

EXPOSURE TO SOUND PRESSURE LEVELS IN THE CLASSROOM, ACOUSTIC IMMITTANCE AND SSW TEST IN STUDENTS OF 3^o AND 4^o DEGREE OF ELEMENTARY SCHOOL

Exposição a níveis de pressão sonora em sala de aula, imitanciometria e teste SSW em escolares de 3^o e 4^o ano do ensino fundamental

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ABSTRACT

Purposes: to investigate the effects of high sound pressure levels in classrooms and changes on acoustic immittance on auditory skills of children in early literacy. **Methods:** quantitative and exploratory study. Acoustic measurement, using the dosimeter, visual inspection of the external auditory canal, tonal audiometry thresholds, speech recognition tests and acoustic immittance. The results of the acoustic measurements through the dosimeter in four schools in Santa Maria, RS, Brazil divided the sample of 87 children of 3 and 4 years of primary school, aged eight to ten years, into two groups – group 1 / not exposed and group 2/ exposed to levels higher than 80dB(A). The sample was also separated in 38 children without changes in acoustic immittance measurements and 49 with changes, measured in their listening skills for the dichotic test of alternate disyllabics – SSW. **Results:** the G1 has presented better results in DC and EC on both immittance terms, however without evidence of statistics difference; it was showed similar performance between the groups; the G1 has showed better results in phonemic decoding, but worse results in codification and organization sub profiles. **Conclusion:** this study has demonstrated that high sound pressure levels in classrooms don't interfere in children's auditory skills in learning process tested using the SSW.

KEYWORDS: Hearing; Noise; School Health

■ INTRODUCTION

The central auditory processing corresponds to a sequence of events that are initiated by the entry of the auditory stimulus (sound) in the external ear to collect and direct sound energy to mechanical tympanic membrane; at the middle ear, to amplify the sound and lead to the inner ear which, in turn, promote sound transduction of mechanical impulses in electrical. These specific nerve stimuli reach the vestibulocochlear nerve (cranial nerve VIII) and are

conducted via brain stem, the transition between the medulla and pons, in order to achieve the cochlear nuclei, including the brain stem, subcortical pathways and auditory cortex that receives, analyzes and program the answer and so does your hearing have meant¹.

Due to awareness that interactions of auditory processing occur in the peripheral and central and not just in certain anatomical *locus*, scientists in Conference Bruton (2000) suggested that it was modified to its nomenclature, omitting the term central, in order to cover the whole sequence of events, which in essence corresponds to decoding, organization and coding of auditory information^{2,3}.

Therefore, whether they occur in behavioral disorganization phenomena in one or more modalities, such as localization and lateralization, auditory discrimination, auditory pattern recognition, temporal hearing (resolution, masking, integration

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Conflict of interest: non-existent

and temporal ordering) aspects, and performance in the presence of competing signals and degraded acoustic signals⁴, preventing analysis and interpretation of sound patterns, without the presence of significant hearing loss, it is suggested that there is an auditory processing disorder (APD)⁵.

An individual with APD presents difficulties related to speech understanding in noisy environments; short attention span; distraction; increased latency time; memory problems; disabilities for math or social studies; slowed response time / delayed; changes in the ability of speaking, writing and / or reading impaired⁶.

In the school context, a noisy environment contributes to the non-understanding speech teacher, and worsening of learning difficulties primarily for the student who has a learning disorder coupled with auditory processing disorder⁷. The scientific evidence converge to a science that finds interrelationships between neural correlates brainstem and cognitive aspects, justifying the interference sound pressure levels high reading on and speech perception⁸.

As a rule, the National Council for the Environment (CONAMA) No. 001, according to the resolution which cites the regulatory norm NBR 10.152/2000, establishes the maximum level for acoustic comfort in classrooms, Values between 35-45dB (A) and 40-50dB (A) as maximum acceptable level⁹, however, if it is taken into consideration that the literature reveals, continuously, that the noise levels in the classroom exceed the values determined by legislation^{10,11}, becomes necessary to rethink the actions of prevention of school health.

