asymptomatic individuals, those who are suspected of having the disease and require more elaborate diagnostic procedures. In the case of the hearing screening in children, this aims to finalize or minimize the effects that hearing loss can have in the learning process of the individual ^{3,7}.

Among the different tests used in screening programs, the otoacoustic emissions (OAE) have an ideal profile because of its fast and non-invasive procedure along with its high reliability. Furthermore, the screening using otoacoustic emissions provides fewer false positives and false negatives results⁸.

The Brazilian Society of Otolaryngology estimates that 10 to 15% of school-age children have mild fluctuating hearing loss and 2% have hearing loss that would require the use of sound amplification devices ⁹.

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The most common type of hearing loss in school-age children is the conductive loss, determined by middle ear infection^{10,11}. The hearing losses are usually presented in mild or moderate degrees and can cause, as its consequence, phonemic changes in speech and writing. Students with this type of hearing loss are often inattentive because they have more difficulty in listening to the teacher than to the colleague on their side¹².

Several diseases can cause hearing loss, leading to impairment in school performance, and even repetition and increased evasion rates. These diseases occur in the external, middle and inner ear, at any age range. The most common examples are impacted ear wax, foreign bodies, tube obstruction, otitis, external ear malformation, among others^{13,14}.

Otitis media is among the alterations most often found in school-age children and approximately 80% of children in school age suffer from temporary hearing loss during the school year. This temporary hearing loss can cause serious problems in auditory perception and, consequently, learning difficulties, such as loss of hearing, acoustic parameters confusion, inability to perceive sounds and their meanings in speech, failure in speech abstraction and subliminal standards¹⁴.

Therefore the detection of hearing impairment in school-age children is of fundamental importance, especially for those who are in the literacy process. The diagnosis allows timely referral to specialized professionals, which favors the treatment and prevention of cognitive, emotional, social and communicative alterations and especially school failure.

Considering the obtained pass/fail results of the hearing screening program, this study aims to determine the frequency of failures detected in school-age children from four to six years of age and to compare the findings of public and private schools in Maceió.

■ METHOD

Ninety children (52 children enrolled in a public school and 38 children enrolled in a private school in the same neighborhood of the city of Maceió) were selected for convenience and participated in the study.

The hearing screening program (HSP) in school-age children was held in quiet rooms of the schools. The following procedure was carried out: otoscopy, using the otoscope HINNE MINE 2000 CE, in order to identify the students who have impacted ear wax or foreign body in external auditory canal (EAC). Children without EAC obstruction were submitted to the hearing screening composed by distortion

product otoacoustic emission (DPOAEs), with the ERO SCAN analyzer from MAICO. The criterion for passing the exam was a difference of signal and noise levels above 6 dB in at least three frequencies. The data collected were recorded on a standardized protocol.

Children from four to six years of age who were attending school at the moment of data collection were included in the study. Children with agenesis of the ear canal and those whose parents refused the participation in the study were excluded from the sample.

This study was submitted for analysis by the Research Ethics Committee of the State University of Health Sciences of Alagoas – UNCISAL and obtained its approval on the protocol of number 779.

A letter to parents explaining the test results and possible causes of failure in the exam were handed to all children who participated in the HSP. The students who failed the HSP were referred for auditory diagnosis, complete ENT evaluation, and follow up in reference centers. Lectures were conducted in schools in order to orient and guide parents and teachers from these schools.

The variables gender and school system (public and private) were analyzed based on the observed results.

Statistical analysis employed the chi-square test, with a significance level of $p < 0.05$.

The ratio of the failure frequency comparing the two school systems was calculated.

■ RESULTS

Ninety children enrolled in kindergarten and first grade of elementary education were evaluated. Of these children, 56 (62.3%) passed and 34 (38.7%) failed the hearing screening program. Regarding the gender of these students, 26 (46.4%) girls and 30 (53.6%) boys passed the screening and 14 (41.2%) girls and 20 (58.8%) boys failed the hearing screening. This data revealed a significant gender difference at $p < 0.05$ according to data presented in Table 1.

Twenty-two children failed in both ears and 11 failed in only one ear.

Of the 90 children assessed, 52 were enrolled in the public school and 38 were enrolled in the private school. From the public school, 25 (27.8%) children passed and 27 (30%) failed the screening whereas 32 (35.6%) children from private school passed and six failed (6.6%) the screening.

Statistical analysis indicated a significant difference between schools of different systems when comparing the results of the hearing screening – $p < 0.05$ (Figure 1).

