UNIVERSIDADE DO PLANALTO CATARINENSE

LUCAS ZANON DE FREITAS

LUIZA LA PORTA MATOS

TRIAGEM DE DISTÚRBIOS DO PROCESSAMENTO AUDITIVO CENTRAL DE ESCOLARES EM LAGES/SC

Trabalho de Conclusão de Curso apresentado ao curso de graduação em Medicina da Universidade do Planalto Catarinense como requisito parcial à aprovação na Unidade Educacional Eletivo de 2023 Orientador: Profa. Dra. Adriana Kosma Pires de Oliveira

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SUMÁRIO

TRIAGEM DE DISTÚRBIOS DO PROCESSAMENTO AUDITIVO CENTRAL DE ESCOLARES EM LAGES/SC[1]

Lucas Zanon de Freitas

Luiza La Porta Matos

RESUMO

O Transtorno do Processamento Auditivo Central (TPAC) é definido como um déficit no processamento neural dos estímulos auditivos e pode coexistir ou estar associado a alterações do desenvolvimento de linguagem e/ou quadros neurológicos. Alterações neste processamento podem levar a prejuízos no desempenho acadêmico, atraso de linguagem, dificuldade para entender apropriadamente o que é dito e dificuldade de aprendizagem, o que muitas vezes pode ser confundido com diferentes patologias da infância. Este estudo teve como objetivo aplicar o questionário *Scale of Auditory Behaviors* (SAB) em crianças entre 10 e 11 anos em uma escola municipal de Lages/SC para identificar possíveis crianças com TPAC. O questionário foi preenchido pelos pais ou responsáveis após a assinatura do Termo de Consentimento Livre e Esclarecido (TCLE). Apresenta uma proposta de estudo descritivo transversal, com abordagem quantitativa de caráter descritivo e exploratório. A pesquisa envolveu 34 crianças matriculadas no 5° e 6° ano. Entre as crianças avaliadas 5 (14,71%) apresentaram escore final indicando uma avaliação formal do processamento auditivo central e 3 (8,82%) com valores indicativos de distúrbio do processamento auditivo central, com necessidade de investigação e acompanhamento a longo prazo. Os resultados, embora limitados pela amostra, sugerem que parte dos participantes necessitariam de avaliação complementar. Enfatiza-se, portanto, a relevância de futuras pesquisas com maior número de participantes e testes auditivos em conjunto para maior conhecimento populacional, identificação e tratamento do TPAC.

Palavras-chaves: Trabalho de Conclusão de Curso; Audição; Percepção auditiva; Processamento auditivo

[1] Artigo apresentado como TCC do Curso de Medicina e submetido à Arquivos Internacionais de Otorrinolaringologia

SCREENING OF CENTRAL AUDITORY PROCESSING DISORDER OF ELEMENTARY SCHOOL STUDENTS IN THE STATE OF SANTA CATARINA, BRAZIL

ABSTRACT

Central Auditory Processing Disorder (CAPD) is a deficit in the neural processing of the auditory stimulus and may coexist or be associated with changes in language development and/or neurological conditions. Changes in this processing can lead to impairments in academic performance, language delay, difficulty in properly understanding what is said and learning difficulties, which can often be confused with different childhood pathologies. This study aimed to apply the Scale of Auditory Behaviors (SAB) questionnaire to children between 10 and 11 years old in a municipal school in Lages, state of Santa Catarina, Brazil, to identify possible children with CAPD. The questionnaire was completed by parents or guardians after signing the Informed Consent Form. It presents a proposal for a cross-sectional descriptive study, with a quantitative approach of a descriptive and exploratory nature. The research involved 34 children from the 5th and 6th grade of elementary school. Among the children assessed, 5 (14.71%) presented a final score indicating a formal assessment of central auditory processing and 3 (8.82%) with values indicative of central auditory processing disorder, requiring investigation and long-term follow-up. The results, although limited by the sample, suggest that some participants would require additional assessment. Therefore, the relevance of future research with more participants and joint hearing tests is emphasized for greater population knowledge, identification and treatment of CAPD.

Key words: Hearing; Auditory Perception; *Auditory Processing.*

INTRODUCTION

Central auditory processing (PAC) is the term used to describe a series of mental operations that the individual performs when dealing with information received via the sense of hearing and that depend on an innate biological capacity, the maturation process and experiences and stimuli in the environment acoustic[1].

Changes in this processing can lead to impairments in academic performance, language delay, difficulty in properly understanding what is said and learning difficulties, which can often be confused with different childhood pathologies. In recent years, there has been growing interest in studying children's auditory abilities in order to identify such impairments early[2,3].

