RELATIONSHIP BETWEEN DATA COLLECTED DURING THE INTERVIEW AND AUDITORY PROCESSING DISORDER

Relação entre dados coletados na anamnese e distúrbio do processamento auditivo

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ABSTRACT

Purpose: the aim of this study was to attempt to correlate data from auditory processing with the data collected during the interview of children and teenagers. **Method:** we analyzed the information from medical records of 51 patients of both genders, ages 5 to 20 years, assisted at the auditory processing evaluation service, UNIFESP. The features observed in the interview were: learning difficulties, presence of depression / motivation, use of medication, need for psychological treatment or pedagogical, and problems with attention and memory. **Results:** we found 86% of cases with learning difficulties, 43% were receiving psychological treatment or pedagogical, 37% had problems with attention and memory, and 33% were using medication. None of these symptoms, however, could be associated with changes in temporal processing (ordinance and resolution) and recognition of non-verbal sounds in dichotic task (selective attention). **Conclusion:** it is necessary to produce new studies to discuss the emotional and social issues received during the interview that possibly are related to auditory processing disorders and learning difficulties.

KEYWORDS: Auditory Perception; Learning Disorders; Medical History Taking

INTRODUCTION

The integrity of the peripheral and central auditory systems is a pre-requisite for the acquisition and development of language. However, the assessment of auditory processing is extremely important, because it verifies how an individual receives the acoustical information using auditory abilities that are essential to learn what is heard[1].

The auditory processing evaluation investigates how one receives, analyses and organizes the acoustical environment information verifying the capacity to pay attention, detect, discriminate and localize sounds, besides organizing, memorizing and integrating the auditory experiences to obtain recognition and comprehension [2]. Alterations in these areas may lead to social, psychic and educational development alterations [3].

It is not enough to simply identify the presence of an auditory processing alteration to make the clinical and educational interventions occur, being also necessary to qualify this alteration[4]. The impact of the auditory processing disorder varies from person to person and from situation to situation [5]. Early diagnosis may diminish the implications in one´s social and academic life [6].

Auditory processing disorders may present one or more behavioral manifestations such as: speech and language production problems (oral communication); comprehension difficulties in noisy environments; dysgraphia

(written communication); inadequate social behavior (agitation, distraction); inferior school performance in reading, grammar, orthography,

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Conflito de interesses: inexistente

math, and impaired attention to sound (localization, discrimination, identification and memory)[5,7-9].

According to the ASHA definition, auditory processing consists of processes of the auditory system that result in many behavioral phenomena including speech and language, presenting a neurophysiologic as well as a functional correspondence[10].

Comprehension, or the individual´s ability to follow verbal commands, comprehend class discussions, retain information or comprehend the meaning of new words, answer questions, give opinions, make use of language, as well as the presence of phonemic, syntactic, or semantic deviations are clues that indicate a possible auditory processing disorder. Other clues that include characteristics related to moods such as: mood instability; aggressiveness, hyperactivity or apathy[11].

The learning difficulties are originated in the problems with the neurophysiologic, emotional, motor, language or sociability development [12]. The emotional aspects are relevant in studies of auditory processing, and hence, a careful approach that includes not only language, attention and memory but also acoustical analyses of the signal as well as higher cognitive processes is fundamental[13,14].

The intervention and compensatory strategies when combined to the individual´s development may bring about benefits to those presenting auditory processing disorders[8].

The individual may not present a specific perceptual problem but present a motivational or even an emotional problem. In the clinical work children with a history of learning difficulties may present associated problems that go way beyond communication, such as the psychiatric disorders - psychological problems. This is because they generate: shyness, anxiety, insecurity, lack of motivation, low self-esteem and an academic performance inferior to the expected[15].

The interview conducted before the assessment is a careful and detailed investigation of clues that might help with the diagnostics hypothesis, as well as point to the selection of test battery. The well defined history becomes the base of the differential diagnosis [3]. Among the aspects that deserve attention are: data regarding social and emotional development.

The goal of this research was to determine, if any, the relationships between the auditory processing assessment data and the data collected at the interview of children, teenagers and youngsters at the following domains: school learning difficulties, presence of depression / lack of motivation, use of medication, need of psychological or psychopedagogical problems, and attention and memory problems.

METHODS

The present study was approved by the Ethics and Research Committee at the São Paulo Federal University with the CEP 1846/07.