Table 1 – Hearing Screening Program (HSP) results according to gender

Otoacoustic Emissions									
GENDER									
Female				Male				Total	
Passed		Failed		Passed		Failed		n	%
N	%	n	%	n	%	n	%		
26	46,4%	14	41,2%	30	53,6%	20	58,8%	90	100

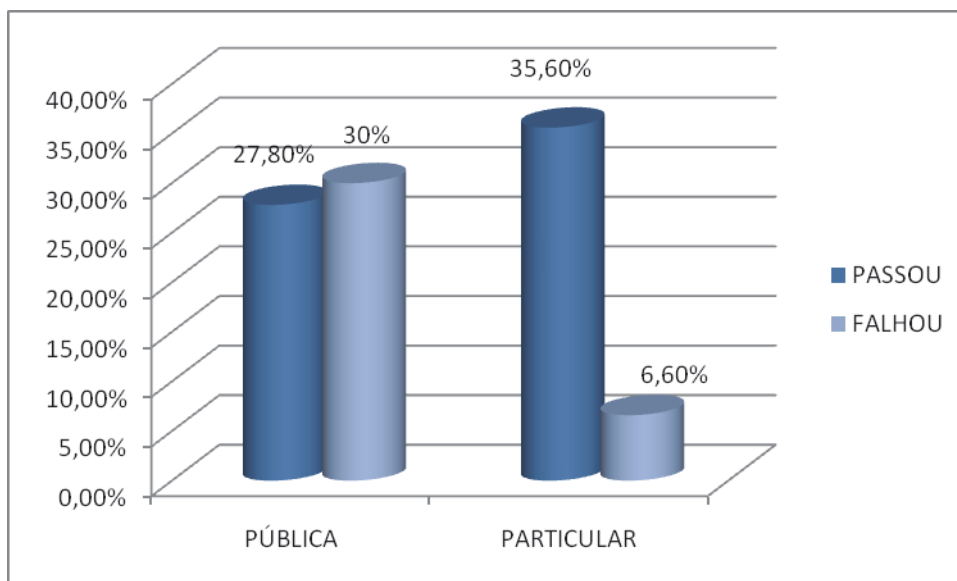


Figure 1 – Comparative analysis of pass/fail results according to school system (Public and Private)

The ratio of failure frequency comparing the two educational systems indicated that students enrolled in public school fail 4.5 times more than private school children (Table 2).

Otoscopy examination was performed in 180 ears, of which 142 ears (78.8%) had open external ear canal and 38 ears (21.2%) had partial or total obstruction by wax, and of these 28 (73.60%) ears

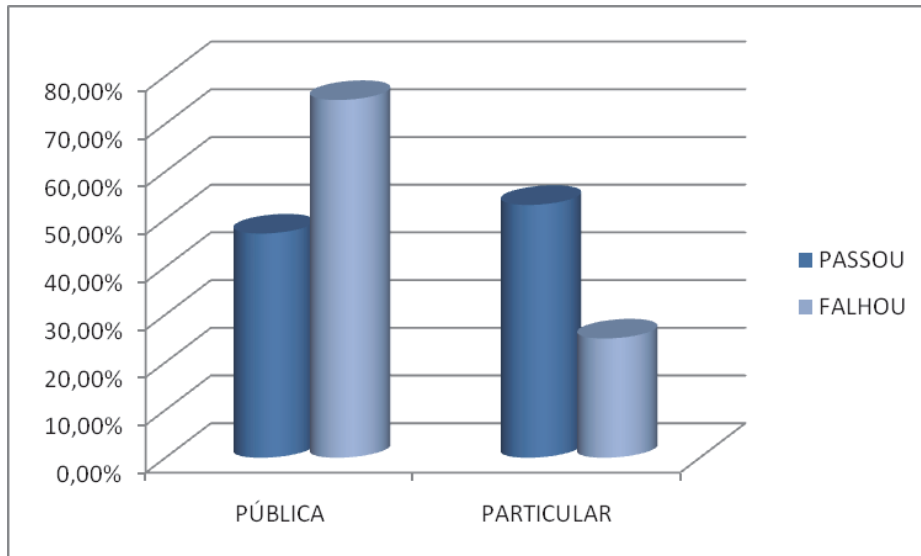
were from public school children and 10 (26.40%) ears were from private school children.

Considering the ears with open ear canals, 61 (53.0%) of children from private and 54 (47.0%) children from public schools passed the hearing screening. Five (25%) ears screened in private school and 15 (75%) ears in public school failed the OAE screening (Figure 2).