Central Auditory Processing Disorder (CAPD) is a deficit in the neural processing of the auditory stimulus and may coexist or be associated with changes in language development and/or neurological conditions. It refers to a dysfunction in the Central Auditory Nervous System that leads to certain hearing difficulties and, consequently, to behavioral manifestations[4]. In most cases, the peripheral auditory system (tympanum, ossicles, cochlea

and auditory nerve) is completely preserved. The main consequence of the disorder is the difficulty in processing information captured by the auditory pathways. Thus, the person will clearly hear human speech, but will have difficulty interpreting the message received.

Regarding the etiology, studies indicate that auditory processing is related to the central auditory nervous system, therefore, any changes that occur in the first two years of life that involve this system can impair auditory processing. The pathologies involved in triggering changes in auditory processing are varied, and include congenital and neonatal infections, high fever during early childhood, chromosomal changes, postnatal infections (meningitis, syphilis, degenerations and demyelinations), metabolic disorders, otitis media of repetition, especially in the first two years of life[5].

The similarity of signs and behaviors in CAPD cases with other changes, such as Attention Deficit Hyperactivity Disorder and Attention Deficit Disorder, is a confusing factor for the diagnosis. However, although some symptoms are similar, CAPD presents signs and symptoms specifically related to hearing impairment, such as difficulty understanding spoken language in noisy environments, accelerated speech, difficulty with similar-sounding words and difficulty following complex auditory commands[6].

When a child is diagnosed early, they can receive adequate support at school and therapy by qualified professionals, which favors their development[7].

Interactive and easily accessible tools are currently being sought as a screening method. The challenge lies in the need for a battery capable of adequately evaluating all the auditory mechanisms mentioned and involved in central auditory processing, as well as confirming their effectiveness through comparison with diagnostic tests. Furthermore, recent guidelines suggest the need to consider the use of self-perception questionnaires as an important instrument for screening CAP, since when used appropriately they can contribute to extracting relevant qualitative information in identifying risk behaviors for TPAC[9].

The Scale of Auditory Behaviors (SAB) questionnaire was the tool used in this study and can be completed by parents or teachers. It is easy to apply, with few questions and closed answers. The study describes that children aged 8 to 12 should obtain an average score of 46 points on the questionnaire, with lower values indicating risk for CAPD. The questionnaire was validated for the Portuguese language, in Portugal, in the screening of children between 10 and 13 years old and the use was suggested in other Portuguese-speaking countries[6].

This study aimed to apply the Scale of Auditory Behaviors (SAB) questionnaire to children between 10 and 11 years old in a municipal school in Lages, state of Santa Catarina, Brazil, to identify possible children with CAPD.

METHOD

This is an exploratory, cross-sectional and individual study, whose data were analyzed quantitatively. The research involved 34 children from the 5th and 6th grade of elementary school from a municipal public school with a low socioeconomic level in Lages, state of Santa Catarina, Brazil. Of these, 21 were 10 years old (61.8%) and 13 were 11 years old

(38.2%). The age was chosen based on the adapted and validated data from the SAB questionnaire translated into Portuguese.

Contact with the school was mediated by the Municipal Department of Education, which signed the authorization form for research. The participating classrooms were nominated by the School's diretor. The present study was approved by the Research Ethics Committee of the University of Planalto Catarinense by the protocol 67061622.4.0000.5368. The questionnaire was completed by parents or guardians after signing the Informed Consent Form.

To be included in the study, children had to meet the following criteria:
- Study at the municipal public school indicated by the Municipal Department of Education in the 5th and 6th grade of elementary school.
- Be between the ages 10 and 11 years old at the time of the assessment.

Children outside the proposed age range, incorrect completion of the questionnaire, non-signing of the informed consent form and those with any previous hearing impairment or neurological disorders were excluded from this study.

The SAB questionnaire was used to evaluate participants regarding auditory processing. It has 12 questions related to daily events. Parents scored questions based on frequency of events: 1 for frequente events, 2 for events that occur almost Always, 3 for events that occur sometimes, 4 for sporadically events and 5 for events that never occur. The scores are added together, resulting in a final score that ranges from 12 to 60 points. The version translated into Portuguese can be found in Figure 1.

According to the authors of the questionnaire, in typical auditory behavior around 46 points are expected. Below 35 points, one standard deviation below the mean, would indicate the need for auditory processing assessment. Scores below 30 points, one and a half standard deviations below the mean, would suggest a central auditory processing disorder.

We entered and tabulated the data in the Microsoft® Excel 2016 program, and statistical analysis was performed using SPSS® Statistics Version 26 Software (IBM®).