The research was conducted with the database from the Auditory Processing Assessment Service from the Department of Speech-Language Pathology from UNIFESP in 2005. Randomly 51 protocols of subjects, aged 5 to 20 years and of both genders. There were no exclusion criteria, all collected protocols were analyzed.

They were divided in two age groups, from 5 to 11 years of age and from 12 to 20 years of age, with the intent of obtaining a more equal distribution of subsamples for the application of inferential statistics.

Data related to the routine exams used in the auditory processing evaluation registered in the protocols (interview, verbal and non-verbal sequential memory test, five direction sound localization test, speech in noise test, randomized gap detection test – RGDT, non-verbal directed dichotic listening test and sound pattern recognition test) were tabulated and analyzed by auditory inabilities, inadequate physiological mechanisms, types of gnosic auditory deficits and a history of school difficulties, depression and/or lack of motivation, use of medication, psychological and/or psychopedagogical treatments, and attention and memory problems.

History of depression and lack of motivation in school, and the registers of psychological and/or psychopedagogical treatments that could provide clues regarding emotional problems that should be further investigated were specially posted. The data was meant to find the better comprehension of the information and deepening of some other that could be passing unrecognized.

Collected data were transformed into descriptive frequencies and statistically analyzed with the application of the Two Proportions Equality Test and the Chi-squared Test, with a 95% ($p \leq 0.05$) significance level. During all statistical analyses the confidence intervals constructed had 95% confidence.

RESULTS

The sample was made up of predominantly of male subjects (82%, n=42), but there was no significant difference observed for the gender comparison (p=0,598). The age range group of 5 to 11 was composed of almost 20,0% female subjects and 80,0% of male subjects, hence the age range group of 12 to 20 had 14.3% female subjects and

85.7% male subjects. Regarding the researched ages most data base was between 7 and 15.

The descriptive frequencies were analyzed and distributed according to the subjects age groups, relative to the individual aspects selected for this study. The history of school problems was observed for 80% (n=24) of the subjects aged 5 to 11, and for 95.2% (n=20) of those aged12 to 20. There was no statistically significant difference between the age groups for each studied individual aspect (Table 1).

Place Table 1 here

There was more difficulty regarding the abilities of figure-ground for non-verbal sounds and temporal ordering of verbal and non-verbal sounds for both age groups. When different age groups were analyzed regarding the prejudiced auditory abilities it was possible to observe the statistically significant difference abilities: auditory closure (p=0.049) and temporal ordering of sound patterns (p=0.007). There were no differences between the age range groups for the other studied variables (Table 1).

The analyses of types of auditory gnosic deficits for the different age groups did not reveal a statistically significant difference. For the age group of 5 to 11, 80% (n=24) presented decoding problems, 46.7% (n=14) coding problems, 56.7% (n=17) organization problems and 86.7% (n=26) non-verbal problems. For the age group of 12 to 20, 85.7% (n=18) presented decoding problems, 28.6% (n=6) coding problems, 57.1% (n=12) organization problems and 76.2% (n=16) non-verbal problems.

The associations between the auditory processing altered physiologic mechanisms and the individual aspects selected for this study are displayed in Tables 2 to 4. There was no significant relation between these variables.

Table 1 - Distribution of presented individual aspects and prejudiced auditory abilities by age groups

			Age groups				
			5 to 11 years		12 to 20 years		p-valor
			N	%	N	%	
Individual aspects	School problems		24	80.0%	20	95.2%	0.120
	Depression/lack of motivation		1	3.3%	1	4.8%	0.796
	Use of medication		11	36.7%	6	28.6%	0.546
	Psychological or psychopedagogical treatment		11	36.7%	11	52.4%	0.265
	Attention and memory problems		11	43.3%	6	28.6%	0.283
Auditory abilities	Sound Localization		1	3.3%	0	0.0%	0.398
	Auditory closure		5	16.7%	0	0.0%	0.049*
	Temporal Resolution		1	3.3%	0	0.0%	0.398
	Figure ground for non verbal sounds		20	66.7%	12	57.1%	0.489
	Temporal Ordering	18	60.0%		14	66.7%	0.628
		5	16.7%		11	52.4%	0.007*

Legend: n - number of subjects; p value - calculated by the Chi squared independence Test.