Table 2 – Hearing Screening Program (HSP) results according to school system (Public and Private)

School System	HSP		N	Frequency of failure	Frequency ratio
	Failed	Passed			
Public	27	25	52	30%	
Private	06	32	38	6,6%	
Total	33	57	90	36,6%	4,5

Note N – number of subjects

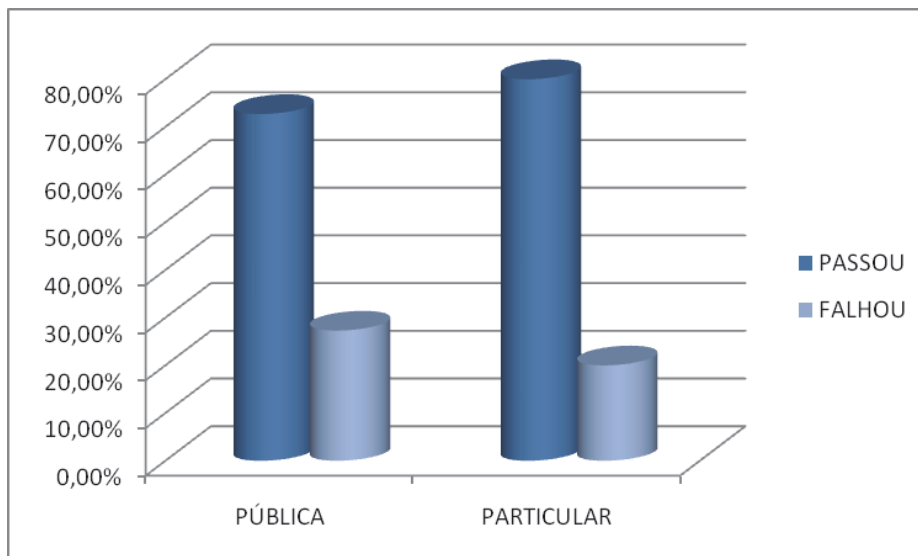


Note: EAC – external acoustic canal; OAE – otoacoustic emissions

Figure 2 – Comparative analysis of EAC, school system and hearing screening program with OAE

Among the ears with partial obstruction identified with impacted ear wax which hearing screening was held in the public school, eight ears (72.7%) passed and three ears (27.3%) failed the screening using OAE. In the private school, four (80.0%) ears with partial obstruction passed and one ear (20.0%) failed the screening. These data are displayed in Figure 3.

In the private school, five (6.6%) ears with total wax obstruction were identified whereas in public school this number was 17 (16.3%), being the regarded considered as failure in the HSP. Statistical analysis indicated significant otoscopy differences between the schools with a significance of $p < 0.05$.



Note: EAC: external acoustic canal; OAE: otoacoustic emissions

Figure 3 – Relationship between EAC, school system and hearing screening with OAE

■ DISCUSSION

In the current study, a higher failure rate in male students when compared to females was observed. However no statistically significant difference between the two groups was found, suggesting that the percentage difference observed is due to chance. Similar results are found in the literature¹⁵⁻¹⁷, however with significant difference between genders demonstrating that HSP failure is more frequent in males than in females.

In the 90 children who constituted the current study sample, the frequency of failure was higher in children from the public school when compared to children from the private school. This finding corroborates with the studies from the literature^{14,18,19}. The current study showed higher failure rates than those observed in previous studies^{14,22}. However, the low economic development of the State in which the study was carried out might justify the high HSP failure rate observed, which emphasizes the relationship between poverty and disease²³.

In the current study, the number of ears with partial or total obstruction of EAC by wax was higher among students from the public school when

compared to those from the private school, corroborating with findings from the literature^{14,24-27}. This suggests that the population of public schools have less access to information on hearing health, especially with regard to the function of ear wax and the constant use of flexible rods.

■ CONCLUSION

The data from the current study suggests that, in the analyzed population, the occurrence of hearing screening failure in school-age children is 37.8%. Furthermore, the findings indicate that the frequency of failure is significantly higher in children from the public school when compared to children from the private school.

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RESUMO

Objetivos: determinar a ocorrência de falhas na triagem auditiva em escolares e comparar os resultados obtidos nas escolas da rede pública com os da particular. **Método:** participaram deste estudo de frequência, 90 escolares matriculados em uma escola da rede pública e outra da rede particular. Os alunos foram submetidos à meatoscopia e às emissões otoacústicas, verificando a influência das variáveis sexo e rede de ensino aos resultados da triagem auditiva. **Resultados:** foi constatado que 62,2% dos escolares passaram na triagem auditiva e 37,8% falharam, sendo observado maior índice de falha entre os alunos da escola pública. **Conclusão:** conclui-se que, na população estudada, a ocorrência de falha na triagem auditiva em escolares é 37,8%, sendo significativamente superior nos alunos da escola da rede pública quando comparados aos da particular.

DESCRIPTORIOS: Audição; Pré-Escolar; Triagem

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