http://dx.doi.org/10.23925/2176-2724.2019v31i3p380-385

Speech therapy profile of neuropathic preschool children undergoing hospitalization in a pediatric hospital in Santa Catarina

Perfil fonoaudiológico de pré-escolares neuropatas submetidos à internação em um hospital pediátrico de Santa Catarina

Perfil fonoaudiológico de preescolares neuropáticos sometidos a la internación en un hospital pediátrico de Santa Catarina

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Abstract

Introduction: Neuropathies are problematic in the central nervous system, and can generate multiple complications, with significant repercussions on neuropsychomotor and myofunctional development. **Objective:** To characterize the speech - language profile of neuropathic children from 4 to 6 years of age who were admitted to the Hospital Universitário Pequeno Anjo, in the city of Itajaí - SC. **Methodology:** Cross-sectional, quantitative and retrospective research, approved by the ethics committee under opinion number 2,567,167. Composed of children from 4 to 6 years old with a previous diagnosis of neurological disease, who underwent hospital admission between March 2016 and March 2017, being described descriptively the diagnosis of neurological disease and changes in swallowing. **Results:** It was identified a higher prevalence of neurological affections, incidence of inflammations in the central nervous system and cerebral palsy in the male gender. The swallowing pattern was altered in these diseases, except in cases of epilepsy and hydrocephalus. **Conclusion:** The relationship between mechanical changes in

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Authors' contributions:
ABPR: Advisor and supervisor responsible for the project participated in the entire process of planning, execution and preparation of the manuscript.
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Received: 9/3/2018
Approved: 8/2/2019

neuronal structures and swallowing disorders is considered, and new studies are needed to analyze the hypothesis from this study.

Keywords: Speech-Language and Hearing Sciences; Child; Neurology.

Resumo

Introdução: As neuropatias configuram-se como problemáticas em nível de sistema nervoso central, podendo gerar múltiplas complicações, com repercussões significativas no desenvolvimento neuropsicomotor e miofuncional. **Objetivo:** Caracterizar o perfil fonoaudiológico das crianças neuropatas de 4 a 6 anos de idade que foram submetidas à internação no Hospital Universitário Pequeno Anjo, na cidade de Itajaí – SC. **Metodologia:** Pesquisa transversal, quantitativa e retrospectiva, aprovada no comitê de ética sob parecer número 2.567.167. Composta por crianças de 4 a 6 anos com diagnóstico prévio de afecção neurológica, que foram submetidas à internação hospitalar entre março de 2016 e março de 2017, sendo analisados descritivamente o diagnóstico da doença neurológica e alterações na deglutição. **Resultados:** Identificou-se maior prevalência de afecções neurológicas, incidência de inflamações no sistema nervoso central e de paralisia cerebral no gênero masculino. O padrão deglutitório mostrou-se alterado nas referidas doenças, exceto nos casos de epilepsia e hidrocefalia. **Conclusão:** Pondera-se a relação entre alterações mecânicas nas estruturas neuronais com os distúrbios da deglutição, sendo necessário novos estudos para análise da hipótese oriunda deste trabalho.

Palavras-chave: Fonoaudiologia; Criança; Neurologia.

Resumen

Introducción: Las neuropatías se configuran como problemáticas a nivel de sistema nervioso central, pudiendo generar múltiples complicaciones, con repercusiones significativas en el desarrollo neuropsicomotor y miofuncional. **Objetivo:** Caracterizar el perfil fonoaudiológico de los niños neuropáticos de 4 a 6 años de edad que fueron sometidos a la internación en el Hospital Universitario Pequeño Ángel, en la ciudad de Itajaí - SC. **Metodología:** Investigación transversal, cuantitativa y retrospectiva, aprobada en el comité de ética bajo opinión número 2.567.167. En el caso de los niños de 4 a 6 años con diagnóstico previo de afectación neurológica, que fueron sometidos a la internación hospitalaria entre marzo de 2016 y marzo de 2017, siendo analizados descriptivamente el diagnóstico de la enfermedad neurológica y alteraciones en la deglución. **Resultados:** Se identificó mayor prevalencia de afecciones neurológicas, incidencia de inflamaciones en el sistema nervioso central y de parálisis cerebral en el género masculino. El patrón de deglución se mostró alterado en dichas enfermedades, excepto en los casos de epilepsia e hidrocefalia. **Conclusión:** Se plantea la relación entre alteraciones mecánicas en las estructuras neuronales con los disturbios de la deglución, siendo necesario nuevos estudios para analizar la hipótesis oriunda de este trabajo.

