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Original articles

Cognitive language performance of children with cleft lip and palate in reading and writing acquisition phase

Desempenho cognitivo-linguístico de crianças com fissura labiopalatina em fase de aquisição da leitura e escrita

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ABSTRACT

Purpose: to identify the cognitive-linguistic skills necessary for children with cleft lip and palate, in order to learn how to read and write.

Methods: 120 children, with 5 and 6 years old, attending Kindergarten II and 1st grade of primary school, were divided into two groups: G1, consisting of 60 children with cleft lip and palate, and G2, with 60 children without developmental alterations. The Raven Colored Progressive Matrices, the Phonological Skills Profile and the Boston Naming Test were employed.

Results: comparing the performances of the groups, there was statistical difference in intellectual functions, indicating loss in cognitive abilities of G1 ($p = 0.019$). The cognitive-linguistic skills were classified as "Under Attention" for both groups, and discrepancy in G1 was more representative, with 66.7%.

Conclusion: the language skills necessary for reading and writing acquisition proved to be deficient in the cleft lip and palate population, presenting levels of cognitive performance lower than expected for the age and education in most of the modalities evaluated. Limiting environmental factors and low socio-cultural status of the sample were suggestive of additional interference to the acquisition of cognitive-linguistic pre-skills necessary for satisfactory performance of the academic tasks, such as reading and writing.

Keywords: Language; Cleft Palate; Reading and Writing

RESUMO

Objetivo: identificar as competências cognitivo-linguísticas necessárias ao aprendizado da leitura e da escrita de crianças com fissura labiopalatina.

Métodos: participaram 120 crianças, de 05 e 06 anos, cursando o Jardim II e o 1º ano do ensino fundamental, compondo dois grupos: G1, formado por 60 crianças com fissura labiopalatina, e G2, com 60 crianças sem alterações no desenvolvimento. Empregaram-se as Matrizes Progressivas Coloridas de Raven, o Perfil de Habilidades Fonológicas e o Boston Naming Test.

Resultados: comparando os desempenhos dos grupos, verificou-se diferença estatística nas funções intelectuais, indicando prejuízos nas habilidades cognitivas do G1 ($p=0,019$). As competências cognitivo-linguísticas foram classificadas "Sob Atenção" para ambos os grupos, sendo mais representativa a defasagem no G1, com 66,7%.

Conclusão: as competências linguísticas necessárias para a aquisição da leitura e escrita mostraram-se deficitárias na população fissurada, com níveis de desempenho cognitivo inferior ao esperado para a idade e escolaridade, em grande parte das modalidades avaliadas. Fatores ambientais limitantes e o baixo nível sociocultural da amostra foram sugestivos de interferência adicional à aquisição das pré-competências cognitivo-linguísticas, necessárias ao desempenho satisfatório de tarefas acadêmicas como a leitura e escrita.

Descritores: Linguagem; Fissura Palatina; Leitura; Escrita

INTRODUCTION

There is a growing interest regarding the amount of children with low performance in learning how to read and write, who remain in the classroom without following academic activities, fostering a negative self-concept in relation to the ability to learn[1]. In the school context, the children with cleft lip and palate are exposed to discriminatory situations resulting from facial deformity, speech and voice alteration, with risks of difficulties in the development of oral and written communication, which significantly interfere in the learning process[2,3].

Among the interfering conditions concerning reading and writing, the cognitive-linguistic disabilities are present, resulting from alterations in the language components. Longitudinal researches in literature show that children with cleft lip and palate present increased risk for language deficits, since they exhibit significantly lower scores in receptive and expressive language, when compared to children without cleft lip and palate[4-6].

The children with cleft lip and palate may present speech[7], orthodontic[8] and emotional[3], disabilities, and therefore these conditions are considered as risk factors for low academic performance[9]. Although some studies report no relationship between facial deformity and intellectual underperformance[10], others report deficits in cognitive abilities of children with cleft lip and palate, justified by alterations in auditory functions and / or speech, essential to the learning process, including reading.

