

EVALUATION OF COGNITIVE AND SOCIAL-AFFECTIVE DEVELOPMENT OF CHILDREN WITH HEARING LOSS

Avaliação do desenvolvimento cognitivo e afetivo-social de crianças com perda auditiva

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ABSTRACT

Purpose: the objective of this study was to evaluate the level of cognitive, affective and social development of children diagnosed with hearing loss. **Method:** the study included 50 children diagnosed with hearing loss, with a mean age of 16.1 months, both genders. We applied a semi-structured interview with parents for the life history of the child, Scale Development and Behavioral Assessment Scale Reaction Baby Retraction. **Results:** the study identified 80% of children with bilateral profound hearing loss. Quotient of normal development occurred in 76% of the sample and the most affected functions were language and personal-social. The affective and interactional levels adjustment were characterized by the alarm reactions for personal problems and social interaction. **Conclusion:** the dephased verbal and nonverbal competences showed implications on cognitive development, suggesting the hearing loss condition and associated risk factors, with limited situational communicative exchanges that promote the development of adaptive skills and increased the self-esteem on the relationships.

KEYWORDS: Child Development; Hearing Loss; Cognition; Behavior

■ INTRODUCTION

Three newborns out of one thousand births have hearing loss, and among newborns at risk, the incidence is 6:1000 ¹⁻⁴. Advances in care to

newborns at high risk led to the increased rate of survival with growing interest of health professionals in identifying risk factors of child development ⁵⁻⁷.

Hearing disorder in childhood can cause various effects in communication and a number of secondary consequences, such as cognitive-perceptual, emotional, social, educational and intellectual changes, being considered a striking factor, especially in the first years of life ⁸⁻¹¹. In this sense, it severely restricts children's ability to develop spoken language, since this is the period in which occurs the maturation of the auditory system.

Language plays a critical role in the perceptual organization, receipt and structuring of information, learning and social interactions of human being. The American Speech-Language-Hearing Association believes hearing loss accounts for 60% of communication disorders.

A child with hearing loss, unable to communicate properly, understand and be understood might

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become isolated, withdrawn and have difficulty in affective and social interaction¹²⁻¹⁵.

Regardless of the type of gap or severity of hearing loss, resources of development should be identified early, since resulting changes can interfere with the cognitive and psychosocial aspects^{16,17}. In general, global development evaluation procedures are performed through standardized tests and specific protocols, being extremely useful to understand motor, language, psychosocial and adaptive impacts¹⁷. The development scales reflect the major gains in the course of ages and identify signs of evolution, considering the history of life and the systematic direct observation of behavior as reference.

The Behavioral Development Scale proposed by Gesell and Amatruda¹⁸ has been used to monitor the development of children at risk. The evaluation of the overall development of children with sensorineural hearing impairment enables to identify efficient performances of preserved compensatory functional areas, reducing potential false diagnoses.

Since the first day of life children learn how to master different mental and emotional functions through the loving presence and peacefulness of their parents given their rocking arms, affection, smiles, soft voice and whispering songs that teach frustration and uneasiness have an end and are followed by a reward.

Thus, babies act motivated by their needs and distresses. Early in their emotional development, the way children get rid of unpleasant experiences they cannot avoid is through motor discharge and body activities. By assigning a meaning to hunger, thirst, pain, joy, anger, sadness, or their multiple emotional experiences, children develop the representation and symbolization of the world, of shared things and emotions, using verbal and nonverbal language.

In assessing children's behavior at early stages of development, the symptoms observed concerns, most of the time, eminently reflex actions, important for the detection of major neurological disorders. Equally important, the affective and emotional aspects often impact the interactive and linguistic pattern of the affected individual, indicating risk to potential adaptive skill¹⁹. Given the difficulties to diagnose specific psychiatric disorders in early ages, Brazelton²⁰ and Guedeney²¹ used the concept of withdrawal response as a precursor of psychiatric conditions, as an indication of normal regulation of interaction and first signs of anguish, characterizing the alarm response to most of the psychological conditions, especially depression.