Figure 1. Scale of Auditory Behaviors (SAB) questionnaire

Behavior items	Frequent	Almost always	Sometimes	Sporadically	Never
1. Difficulty listening or understanding in noisy environment	1	2	3	4	5
2. Does not understand well when someone speaks fast or "muffled"	1	2	3	4	5
3. Difficulty following oral instructions	1	2	3	4	5
4. Difficulty identifying and discriminating speech sounds	1	2	3	4	5
5. Inconsistency of response to auditory information	1	2	3	4	5
6. Poor reading ability	1	2	3	4	5
7. Ask to repeat things	1	2	3	4	5
8. Easily distracted	1	2	3	4	5
9. Academic or learning difficulties	1	2	3	4	5
10. Short Attention Period	1	2	3	4	5
11. Dream awake, seem inattentive	1	2	3	4	5
12. Disorganized	1	2	3	4	5

RESULTS

The studied population consisted of 34 students, 19 from the 5th grade (56%) and 15 from the 6th grade (44%). Regarding the ages of the participants, 21 were 10 years old (62%) and 13 were 11 years old (38%).

Of the 34 children evaluated, 18 (53%) had a value equal to or greater than 46 points. For the central auditory processing screening analysis, it was found that the other part of the group, 16 (47%), had a value below normal of 46 points. According to the authors of the questionnaire, average values, around 46 points, would indicate typical and expected auditory behavior for the age group between 10 and 11 years old.

Of the children evaluated, 5 (14.71%) had a final SAB score below 35 points, one standard deviation below the normal average. Values lower than 35 would indicate a formal assessment of central auditory processing.

It was also found that 3 (8.82%) of the children had a final score below 30 points, one and a half standard deviations below the normal average. Values that indicate central auditory processing disorder, requiring formal assessment, auditory skills training and long-term monitoring. Recommendations for analyzing the SAB questionnaire are found in Figure 2.

Figure 2. Recommendations for analyzing the Scale of Auditory Behaviors questionnaire

Age	Parental response (final score)	Recommendation
10-13 years	Average = 56/SD=3,5	Passed the screening
	Average = 46 points	Failed the screening. Analyze in conjunction with other auditory processing screening tests
	Average = 31-45 points	Failed the screening. Risk for CAPD - indicate formal assessment
	Average = less than 30 points	High risk for CAPD - indicate formal assessment and training of auditory skills

DISCUSSION

Hearing screening should be a simple and quick procedure that is applied to a large number of people with the aim of early identifying those with a high probability of presenting a specific problem and based on this identification, carrying out a complete assessment[10]. The SAB proved to be adequate in such skills, as it is easy to apply, with few questions and closed

answers. According to studies, the higher the SAB score, the better the assessment in auditory processing tests, and it can be inferred that it is possible to use it for a simplified screening assessment[6]. Furthermore, validation for Portuguese allows reconciliation with the application of the questionnaire in Brazil.

Once identified through screening, an assessment of auditory processing (AP) can be conducted through behavioral and electrophysiological auditory tests. Such complementary studies are essential for a complete approach to children who performed below 46 points on the SAB[6].

The original study detected an average of 46.8 points in the responses of parents of children between 10 and 11 years old and a standard deviation of 11.5. Our study verified that the data found in the city of Lages/SC are close to those available in the literature consulted. We obtained a sample mean of 45.41 points with a sample standard deviation of 10.

A survey of the prevalence of speech disorders in schoolchildren between five and ten years old showed a prevalence rate of 24.6%. The authors related these changes to the parents' socioeconomic factors and confirmed that the rate of change was higher in children whose parents had a lower level of education[11]. The socioeconomic situation of the parents of the children evaluated in the present study may also have justified the high rate of children in need of additional evaluation.
Another study found that 26% of children between seven and nine years old had some type of vocal disorder. The most significant aspect of this research was that 95.7% of the parents of these children do not notice changes in their children's voices[10]. This data highlights the importance of speech therapy work in the school community, guiding and clarifying families regarding children's vocal and hearing health.

The study has limitations despite the relevance of the results found. It was carried out with a small and unrepresentative sample of the population, as there was little interest in cooperation from parents in answering the questionnaire sent via the school diary and from the school board in publicizing and requesting the return of answers. These facts highlight the need for more information and studies on the topic, which is of fundamental relevance to children's academic performance.

CONCLUSION

Despite the limitation in the number of children studied, it is possible to infer, through the correlation of the SAB with auditory processing tests seen in previous studies, that some of the participants would need a complementary assessment. For greater investment and population knowledge about the disorder, future research with a greater number of participants and joint hearing tests should be encouraged for adequate identification and treatment.

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Autores
Kosma Pires de Oliveira, Adriana
Zanon de Freitas, Lucas
La Porta Matos, Luiza

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