In order to read, children should acquire certain cognitive skills, necessary to understand that letters correspond to the segmentation of sounds, that is, they represent the phonemes. Among the mechanisms which compose the linguistic processing, the phonological awareness is present, which implies the formal language characteristics awareness[11]. Although some children already present lack of cognitive-linguistic resources[12] on the 1st grade, important for learning how to read and write, a large amount is not identified until the 3rd or 4th grade (not unusual in adolescence), procrastinating the problem without guiding to an effective orientation. Thus, the identification of language skills for reading and writing of children in preschool and early elementary school may represent an important bias in early recognition of serious difficulties in the academic context.

Despite the demands and complaints concerning learning,[9,13] the evaluation of the initial skills for the acquisition of reading and writing in preschool children is not explored among this population, in general[14], thus, it is inexistent for children with cleft lip and palate, so, the development and the relationship patterns established with other cognitive domains are practically unknown.

Therefore, this study aimed to identify the cognitive-linguistic skills necessary for children with cleft lip and palate to learn how to read and write.

METHODS

Initially, ethical research procedures were adopted according to the National Council of Health CNS466 / 2012, approval n° 517168 by the Ethics Committee on Human Research of the Craniofacial Anomalies Rehabilitation Hospital HRAC / USP, and subsequent signature of the Informed Consent by the participants of the study.

The sample consisted of 120 participants, both genders, aged between 5 years and 6 years and 11 months, attending kindergarten II and the 1st grade of elementary public schools in a town in the interior of São Paulo State, forming two groups: G1, comprising 60 participants with cleft lip and palate, 23, with pre-foramen type, 13, post-foramen and 24, trans-foramen; and G2, comprising 60 participants without craniofacial abnormalities or other alterations in development, as the comparison group. For inclusion criteria, participants of G1 had to be enrolled in the rehabilitation hospital where the research was conducted; and G2, had to be enrolled in the public school. Both groups should be aged as required and should have signed the consent for spontaneous participation in the research. Children diagnosed with neurological, psychiatric, sensory or syndrome alterations, limited to instrumentation, were excluded of the study.

For intellectual resources evaluation, the psychometric standardized test *Raven´s Colored Progressive Matrices - Especial Scale*[15] was employed, consisting of three sets of 12 items: A, Ab and B, arranged in an ascending degree of difficulty. The interpretation of results followed the normative criteria and the classification of the instrument.

To check metaphonology, the *Phonological skills profile*[16] was applied to evaluate awareness, ability to split consciously words into syllables and phonemes. The instrument consisted of subtest analysis, synthesis, segmentation, subtraction, substitution, rhymes, transposition and articulatory image, ranking quantitatively

the performance by age, with classification concerning "*attention"* and *"expected*".

BNT-Boston Naming Test[17] was employed to evaluate the language skills by naming figures, presenting 60 drawings in an ascending order of complexity. The total score was converted into percentiles, and classified according to: *much higher, upper, middle, upper middle, middle, middle lower, borderline and deficit.*

The results were submitted to statistical analysis for comparison of independent variables, using Chi-square test, at a significance level of 5%.

RESULTS

Observing the sample characterization, although not statistically significant between the groups (p = 0.446), there was a predominance of males with 68.3% in G1 and 60% in G2. Regarding the age and education between the groups, there was a statistically significant difference (p <0.001), since in G1, 41.7% of the participants were 5 years old and enrolled in Kindergarten II; and 58.3%, 6 years old, in the 1st grade of elementary school. In G2, 10% of the participants were 5 years old and 90% 6 years old, but 100% were enrolled in the 1st grade of elementary school.

Table 1. Characterization of the subjects in Groups 1 and 2, concerning gender, age and education

Subjects		Males	Females	5 yrs	6 yrs	kindergarten II	1st grade
G1	n	41	19	25	35	25	35
	%	68.3	31.7	41.7	58.3	41.7	58.3
G2	n	36	24	6	54	0	60
	%	60	40	10	90	0	100%

p<0.001 Chi-square

The G1 sample was characterized by participants with cleft lip and palate of different types: 38% (23) participants, with pre-foramen, 22% (13), post-foramen and 40% (24), trans-foramen. Regarding gender, there was a higher incidence of males including pre-foramen (95.7%) and trans (54.2%); in relation to post-foramen, females (53.8%) predominated. As for age, in post-foramen groups (76.9%), 6-year-old children predominated, and trans-foramen (66.7%); for pre-foramen, there was a higher amount of 5-year-old participants (60.9%). In relation to education, the majority of G1 attended the 1st grade (84.6% post-foramen and 62.5% trans-foramen); and 60.9% pre-foramen type, attended Kindergarten II.