In this context, the objective of this study was to evaluate the level of cognitive and emotional-social development of children diagnosed with hearing

loss through the Behavioral Development Scale and the Alarm Distress Baby Scale.

■ METHOD

This is a descriptive study on the characteristics of children with hearing loss and the relation among cognitive-affective-social variables.

A total of 50 children participated in this study, 31 male and 19 female, mean age 16.1 months, diagnosed with different degrees of hearing loss enrolled in the evaluation program for cochlear implant surgery at the Hospital for Rehabilitation of Craniofacial Anomalies – USP. The Behavioral Development Scale by Gesell and Amatruda¹⁸ and the Alarm Distress Baby Scale^{19,20} were applied. A semi-structured interview with parents for the history of life of the child was conducted.

The observations obtained using the Behavioral Development Scale by Gesell and Amatruda¹⁸ were supplemented with information obtained from parents. We assessed the child's development in five areas of behavior: 1) *adaptive behavior*: we observed the child's skill as regards organization of stimuli, perception of relations, decomposition and reintegration of the whole with the parts; 2) *gross motor behavior*: we evaluated postural responses, balance of the head, and posture at standing, sitting and walking; 3) *fine motor behavior*: we observed the ability to use hands and fingers to manipulate objects, 4) *language behavior*: we observed facial expressions, gestural and postural movements, vocalizations, words, phrases or sentences, including imitation and understanding of communication with others, 5) *personal-social behavior*: we observed personal responses of the child in their social environment, considering the rules and variations of individual education.

The scale describes that the Developmental Quotient (DQ) of a child with average results is 100. Values between 85 and 68 are considered borderline and would have implications in terms of monitoring. Values below 68 indicate significant delay in one or more areas of development¹⁸.

The Alarm Distress Baby Scale is a clinical scale featuring eight categories (facial expression, eye contact, general level of activity, self-stimulation gestures, vocalization, briskness of response to stimulation, relationship and attractiveness) that allow the tracking of potential psychiatric symptoms. Each category contains a list of behaviors that should be evaluated and ranked on a scale of 0 to 4 points. 0 represents normal standards; 1 is equivalent to a dubious score on pathological character; 2 means minor alterations; 3 shows defined losses; and 4 indicates intensified pathological signs. The

total score results from the arithmetic sum of the scores obtained²⁰.

Prior to data collection, the ethical procedures for research were adopted, and the project was approved by CEP/HRAC-USP – Protocol No. 099/2008.

A comparison of results between the scales used in this study considered the five fields of development and the sum of these, using the nonparametric Kruskal-Wallis test. The measures of position (minimum value, 1st and 3rd quartiles, median, maximum value) were considered and the value of the test with related descriptive level (“*valor-p*”). Significance level was 5%.

■ RESULTS

The history of life led to the identification of bilateral profound hearing loss in 80% of the sample, 17% mild and 3% moderate. Considering the etiology, 42% of children had congenital factors, 70% had multifactorial conditions related to idiopathic, neuropathic, infectious (meningitis and

cytomegalovirus) components and ototoxic drugs. Results showed 42% of cases in which hearing loss was due to congenital factors.

Gestational age ranged between 6 and 10 months (26.1% preterm and 2.1% post-term) and 32% were SGA (small for gestational age).

In this study, 76% of the cases had global development, namely the Developmental Quotient (DQ), rated in the normal range, but 20% slightly lagged, 2% moderate and 2% severe.

When comparing DQ with risk factors, there was no statistical significance (nonparametric Kruskal-Wallis test). However, analyzing the descriptive factors of development, gaps were found in language and personal-social areas. In the language area, 84% had lower performance in verbal and non-verbal tasks related to understanding and expression. As regards personal-social behavior, 62% of subjects had low gain (absent). Broad or global (gross) motor skills were the best *performances* in the group studied (TABLE 1).