In clinical practice audiological, an instrument used to detect auditory processing problems in children with learning demoted, is the SSW (Staggered Spondaic Word Test) or Staggered Spondaic Word (Disyllabic Alternate), term used in the adaptation to the Portuguese. This evaluation allows to investigate how the tracks of the speech signal are used to recognize, analyze, interpret and understand the spoken message. Easy to apply, has the ability to assess the binaural separation and integration, divided attention and memory¹².

According to this, this study aimed to investigate the effects of high sound pressure levels in classroom and changes immitance on the hearing abilities of children in early literacy.

■ METHODS

This research was conducted at University Hospital after joining the Direction for Teaching, Research and Extension at HU (GAP/CCS 027364) the period from February to July 2011.

Based on the Resolution CNS 196/96 research involving humans, before the start of data collection parents or guardians received detailed discussion about the nature of research, indicating objectives, methods, no risks and possible discomforts, anticipated benefits and confidentiality regarding the identification of the children studied.

Those who agreed with the child's participation under its responsibility signed the consent form. The Instrument of Consent was signed by the child, beyond obtaining authorization of Educational Institutions and the Confidentiality Agreement signed by the researchers.

The research developed is a quantitative nature, as field study, having as direct technical documentation, with extensive and intensive direct observation, with the use of questionnaires and tests. According to the objectives, this was exploratory, more specifically exploratory-descriptive combined, and deductive regarding the method for epidemiological approach.

Children were selected in four Municipal schools in Santa Maria (RS). The schools were selected by convenience, considering the location related to a noisy environment and silent environment, to perform acoustic measurements in situ.

In this research were employed the criteria adopted by CONAMA No. 001, according to the resolution citing regulatory NBR 10.152/2000, which establishes as level of acoustic comfort for classrooms, maximum values between 35 to 45 dB(A) and accepchart noise level of 40 to 50dB(A)⁹. In addition to opt for split groups of children exposed and unexposed the high sound pressure levels, based on NR 15 of Ordinance No. 3.214/1978 (regulatory norm it comes to unhealthy activities or operations of the desktop)¹³, considering the limit of tolerance for noise 85dB(A) as a preliminary hearing. However, when considering preventive measures determining that minimizes the likelihood that exposure to high noise levels may harm hearing and in order to avoid that the limit is exceeded, was adopted with the sound cutting 80dB(A) (action level) levels.

Through the measurement of sound pressure levels use was made of the dosimeter Model 4445 for measuring the Eastern Sound Level (Lavg, average level), which is defined as the average of the sound levels measured during measuring an elapsed time. The equipment was adjusted to scale clearing "A", slow response speed (slow) placed on the collar of a student behavior calm and positioned over the center of the room. We used the warp factor at Q = 5dB to the exposure time, according to international values established recommended based on OSHA standards.

Once the acoustic measurements, we applied the inclusion criteria explained below: age and schooling, ie, children aged 8-10 years; participants of the 3rd and 4th year of elementary school, on completion of the literacy process; of both sexes; with good or poor school performance. The criteria for exclusion were considered the unavailability of parents and educators to collaborate with the research; the presence of learning disabilities and speech; neurological disorders; proven or reported hearing loss.

Thus, was performed by means of anamnesis, a careful investigation to raise the audiological and the child's school. Then performed a visual inspection of the external auditory canal, conventional audiologic evaluation consists of pure tone audiometry (PTA), Speech Recognition Threshold (SRT), Percentage Index Speech Recognition (SDT) and Acoustic immittance measures (MIA). The test was conducted in a sound treated booth, digital two-channel audiometer, Madsen-GN Otometrics, Itera model, type II, with TDH-39 and calibrated according to ISO 11957-1986 standard. The acoustic impedance measurements were performed on a impedanciometer Interacoustics AZ-26 model, with supra-aural earphones TDH-39P, Telephonics brand HB and cushion-7 probe-tone with 256 Hz and calibration according to IEC 60645-5-1992.