Palabras clave: Fonoaudiología; Niño; Neurología.

Introduction

There is a very thin line between neuroscience and Speech-Language and Hearing Sciences, since neuroscience aims to study the nervous system and its pathologies, while Speech-Language and Hearing Sciences aims to study cognitive and communicative functions, as well as the development of stomatognathic functions[17,22]. It is common to face prevalent neurological disorders in the pediatric population, such as epilepsy, cerebral palsy, meningitis, hydrocephalus and microcephaly, which tend to change the language and cognition motor area, also affecting food intake,[15,22] and favoring malnutrition and respiratory issues[15].

Epilepsy is characterized as a chronic brain disease, which is also distinguished by recurrent epileptic seizures due to uncontrolled electrical discharges from cells, resulting from seizures to unconsciousness and it may be associated or not with cerebral palsy[3,13]. Head injuries during childbirth are the most common cause of epilepsy. Clinical

findings are sudden memory loss, fainting, movement, cognition and learning disorders[3].

Cerebral Palsy (CP) has different forms and grades, being characterized by a set of changes in movement and posture development. There are changes that occur in the development of orofacial structures and consequently in breathing, swallowing, chewing and speech due to global motor changes and oral sensorimotor deficit. Changing swallowing requires a careful and professional analysis, as the subject is susceptible to severe dysphagia, which is a precursor of recurrent pneumonia, malnutrition and dehydration[4,12].

Although CP and epilepsy are diseases commonly found in the pediatric population, there may be also other comorbidities that may affect the neuropsychomotor development of the subject. Meningitis, hydrocephalus and microcephaly stand out among such pathologies.

Meningitis is an infectious disease of viral or bacterial origin, which is characterized by the inflammation of the meninges. The most common findings are headache, fever, vomiting, neck stiffness, petechiae, and when severe, it can lead to death. Bacterial or viral meningitis is one of the most common causes of mortality and morbidity in children and it can cause significant sequelae[6,21].

In addition to the above effects, meningitis may lead to hydrocephalus[5]. Hydrocephalus, in turn, is characterized as an imbalance between how much cerebrospinal fluid (CSF) is produced and how much is absorbed. Findings vary and may include motor, behavioral, learning, and attention disorders[19].

On the other hand, microcephaly is characterized as a congenital malformation, which impairs the normal development of the brain[2]. In children, microcephaly is usually present with some kind of neurological disorder and below average head circumference, as in CP, for example. Signs and symptoms depend on the degree of brain impairment, and most common are delayed psychomotor development, hearing, intellectual, cognitive and visual impairment, sensitivity, perception, communication and swallowing disorders[2,7].

Neurological comorbidities imply in functional changes, especially in motor and cognitive aspects. In the context of Speech-Language and Hearing Sciences, the impact on communication and swallowing tends to generate a significant impact on the quality of life of the subjects and their family[8,15]. Therefore, Speech-language pathologists must perform an accurate assessment of their patients to reach a diagnosis and create a therapeutic planning, aiming at the adequacy and/or adaptation of the main needs of the subjects. However, when certain patterns are observed in the different comorbidities, these patterns should be discussed with the aim of raising new methodological proposals regarding therapeutic and preventive practice. Therefore, the objective of this study is to characterize the speech-language profile of neurologically impaired children from 4 to 6 years of age who were hospitalized.