To assess the cognitive-linguistic resources of the participants, the instruments described in the methodology were employed, in order to obtain necessary information to meet the objectives of the study, comparing the target group (G1) and the control group (G2). In relation to the intellectual level, the results show a significant difference (p = 0.019) in ratings: *below average* (G1 = 38.3%; G2 = 20%), *average* (G1 = 30%; G2 = 53.3%) *superior* (G1 = 6.7%; G2 = 0), constituting 45% of G1 with lower performance (38.3% "below average" and 6.7% "poor") and G2, 30% (20% and 10%, respectively).

When the competence to identify, isolate, manipulate, combine and segment mentally and deliberately the phonological segments of the language was investigated, there was no statistically significant difference between the groups (p = 0.125), classified as "Under Caution" for both; G 1 with 66.7% and G2 with 53.3%.

When the lexical resources level of the participants was checked, the prevalence of deficient classification was found for both groups, G1 (41.7%) and G2 (66.7%). In reference to borderline classification, G1 (28.3%) and G2 (10%) presented statistically significant difference (p = 0.036). The minority of the participants in both, G1 and G2 presented superior classification (G1 = 1.7, G2 = 3.3%) and average for (G1 = 15%, G2 = 8.3%).

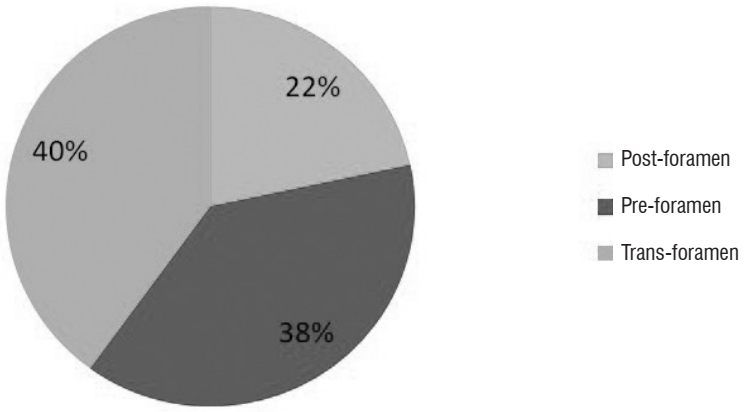
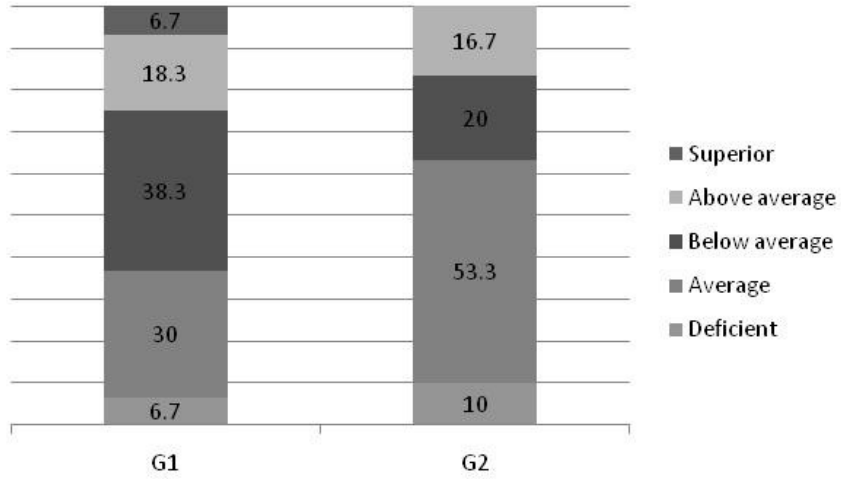
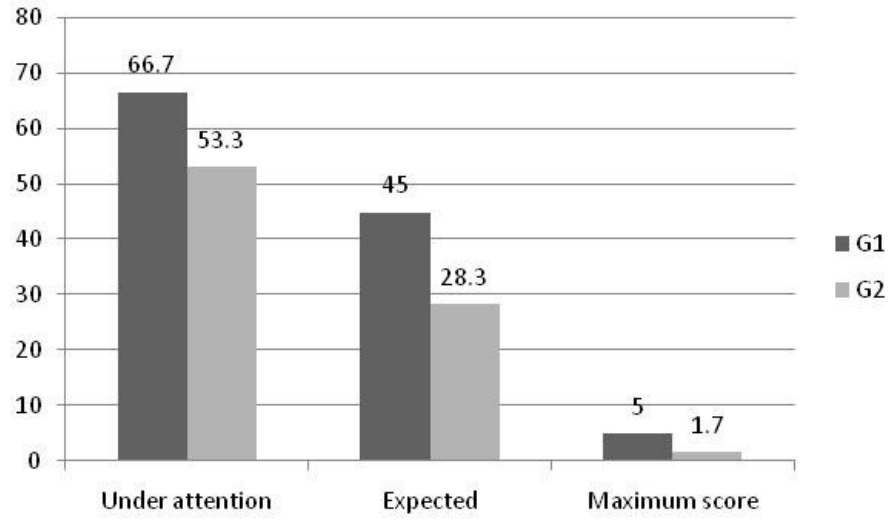