From the above tests, selected children who met the following criteria: auditory thresholds of air up to 25dB frequencies in the 250-8000 Hz in both ears; LRF compatible with pure tone audiometry; SDT above 88%. Thus, the groups were divided as follows:

- GROUP I (G1) – Not exposed to higher noise levels to 80dB.
- GROUP II (GII) – Exposed to noise levels greater than 80dB.

In each of these tests a subdivision was established: with modification and without modification immittance, as follows: No change immittance – voted with normal standard when presented Type A tympanogram and acoustic reflex in both ears. With amendment immittance – children who had other types of curva¹⁴ and/or contralateral acoustic reflexes and absent ipsilateral at one or more frequencies of 500, 1000, 2000 and 4000 Hz.

The sample consisted of 87 children with thresholds within normal limits. Of these, 40 were male and 47 females. As to age, 36 children were eight years; 47, nine years four to 10 years. Considering the level of education, 43 enrolled in the third year study and 44 in the fourth year. Faced reviews of impedance, it was found that of the 87 children selected 38 (42.53%) had normal

immittance results, with 49 (56.32%) suggesting changes.

Applied the values established for noise levels with 80dB cut (A) (action level), by using criteria that encompass targeted speech intelligibility and the prevention of hearing integrity was found 80.46% of unexposed children (G1) and 19.54% children under the exposed condition (G2), pertaining to classrooms 1, 3:06. Being in G1 – 31 children without immittance changes and 39 with amendments. G2 – 7 children without immittance changes and 10 with amendments.

The groups were submitted to auditory processing where we applied the SSW test, audiometer in a soundproof booth mentioned above, with stereo Stereo Porchart coupled – Discman, Sony brand, model D –171, and use of CD (Compact Disc) to submit a list of forty items recorded on CD – Vol . 2/6¹⁵ Track, containing two pairs of two-syllable words paroxitone (trochee) in competitive and non-competitive situation. The presentation mode was configured as a dichotic task and was applied at an intensity of 50dB sensation level (NS). The child was asked to repeat a sequence of words heard in both ears. The first word is presented to the right ear (RE) without competing message (Not Right Competitive – DNC); then two words simultaneously (Right Competitive – Competitive DC and Left – EC, respectively) and then a word in the left ear (LE) without competing message (Not Left Competitive – ENC) ie , half of the items begin with the OD and the other half by OE always alternately. The odd number of items begin with the OD and even-numbered items begin with the OE. The performance of the individual varies between hits, omission, substitution and distortion of the word heard^{16,17}.

Was performed quantitative analysis in the competitive situation of DC, EC and total hits and qualitative analysis there were trends of answer the following^{15,18}: Effect of Order (EO) – err more often in the first two words (high-low effect) or the last two words (low-high end) of the test items; Auditory Effect (EA) – err more often when testing starts in OD (high end/low) or OE (low/high effect); Type A – a large number of bugs in the same column of the representative competitive condition which starts the test and finally Inversion, when the words are repeated an item out of order. Thus, occurrences of auditory processing disorders were classified into subprofiles: Phonemic decoding (high/low and/or EO low/EA); Gradual loss of memory (EA low/high and/or EO high/low); Organization (higher than the estimated number of inversions) and Integration (Presence of Type A).

This research is part of the project submitted to the Research Ethics Committee, with data collection initiated after approval by February 9, 2011, being the case number (23081.020148/2010-93) Certificate of Presentation and Consideration for Ethics (CAAE 0371.0.243. 000-10).

Regarding the statistical method and data analysis evaluation results were organized in spreadsheet calculation program written Microsoft Office Excel 2003 and then statistically analyzed by SAS – *Statistical Analysis System 9.0*. Descriptive statistics of variables was performed in study with the scores of auditory processing being analyzed by the standard deviation values, average, minimum

and maximum. The crosses were performed variables using the chi-square test adapted to the Fisher exact test, with a significance level of $p \leq 0.05$.