Methods

This is a quantitative, cross-sectional and retrospective study[9] that included the analysis of medical records at the Hospital Universitário Pequeno Anjo. This research was approved by the Research Ethics Committee of the Universidade do Vale do Itajaí (REC/UNIVALI) under no. 2.567.167.

The target population of the study consisted of children from four to six years old, who were hospitalized in the last two years, that is, from March 2016 to March 2017. The total population consisted of 867 subjects, of which 39.56% were female and 60.44% were male. After the identification of the subjects, a careful reading of the medical records was conducted by the researcher in a specific sector of the institution in order to identify potential participants. Subjects aged between four and six years who underwent hospitalization from March 2016 to March 207 and who had a neurological disorder diagnosis were selected. On the other hand, subjects who did not have any neurological impairment were excluded, as well as patients with syndromic conditions. Finally, the sample comprised 31 subjects, with a mean age of 5 years 6 months and 3 days, of which 35.48% were female and 64.52% male.

The lack of Speech-Language and Hearing Pathology was highlighted in many medical records during data collection; this may have been due to the fact that some comorbidities are of greater medical priority, and that there may be no consequences on cognitive, language and swallowing functions to varying degrees. Therefore, no complaints regarding language pattern and related aspects were found. Thus, data related to gender,

age, neurological disorder, diagnosis and Speech-Language and Hearing Pathology were collected.

After completing the data collection, the results were tabulated in Excel spreadsheets (2016 v.) and descriptively analyzed in order to conduct a speech-language profile survey of preschool children with neurological disorders, as well as to identify potential relationships between the proposed variables.

Results

The sample consisted of 31 subjects, with a mean age of 5 years 6 months and 3 days, of which 35.48% were female and 64.52% male. As shown in Table 1 and 2, there was a greater neurological involvement due to inflammatory diseases of the central nervous system (meningitis and/or encephalitis).

Table 1. Distribution of subjects by gender and location

Gender / Location	AMFRI	Other regions	Total
Males	17 (54.84%)	3 (9.68%)	20
Females	11 (35.48%)	0 (0.00%)	11
Total	28	3	31 (100%)

Legend: *AMFRI – Associação de Municípios da Foz do Rio Itajaí.

Table 2. Distribution of subjects by gender and neurological disorder

Gender / Comorbidity	Epilepsy	Inflammatory disease of the CNS	CP	Hydrocephalus	Total
Males	2 (6.44%)	11 (35.46%)	5 (16.12%)	2 (6.52%)	20
Females	0 (0.00%)	10 (32.25%)	1 (3.21%)	0 (0.00%)	11
Total	2	21	6	2	31 (100%)

Legend: Inflammatory disease of the CNS - Inflammatory disease of the central nervous system - meningitis and/or encephalitis; CP - cerebral palsy.

Of the total subjects in the sample, 13 (41.93%) were referred for Speech-Language Pathology care, of which 4 (30.77%) had a swallowing disorder. Of the total sample, 15 (48.38%) had other speech-language disorders, such as global developmental delay, stomatognathic system changes and language delay. It is noteworthy that the interventions of the speech-language pathologist of the institution are usually preventive, addressing patients in their beds, without the need for a prescription. In cases of greater severity, the pediatrician usually prescribes through an electronic system or through informal conversations at the hospital. For this reason, there is a divergence in the number of referrals of the professional in relation to the number of other speech-language complaints.

This divergence shows the importance of autonomy and freedom for professionals to perform their functions in healthcare institutions, since the professional may notice major aggravating factors that will enable early care and diagnosis.

The other 18 (58.06%) subjects who were not referred for Speech-Language and Hearing Therapy also had no changes in the swallowing pattern, only in other aspects, which is in line with the methodology of the Speech-Language and Hearing Therapy care in the institution.