In this study, the mean age was 16.1 months (TABLE 2).

Table 1 – Representation of development acquisitions

Behaviors	Absent	Present
Adaptive	38	62
Fine motor	30	70
Gross motor	24	76
Language	84	16
Personal/ social	62	38
Average	47.6	65.5

Table 2 – Representation of age, developmental quotient and age

Variables	N	Average	Standard deviation	Min.	Median	Max.	P-value
Age (months)	50	16,1	7,7	3,0	14,0	35,0	0,23
DQ	50	86,7	14,6	24,6	90,0	104,6	0,38
DA	50	13,6	6,2	2,6	13,8	27,0	0,16

Nonparametric Kruskal-Wallis test, with 5% significance level.

The developmental age (DA) appeared inconsistent with chronological age, with an average of 13.6 months. The developmental quotient (DQ) with a score of 86.7 represented appropriately based index of global development. Thus, although the group had changes in the level of acquisitions (DA), it is in the middle range at this level. The discrepancy between the developmental age and the developmental quotient can be understood by the gap identified in 24% of the sample, shown in Table 1.

When comparing DQ with Adaptive, Gross Motor, Fine Motor, Language and Social Behaviors, significant results were identified, with $p < 0.05$ (TABLE 3).

The quality indicators of emotional-affective interaction, verified by the Alarm Distress Baby Scale,

showed significant results, reported under “*doubt as to the pathological nature*”. According to the scale, the higher the number of absent behaviors, the better the behavior observed in the levels of affective and interactional adjustment (TABLE 4).

Although the item “*doubt as to the pathological nature*” shows statistical significance, 84% of subjects had satisfactory answers, indicating the absence of comorbidities specific to the relationship, identified by the index of regulation for the interaction.

When comparing the level of withdrawal with DQ, the observed behavior relative to “Eye Contact” under *doubtful nature* was statistically significant ($p = 0.042$), indicating that subjects with this aspect of doubt had increased risks for the diagnosis of relational problems.

Table 3 – Multiple comparisons of the developmental quotient, tested by age, according to adaptive, gross motor, fine motor, language and personal-social behaviors

Adaptive	p	Gross Motor	p	Fine Motor	p	Language	p	Personal/ social	p
0 and 1-2	0.97	0 and 1-2	< 0.01*	0 and 1-2	0.29	0 and 1-2	0.02*	0 and 1-2	<0.01*
0 and 3-4	0.04*	0 and 3-4	0.35	0 and 5-6	< 0.01*	0 and 3-4	0.75	0 and 3-4	0.01*
0 and 5	<0.01*	0 and 5-6	0.12	1-2 and 5-6	0.61	0 and 5	0.03*	0 and 5-6	<0.01*
1-2 and 3-4	0.01*	1-2 and 3-4	0.87	-	-	1-2 and 3-4	0.89	1-2 and 3-4	0.49
1-2 and 5	<0.01*	1-2 and 5-6	0.99	-	-	1-2 and 5	0.88	1-2 and 5-6	0.17
3-4 and 5	0.33	3-4 and 5-6	0.72	-	-	3-4 and 5	0.86	3-4 and 5-6	0.36

Nonparametric statistical test Behrens-Fisher-Test, where $p < 0.05$ indicates significant difference on the comparison of results.

Table 4 – Representation of results from the Alarm Distress Baby Scale

Observed behavior	Absent (%)	Doubts as to pathological nature (%)	More discrete pathological sign (%)	Apparent to all (%)	Intense (%)
Facial expression	74	26	0	0	0
Eye contact	82	18	0	0	0
General Level of Activity	88	10	2	0	0
Self-stimulation Gestures	94	2	4	0	0
Vocalization	75	26	0	2	0
Briskness of response to stimulation	94	6	0	0	0
Relationship	84	10	6	0	0
Attractiveness	82	16	2	0	0

■ DISCUSSION

The idiopathic or unknown etiology of congenital hearing loss prevails over the other causes, which shows the need to routinely carry out genetic studies in order to obtain a real profile of the prevalence of congenital hearing loss causes^{3,4}.