■ RESULTS

According to the sound pressure levels scaled by Lavg in each classroom, it was found that the sound levels exceed the values established for comfort according to CONAMA 001, NBR 10.152/2000. As Figure 1, is demonstrated that the 12 classrooms, ie, 100% of the four schools studied not meet the criteria of the law⁹.

AMBIENCE	Lavg	AMBIENCE	Lavg
Class 1	80,9	Class 7	70,2
Class 2	65,2	Class 8	74,6
Class 3	114	Class 9	63,1
Class 4	63,7	Class 10	72,8
Class 5	77,5	Class 11	60,3
Class 6	81,3	Class 12	51,9

Caption: Lavg = Medium Sound Level

Figure 1 – Measurement of sound pressure levels in classrooms

Chart 1 illustrates the results of descriptive measures which give a quantitative analysis of the SSW test in competitive right conditions (M =

60.51, SD = 17.97) and left (M = 77.24, SD = 14.10), beyond the total of hits presented by children from G1 and G2 without immittance changes.

Table 1 – Distribution of standard deviations, mean, minimum and maximum values based on the DC conditions, EC and total hits for groups without immittance changes, expressed as percentage of correct responses (%)

Descriptive Measures	No immittance Changes (n=38)					
	DC		EC		Total hits	
	G1	G2	G1	G2	G1	G2
Standard Deviation	17,69	16,26	14,02	8,59	17,14	10,72
Average	60,97	58,93	76,94	75,36	74,80	74,29
Minimum	30,00	27,50	40,00	62,50	13,75	57,50
Maximum	90,00	75,00	100,00	90,00	96,88	88,13
P	0,489		0,514		0,682	

Chi-square test

Caption: DC – right competitive, EC – left competitive;

G1-G2 and non-exposed – exposed

Statistical significance ($p \leq 0.05$)

Chart 2 shows the results of the extracted descriptive measures of quantitative analysis of the SSW test in competitive conditions right and left,

beyond the total of hits presented by children from G1 and G2 with immittance changes.

Table 2 – Distribution of standard deviations, mean, minimum and maximum values for the conditions DC, EC and total hits for groups with immittance changes, expressed as percentage of correct responses (%)

	With immittance Changes (n=49)					
	DC		EC		Total hits	
	G1	G2	G1	G2	G1	G2
Standard Deviation	17,33	18,44	15,80	15,60	12,94	12,91
Average	63,23	53,00	79,35	73,50	78,53	74,10
Minimum	32,50	30,00	30,00	47,50	46,25	53,50
Maximum	92,50	82,50	100,00	97,50	96,25	94,38
P	0,812		0,523		0,813	

Chi-square test

Caption: DC – right competitive, EC – left competitive;

G1-G2 and non-exposed – exposed

Statistical significance ($p \leq 0.05$)

In Charts 3 and 4 are demonstrated both typical and atypical of the SSW test results in relation to the quantitative variable ie DC , EC and/or both, with

distribution of the number of children for exposure to sound levels and immittance conditions.

Table 3 – Distribution of quantitative analysis in the SSW test of immittance change without children (n = 38) according to exposure to sound levels

Exposure to noise levels	DC		EC		DC e EC	
	Typical	Atypical	Typical	Atypical	Typical	Atypical
G1	2	29	13	18	2	29
G2	0	7	2	5	0	7

Chi-square test

Caption: DC – right competitive, EC – left competitive; G1-exposed and non-

G2 – exposed

Statistical significance ($p \leq 0.05$)

As regards the absence of immittance changes and the results of DC, is typical or atypical of the 31 children in G1, 76.32% had irregular. So too was shown for G2 in which they have seven children,

ie, 100% showed lag, representing 18.42% of the total percentage. For the results of CE, it was found that of 31 children in G1 and G2 seven, respectively, 47.37% and 13.16% had Bad performance.