Figure 1. Representation of the type of cleft lip and palate in Group 1



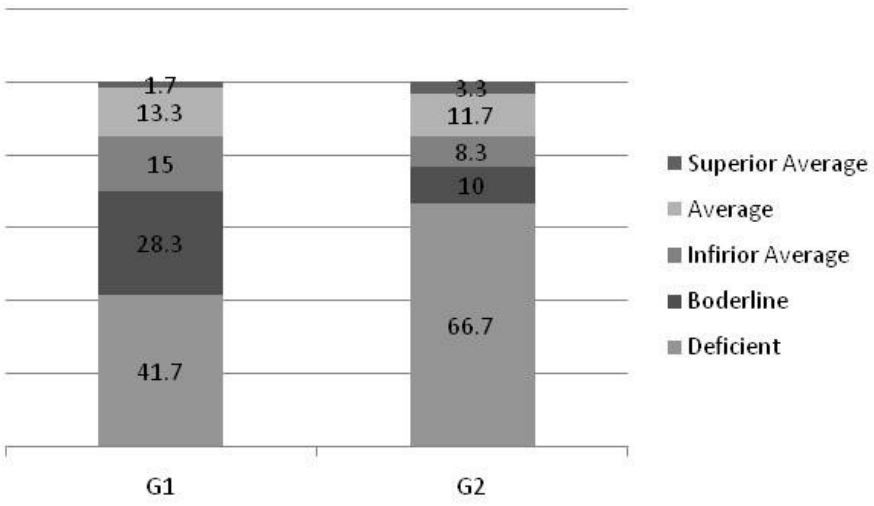
(p=0.019) Chi-square

Figure 2. Classification of the intellectual level of Groups 1 and 2



(p=0,125) Qui-quadrado

Figure 3. Comparison of the Phonological Skills of Groups 1 and 2



(p=0.036) Chi-square

Figure 4. Representation of the groups according to the classification of the Boston Naming Test

DISCUSSION

In this present study, the sample characterization with predominance of males in G1, corroborated other studies[18,19]. Epidemiological findings have shown gender differences in incidence, prevalence, during alterations of development and behavior[20], however, in the population with cleft lip and palate, prospective studies have not been registered to justify this rate, due to the wide range of genetic and teratogenic factors related, although there is a higher prevalence for females, as for post-foramen type, and a prevalence for males, as for pre and trans-foramen types[14]. The predominance of females in G2 was suggestive of the relationship, due to convenience of the comparative sample. There was a significant statistical difference regarding ages between the groups, because when the data collection was performed, in the second half, most of the children were turning into 6 years.