Table 2 - Distribution of frequencies relative to the individual aspects selected for the study according to temporal processing (ordering)

Individual aspect	Temporal Ordering				Calculated p value
	Normal		Altered		
	n	%	n	%	
School problems	10	50.0	34	37.0	
Depression / lack of motivation	1	5.0	1	1.1	
Use of medication	2	10.0	15	16.3	
Psychological or psychopedagogical treatment	4	20.0	18	19.6	
Attention and memory problems	3	15.0	16	17.4	0.501

Legend: n - number of individuals ; p value - calculated by the Chi squared independence Test.

Table 3 - Distribution of the frequencies of the altered socio-emotional aspects according to the recognition of non-verbal sounds overlapping dichotic listening (selective attention)

Individual aspect	Selective attention				Calculated p value
	Normal		Altered		
	n	%	n	%	
School problems	5	83.3	39	36.8	
Depression / lack of motivation	0	-	2	1.9	
Use of medication	0	-	17	16.0	
Psychological or psychopedagogical treatment	1	16.7	21	19.8	
Attention and memory problems	0	-	19	17.9	0.330

Legend: n - number of individuals; p value - calculated by the Chi squared independence Test.

Table 4 - Distribution of the frequencies of the individual aspects selected for this study according to temporal processing (temporal resolution)

Individual aspect	Temporal Resolution				Calculated p value
	Normal		Altered		
	n	%	n	%	
School problems	27	37.5	17	42.5	
Depression / lack of motivation	2	2.8	0	-	
Use of medication	10	13.9	7	17.5	
Psychological or psychopedagogical treatment	14	19.4	8	20.0	
Attention and memory problems	14	19.4	5	12.5	0.815

Legend: n - number of individuals; p value - calculated by the Chi squared independence Test.

DISCUSSION

This study sought to highlight the emotional aspects analyzed by means of the initial interview in order to obtain a possible improvement in the patient´s assessment report, hence it is the determining element of the therapeutic planning as well as of the need of further referrals.

In many studied protocols data entries were missing, what made the interpretation of findings difficult. The lack of information brought about doubts regarding the absence of a complaint or if simply it had been omitted. The fact points to the need of both a more complete interview exploring issues of emotional order as well as the filling out of the information, which needs to be more careful.

Regarding the gender variable there was a much higher number of protocols of boys than of girls. One explanation for this phenomenon is the fact that during the gestation of boys, the mother produces high levels of testosterone and, possibly, this exposure may prevent the growth of the left hemisphere and stimulate development of the right hemisphere[16]. These results agree with another study in which a worse performance was noted for the males in reading comprehension. Therefore, the gender disadvantage of males over females in tasks of decoding may be related to the hormonal influence in brain development. However other researches are needed to clarify this possible difference.

The maturation of the auditory pathway has already been observed in many studies using electrophysiological tests [18,19], with best responses being verified from birth to up to age 12, when response patterns have become similar to those of adults. The same thing happens with the auditory processing behavioral tests, with studies reporting a quantitative improvement in responses with the growth in age, specially between the ages of eight and ten[20,21].

To obtain a better analysis of the responses , taking into account the auditory maturation aspects, this study used age groups. Before 7 years of age, it´s not always possible to detect school difficulties, that, however, these children already display important problems regarding their auditory behavior that require to be diagnosed as early as possible.

It was possible to observe an improvement in the auditory abilities of sound localization, closure, temporal resolution, and figure-ground for non-verbal sounds as age increased. There was a statistically significant difference for the auditory closure ability between age groups.

An important impairment of the auditory closure ability may generate a comprehension difficulty in noisy environments. And, consequently, writing difficulties are noted, such as: auditory perceptual errors and also an impaired graphic comprehension and elaboration[22]. The result of this study is in agreement with the literature that observed that children at 10 years of age with school difficulties presented a low performance on the speech in noise test[23].

The auditory abilities of: temporal ordering, and figure-ground for non-verbal sounds presented the worst performances in the age group 12 to 20. Authors indicated in studies conducted with children with learning disorders, that little response improvement was detected with age mainly in dichotic tests[24]. The low performance was associated with a possible delay in maturation of the corpus callosum, and the maturation aspects are related to the delay in the development of auditory abilities.

With the objective of studying auditory processing alterations in children with specific reading disorder a research suggested that the signs of the disorder are associated with the auditory inabilities of temporal ordering of verbal sounds, closure, ground figure for verbal and non-verbal sounds, directed listening, and sound pattern identification [25]. Therefore, in this study, the school complaint referred at the interview may be associated to a specific reading disorder, hence a low performance was found for the auditory abilities of temporal ordering and figure-ground for non-verbal sounds.