Table 4 – Distribution of quantitative analysis in children with SSW immittance changes (n = 49) according to exposure to sound levels

Exposure to noise levels	DC		EC		DC e EC	
	Typical	Atypical	Typical	Atypical	Typical	Atypical
G1	3	36	16	23	2	37
G2	1	9	3	7	1	9

Chi-square test

Caption: DC – right competitive, EC – left competitive;

G1-unexposed and G2 – exposed

Statistical significance ($p \leq 0.05$)

Considering the presence of category immittance changes related to DC the results showed that 39 children in G1, 73.47% had atypical DC, characteristic similar to 10 children of G2, with 18.37% of atypical results.

These data reveal that the majority of the sample had a deficit in DC with a low percentage of 5.26% typical for children without immittance changes and 8.16% for those with modifications. For the relationship between the results of children with immittance and EC changes, 39 children in G1

and 10 in G2, 46.94% of the selected sample and 14.29%, respectively, confirmed atypical EC. Thus, highlights the superior performance of CE to the subjects of this study, with 39.47% of the total group of those without immittance changes and 38.77% for those with, exhibiting characteristic results as the reference criteria of analysis.

Below Chart 5 shows the decoding, encoding and Organization subprofiles based on trends of the effect of errors of order auditory effect, inversions and standard type A.

Table 5 – Distribution of qualitative analysis (subprofiles) SSW test in children with and without immittance changes depending on the exposure to sound levels

Categorization (subprofiles)	G1		G2		P	
	Typical	Atypical	Typical	Atypical		
No immittance changes (n = 38)						
Decoding	17	14	4	3	0,91	
Codification	Gradual loss of memory	18	13	6	1	0,17
	Integration	22	9	6	1	0,42
Organization	19	5	2	12	0,61	
Two or more subprofiles	5	26	1	6	0,46	
With immittance changes (n = 49)						
Decoding	21	18	6	4	0,72	
Codification	Gradual loss of memory	23	16	6	4	0,17
	Integration	25	14	7	3	0,72
Organization	23	16	10	0	0,01*	
Two or more subprofiles	6	27	3	7	0,35	

Chi-square test

Statistical significance ($p \leq 0.05$)

* significant

In the statistical treatment using chi-square test there was no statistical significance between the data, ie, exposure to high sound pressure levels, with or without amendments immittance and hearing abilities investigated by the SSW test, condition except for deficits in auditory gnosis process of organization ($p = 0.01$) in G1 with immittance changes, which is expressed by the amount of errors type inversions. It can also be seen in the overall outcome of SSW to investigate the performance of children in auditory processing test, significant differences were observed for those with changes in impedance ($p = 0.04$) tests, therefore, showed 97.96 % of one or more disorders hearing abilities investigated. Finally, regardless of the immittance test is observed that the G2 has a significant percentage ($p = 0.03$) for EC with atypical outcome for children as the level of education, specifically in the third year.

■ DISCUSSION

In this research, the average DC and EC showed lower percentages than would be appropriate for this population, or 80% to 90% accuracy at 90% and 75%, respectively. Therefore, both groups showed a deficit in the performance of the SSW test, whichever results of CE compliant children at age eight years¹⁸. G1 got better rates in DC and EC, immittance in both conditions, however this difference did not prove significant ratio exposure to high sound pressure levels of auditory processing. Contradicting these results, study showed higher percentage of success in DC and EC exposed, however, agree with this research by demonstrating that there was no statistical association to establish similar relationship¹⁹.