The implicit use of classificatory relations, in an attempt to adjust to different environmental contingencies, as applied to the participants of this study, aimed to identify the skills to discriminate similarities and establish explicit logical relations of cognitive schemes as intelligence measurements. As observed, a percentage of G1 presented intellectual ratings below average. However, G2 also showed impaired intellectual reasoning related to visual perception of nonverbal logical spatio-temporal tasks (Figure 1). Although there is evidence of intellectual abilities of preserved reasoning in a representative percentage of the population with cleft lip and palate [5,9], the same standard of performance in cognitive tasks involving the most varied functions, such as sustained attention, visual processing speed and visuospatial perception[13,21], is not ensured.

In Brazil, the population's reading level has been considered as low[22], where high illiteracy rate, low purchasing power and absence of a continuous cultural policy are some factors related to functional literacy problems. Establishing reading habits with the participation of parents since early age, besides being fundamental for further learning, constitutes one of the biggest challenges in school and in family culture. The preparation process for literacy in preschool comprises activities in which students are most of the time shaping objects, cutting papers, recognizing similarities and differences between figures, supplying them with mechanized resources, providing scarce relation to the real needs for reading communication.

Thus, the children's pre-skills for reading acquisition suffer interference from environmental factors, literacy phase precursors. Students who comprised the control group in this study, although not having history of alterations in development, and therefore should have established and evidenced evaluated pre-skills, did not present these competences. It is noteworthy that the participating school, located in an area comprising students with low income and educational level, may have been an important variable, a differential in the quality of G2 production.

From the maturational point of view, prior to this age group of 3-4 years, the children are able to recognize

the correct spelling of some words based on the sound; and on the stage prior to literacy, to express the thoughts by continuous interaction of speech and writing[11]. The incidence of related deficits on cognitive-linguistic skills, predictors for learning how to read and write, observed in G1, was consistent with other findings, including children with cleft lip and palate in their literacy phase[6,10,19]. However, as both groups showed impairments concerning pre-skills for learning how to read and write, this finding may represent the skill in its development process, instead of being consolidated.

No domain related to segmentation, rhyme, alliteration, addition, subtraction and phonemic transposition, among other verbal skills, was observed. Studies conducted with the cleft lip and palate population[7,9,19], showed involvement in speech articulation and processes comprising oral and written language, indicative of a set of articulatory and acoustic characteristics engaged in the speech and language production of these individuals.

When the lexical repertoire for verbal communication was analyzed, it was found that the group with cleft lip and palate, although mostly with performances below the expected average age, presented a smaller contingent of participants in this category, below average. The speech difficulties, common in this population with cleft lift and palate, with expression and domain often acquired after the second childhood, may have been an influencing factor in the construction of linguistic repertoires and facilitators of oral communication[19]. Along with these intrinsic components, the extrinsic ones should be considered, originated from environments which did not facilitate the quality of expressive language [5].

Language tests comprised verbal comprehension, phonological awareness and oral expression. Group G1, as compared to G2, although not statistically significant, was most affected by descriptive performances below average, indicating limitations on the identification and manipulation of speech sounds, which is an important predictor of the child's ability to develop reading competence[11].

Deficient repertoires were found in both groups, when the receptive vocabulary resources were analyzed by the Boston Naming Test. Impaired speech and language processes were considered as risk factors for G1, composed by the cleft lip and palate population, as during the critical period of the development for speech acquisition, the child without this domain may be vulnerable to this interference regarding the quality of lexical repertoires[7]. Lack of adequate stimulation or living in culturally disadvantaged environments may justify the quality of the repertoire below the expected range for age, in groups with and without cleft [8,21,23].

The results of this study show the necessity of expanding researches on skills for reading and writing acquisition, regarding children with cleft lip and palate, because the literature is incipient concerning alterations related to oral and written language. The statements arising from this research require new replications, monitored throughout the fundamental learning. Thus, it is expected that these findings may contribute to the scientific community in the educational area, concerning health, continuing to present findings on cognitive skills, typical of children with craniofacial anomalies.

CONCLUSION

Language skills required for reading and writing acquisition, proved to be deficient in the population with cleft lip and palate, presenting levels of cognitive performance lower than those expected for the age and education in most of the modalities evaluated. G1, when compared to the control group, presented lower ratings of intellectual reasoning. Limiting environmental factors and low socio-cultural level of the sample were suggestive of additional interference to the acquisition of cognitive-linguistic pre-skills necessary for the satisfactory performance of academic tasks such as reading and writing.

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