Regarding the selected individual aspects, taking the entire sample, school difficulties were the most common complaint in the interview. Research found that individuals with complaints of school difficulties usually presented a worse performance in the auditory abilities processing tests due to the delay of maturation of the auditory abilities[26], which are fundamental for the process of learning how to read and write[23].

Some studies show that some school aged children present a shorter memory span for the sound material presented [27]. This may indicate that the second most common complaint in the interview of children aged 5 to 11, has been memory and attention difficulty.

The findings of this study revealed some difficulties in the development of the auditory abilities, in both age groups, with a higher prevalence of the abilities of figure ground for non-verbal sounds and temporal ordering. A deficit in this ability may prevent the correct processing of information and, as a consequence, may affect the normal school development [28].

Regarding the temporal ordering ability for sound patterns there was a higher difficulty for the age group of 12 to 20, with a statistically significant difference ($p=0.007$). Probably this higher occurrence was due to the fact that the test was not applied to lower age groups because of neurologic maturation was still developing and also need to use test batteries of short duration.

Regarding the alteration of the gnosic processes, they were similar in both age groups studied. It is worth to point out the high incidence of alterations of the gnosic processes of non-verbal decoding (3/5 of the sample), and of organization (3/5 of the sample) for both age groups.

According to the literature decoding is considered the process that is the most specific to the auditory modality, being considered the true auditory processing disorder[4,29]. This kind of alteration presents difficulties such as when discriminating the

heard sounds, analyzing speech sounds, difficulty to hear in noisy environments, use of restricted vocabulary, substituting graphemes when writing, and interference in reading[17]. The decoding alteration is associated to the high number of complaints of school difficulties in this study.

The individuals with non-verbal deficits present difficulty to identify and/or use the supra-segmental features of speech, and present difficulty in the temporal processing tests[3]. The same thing happened in this study. There was a high index of sound pattern recognition problems, and, therefore, difficulties of the non-verbal gnosic process.

The organization problems (sequential memory) may indicate difficulties in organizing, sequencing , planning and/or producing responses. The abilities that depend on organization and memory and on the phonological representation at long term are frequently decreased [3]. Therefore, it agrees with the findings of this study, that presents many complaints of attention and memory, and difficulties of the auditory abilities of temporal ordering.

On the more direct objectives of this study, that is, to establish associations between problems in auditory processing, more specifically those represented by temporal processing and of non-verbal sound recognition in monotic listening and the selected individual aspects in this study, there were no significant associations identified. This indicates that there is a high frequency of signs associated to school and behavior difficulties in patients with auditory processing disorder, independently of age and of the type of problems displayed.

CONCLUSION

No significant difference between the frequency of the selected individual aspects was observed when the age groups from 5 to 10 and 11 to 20 were compared. However, it is important to highlight the high frequency of subjects with school difficulties (86%) and attention and memory problems (37%).

This study allowed us to show need for further research that might discuss emotional and social issues noted at the interview and that, eventually, are related to the auditory processing disorder and complaints of school problems.

RESUMO

Objetivo: o objetivo deste trabalho foi tentar relacionar dados da avaliação do processamento auditivo com os dados coletados na anamnese de crianças, adolescentes e jovens. **Método:** foram analisadas as informações dos prontuários de 51 pacientes, de ambos os sexos, com idade de 5 a 20 anos, atendidos no Serviço de Avaliação do Processamento Auditivo, da UNIESP. Os aspectos observados na anamnese foram: dificuldades escolares, presença de depressão/desmotivação, uso de medicamentos, necessidade de acompanhamento psicológico ou psicopedagógico, e problemas de atenção e memória. **Resultados:** foram encontrados 86% dos casos com dificuldades escolares, 43% faziam acompanhamento psicológico ou psicopedagógico, 37% apresentavam problemas de atenção e memória, e 33% faziam uso de medicamentos. Nenhum desses sintomas, porém, puderam ser associados com alterações no processamento temporal (ordenação e resolução) e reconhecimento de sons não verbais sobrepostos em escuta dicótica (atenção seletiva). **Conclusão:** é necessária a produção de novos estudos que possam discutir as questões emocionais e sociais recebidas na anamnese que, eventualmente, estão relacionadas aos distúrbios do processamento auditivo e queixas de dificuldades escolares.

DESCRITORES: Percepção Auditiva; Transtornos de Aprendizagem; Anamnese

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