With regard to the "ear effect" it appears that the OE better results in this study, contradicting reports commonly described in the literature that attach to the greater amount of hits for RE, since most people are right-handed and have a higher representation in the left hemisphere (HE), so advantageously on the OD to verbal stimuli²⁰. Factors related to attention and structural brain asymmetry have greater influence on verbal auditory processing although the perceptual asymmetry (dominance of dichotic tests in OD) is a source of controversial investigations and scientists associate with difficulties in reading decoding with caution²¹. In a study on cerebral dominance, LSP test was applied, in monaural quality to VERIFY the effect of laterality in the presence of noise. The OD had worse results in both righties as lefties in demonstrating dissent in recognizing sentences as shown in the literature²². Although HE is predominant in information processing in the presence of noise, when there is

a S/N ratio in a poor environment and requires a more accurate auditory processing is evident in the increased neuronal right auditory cortex in support of HE²³. Although the superiority of OD in individuals with dominant HE be discussed until the present day, in 1989 reported the clinical insignificance of this finding in the SSW test²⁴.

With respect to average total hits, G1 and G2 have equivalent performance. The literature differs in its results of total successful due to the particularity of each investigation. This research showed similarity with the values of all items reported by other studies, however, it is respectively of people with learning difficulties²⁵ and learning disorders²⁶, suggesting that children in this study have lag in the auditory short-changed compared to the performance of their peers. Resemblance to the group of lower middle socioeconomic and cultural level can also be found, where the mean score was 76.6%²⁷. Since the children in this study have the same social status, corroborates the assumptions that refer interference environment on auditory skills²⁸.

Of the 87 children studied, 84 (96.55%) showed alterations in at least one embodiment of the test, were considered as having APD. The qualitative analysis of the SSW test showed that children had errors in the four subprofiles reviews.

By observing the values of average G2/no immittance the changes showed better performance than change, however, both have longer lag when related to the unexposed group. In phonemic decoding the individual components of a message are identified through closing skills, auditory discrimination, temporal processing, separation, binaural integration and sound localization. The bilateral deficit or change in OD refers in this category and affects the auditory analysis and synthesis, causing inability to assign meaning to phonemic information, ie, related to language comprehension^{29,20,18}. Assumption of this study was that the G2 would be required on your listening skills, since the greater the environmental challenges are, the greater the incentives for improvement of auditory processes explained by neuroplasticity hearing, which provides theoretical basis for the application of auditory training³⁰, however, this hypothesis has not been demonstrated in the results. However, the lag of G2/immittance changes can be explained by the fact that the condition immittance changes, indicative of a change in OM, interference in the transmission of sound produces inability of listening situations, to cause difficulties to identify the speech signals, even assuming a favorable opportunity to alleviate the discomfort and the ability of aggressive noise³¹. When considering changes in the acoustic reflex, beyond its function to protect the inner ear against

loud sounds, cannot rule out the mechanism of anti-masking stapedius, that attenuates the sounds of low frequency environmental or individual, and thus provides the ease of capture of speech sounds, improving the encoding of information by encouraging speech intelligibility. Thus, we hypothesize that changes in the acoustic reflex can influence auditory processing abilities³². The literature reports that children with a history of OM infections tend to present the worst performance when hearing tests and the effects of fluctuating hearing loss in speech and writing may extend throughout the school term³³.

In both groups, yielded the largest amount of typical reflect the auditory effect. However, comparing G1 and G2 atypical, the first group had worse outcomes, but without statistical significance. The sub-profile encoding, with regard to the gradual loss of memory demonstrates the difficulty that the individual has to ignore background noise and to rescue immediate memory²⁷. One study showed that both children with normal hearing abilities, as the bearers of DPA are affected by irrelevant sounds in performance that requires the use of memory. However, the difficulty caused by irrelevant sounds a tone – stimulus did not differ in difficulty among those who presented DPA when the irrelevant sound was a speech (speech) contrary to what had children with the same age and full development, who felt most affected by irrelevant speech sounds with content. Thus, the authors explained that the difficulty that patients with APD have to process information in bad acoustic environment is because the speech processing occur to them in a different way³⁴.