Children born prematurely and underweight are at risk for developmental delay and neurological disorders due to the immaturity of their nervous system. However, not only the somatic factors determine the baby at risk, but also the environmental factors, which may cause deficits in the motor, sensory, mental and emotional aspects³⁻⁸.

The low gain, characterized by the absence of personal and social behavior, represented limited acquisition patterns related to the social culture and influenced by the environment. Thus, communication difficulties of children with hearing loss suggest a high likelihood of reduced interactions with parents.

Broad or global (gross) motor skills were the best performances in the group studied. Even deaf, a baby usually has typically normal motor development at the expected level, considering their age, in assessments that adopt scales of child development^{6,7}, as well as the results obtained in this study.

Whereas hearing loss during early development (0-2 years) may strongly interfere with normal communication skills, compromise language acquisition and hinder psychosocial relationships, the child that cannot understand the context and make themselves understood may get frustrated and become withdrawn, and this represents a risk factor for behavioral and cognitive disorders.

The quality of the affective and emotional interactions observed in this study showed high indicators of "doubt" that constitute the alarm response, often observed in children with relationship issues, being hearing loss condition, presumably, the risk factor for such manifestations¹⁸.

In addition to language skills, the use of visual systems in communication can facilitate the development of skills related to affective and emotional interactions^{15,18} in children with hearing loss. Therefore, reporting "eye contact" as doubtful nature, found in this study, is a suggestive risk factor for the acquisition of communicative skills.

■ CONCLUSION

The study showed that complications caused by multiple factors were significant to the development, such as prematurity and SGA, which represented important risk factors for development losses in 20% of the sample (10 subjects).

In assessing development, the most significant gaps occurred in activities related to language understanding and expression, both verbal and nonverbal. Losses were also identified in the relational skills of the personal and social behavior. As regards optimization of resources, motor skills were the most preserved functions of the development.

Whereas hearing loss in the overall development of the child, especially in the early stages, the normal intelligence pattern (DQ preserved) does not ensure the same level of cognitive functions, causing losses in the developmental age (DA).

The levels of affective and interactional adjustment observed in this study featured alarm responses to problems related to personal and social interaction, suggesting implications on the condition of children with hearing loss, circumstantially limited to communicative exchanges that promote self-concept and strengthen self-esteem.

The scores of the cognitive and behavioral development observed suggest implications on the condition of children with hearing loss and on the related risk factors, given children are circumstantially limited to communicative interactions, which promote structural and functional changes, important to strengthen self-esteem and develop adaptive skills.

RESUMO

Objetivo: avaliar o nível de desenvolvimento cognitivo e afetivo-social de crianças com diagnóstico de deficiência auditiva. **Método:** participaram do estudo 50 crianças com diagnóstico de deficiência auditiva, com idade média de 16,1 meses, de ambos os gêneros. Empregou-se a entrevista semi-estruturada com os pais para a obtenção da história de vida da criança, a Escala de Desenvolvimento Comportamental e a Escala de Avaliação da Reação de Retração do Bebê. **Resultado:** o estudo identificou 80% das crianças com perda auditiva profunda bilateral. O Quociente de Desenvolvimento na normalidade ocorreu em 76% da amostra, sendo as funções da linguagem e pessoal-social, as mais prejudicadas. Os níveis de ajustamento afetivo e interacional foram caracterizados pelas reações de alarme para problemas de interação pessoal-social. **Conclusão:** as competências defasadas de habilidades verbais e não-verbais mostraram implicações no desenvolvimento cognitivo, sugestivas da condição da criança com perda auditiva e dos fatores de risco associados, com limitação circunstancial a trocas comunicativas que promovem o desenvolvimento de competências adaptativas e o fortalecimento da auto-estima para as relações.

DESCRIPTORIOS: Desenvolvimento Infantil; Perda Auditiva; Cognição; Comportamento

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