In sub-profile encoding type integration, the results showed a lower amount of change children in both groups, represent no difference in exposure to sound levels in the question would indicate difficulty in associating sound – symbol. This category represents the findings of the standard type A (large number of errors in the competitive ear that starts the test – in this research, it was decided to initiate the OD) and their damage comes from the inability to integrate information, ie, due to poor inter – hemispheric transfer (via the corpus callosum)¹⁸. Clinical evidence on verbal dichotic tests, especially in the SSW, performance is degraded in OE. By observing the distribution of qualitative findings relating to integration (see Chart 3 and 4) it appears that the performance of children in both groups showed disagreement because there is a greater number of clinical atypical however, with a larger number of typical integration. Therefore,

the quantitative aspect of this variable was not expressed qualitatively. In return, if deemed Type A standard to the findings in Chart 1 and 2, wherein the mean score is less for DC can thus infer agreement with the quantitative findings.

In sub-profile organization, responsible for identifying the difficulty that the individual has for verbal sounds in sequence and cause difficulties for the understanding of speech, it is observed that the G1/no immittance changes had worse results. However, significance was demonstrated in the figures provided by the presence of G1 with immittance changes. The sequence of acoustic events which happen in time is dependent on short-term memory and the influence functions of the central auditory nervous system, and are important for written language³⁵. Scientific controversies have relied on the fundamentals of stochastic resonance to conceive the idea that the noise is not always detrimental to cognitive performance. This model proposes that inattentive children and at risk for poor academic performance would be encouraged to pay attention to the content with improvement on episodic memory when added acoustic background noise (white noise) however, worsening the performance of children without attention difficulties³⁶.

Scholars call attention to the heterogeneous nature of the DPAs, that coexist in parallel with disorders of language processing, cognition, motor skills or learning and need to be investigated with the control of all its variables³. In concordance with the authors, there are reports of the tests investigating the auditory abilities can be influenced by many extrinsic and intrinsic factors such as attention, auditory experiences, psychological, age, auditory maturation and other factors³⁷. Thus, the questions of this research should be investigated in future more restricted samples in search of isolation stakeholder aspects, in order to find which factors have a direct influence on auditory processing in a room acoustically unhealthy lesson with the greater purpose of modifying the environment and teaching practices in favor of a healthy school environment, although it is necessary to emphasize that the criteria of this research have made relatively homogeneous study population.

■ CONCLUSION

The present study showed that high levels of sound pressure in the classroom does not interfere with hearing abilities, tested with SSW, children in the learning process.

RESUMO

Objetivo: investigar os efeitos dos níveis de pressão sonora elevados em sala de aula e das alterações imitanciométricas sobre as habilidades auditivas de crianças em fase inicial de letramento. **Métodos:** estudo quantitativo e exploratório. Medições acústicas por meio de dosímetro; inspeção visual do conduto auditivo externo; audiometria tonal e vocal; imitanciométrie. Os resultados das mensurações acústicas realizadas por meio de dosímetro em quatro escolas de Santa Maria – RS, dividiu a amostra de 87 crianças do 3º e 4º ano do ensino fundamental, na faixa etária de oito a dez anos em dois grupos – Grupo 1 / não expostos e Grupo 2 / expostos a níveis maiores que 80dB(A). A amostra também foi separada em 38 crianças sem alterações imitanciométricas e 49 com alterações, avaliadas em suas habilidades auditivas pelo teste dicótico de Dissílabos Alternados – SSW. **Resultados:** o G1 apresentou melhores resultados na DC e EC em ambas às condições imitanciométricas, sem evidenciar diferença estatística. Foi constatada maior quantidade de acertos para a OE; a média do total de acertos evidenciou desempenhos semelhantes entre os grupos; o G1 apresentou melhores resultados na decodificação fonêmica, porém piores resultados nos subperfis codificação e organização. **Conclusões:** o presente estudo demonstrou que níveis de pressão sonora elevados em sala de aula não interferem nas habilidades auditivas testadas por meio do SSW, de crianças em processo de aprendizagem.

DESCRITORES: Audição; Ruído; Saúde Escolar

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