Table 3 shows the distribution of subjects by neurological comorbidity and swallowing disorders.

Table 3. Distribution of subjects by neurological comorbidity and swallowing disorders

	Epilepsy	Inflammatory disease of the CNS	CP	Hydrocephalus	Total
Change in the swallowing pattern	0	2	2	0	4
Total	0 (0.00%)	2 (50.00%)	2 (50.00%)	0 (0.00%)	4 (100%)

Legend: *Inflammatory disease of the CNS - Inflammatory disease of the central nervous system - meningitis and/or encephalitis; CP - cerebral palsy.

Discussion

A higher incidence of male subjects was observed when investigating the speech-language profile of preschool children admitted due to comorbidities, as well as a higher prevalence of inflammatory processes of the central nervous system, followed by CP and similar incidences of epilepsy and hydrocephalus.

Inflammations of the central nervous system, as meningitis or encephalitis, are common disorders in childhood, since there is greater exposure to viral or bacterial agents to a still developing immune system. Literature suggests that meningitis and encephalitis are diseases that occur due to the presence of an aggressive factor, such as viruses, fungi or bacteria, which contaminate the layers covering the central nervous system (meninges), resulting from minor changes to significant neurological sequelae and death[18].

The study found a higher incidence of central nervous system inflammation in male subjects, which is in line with the findings of an ongoing study in which 63.0% of the 108 cases of children with meningitis were male[16]. There is also a higher prevalence of CP in the male population. CP is a chronic non-progressive lesion in immature neuronal tissue that impairs the connection of synapses that are responsible for performing basic human functions, such as breathing, swallowing and heart rate, as well as higher functions such as walking, fine motor skills and language[1].

Hospitalization is required at multiple times both in cases of central nervous system inflammation, which are unique, and CP, which has been a permanent condition since the early years of a child. During these moments, the physician and staff should investigate the priorities in order to define diagnosis, treatment, and prognosis. Depending on the clinical context, speech-language pathology intervention is required in many cases to evaluate the conditions of oral diet intake and diagnosis of changes in the swallowing pattern. This study allows us to notice the importance of the speech-language pathologist in the pediatric hospital as a key resource for analysis of other changes in the development than dysphagia. Such analysis allows the technical and moral principles of the professional to be fulfilled, that is, to conduct comprehensive and autonomous actions for preventive intervention.

Being a hospital institution, which aims for agility in the service with excellence, the care for swallowing disorders is a priority. Dysphagia in the pediatric population compromises the effectiveness of the biodynamics related to patient's swallowing, and may contribute to significant risks of bronchoaspiration, low food and water intake followed by malnutrition, recurrent pneumonia and, in a larger instance, death[4,20].

The changes noticed in neurogenic oropharyngeal dysphagia include difficulty in initiating swallowing, inadequate sensitivity and mobility of oral cavity structures, lack of coordination of tongue control, sialorrhea, nasal regurgitation, inefficiency in the mobility of laryngeal muscles and choking and coughing episodes while eating[23].

This study demonstrates that changes in swallowing pattern were clear in central nervous system inflammation and CP (Table 3), but were not present in cases of epilepsy and hydrocephalus. According to the 4 cases studied, it can be suggested that the change in swallowing function may be associated to the presence of a physical agent acting on the central nervous system and that these changes are not clear in cases of epilepsy and hydrocephalus, since there is no change in the anatomical and biological mechanism, but an inadequacy in electric discharges[3,13] and an imbalance between how much cerebrospinal fluid is produced and how much is absorbed[5,19]. Therefore, potential changes that are directly associated with the neuronal structure appear to be more impactful, as the changes

that affect message transmission mechanisms and the volumetric control of the cerebrospinal fluid. However, further research is required in order to analyze this hypothesis with a larger number of samples and a broader spectrum of age.

Conclusion

The methodology proposed in this study allowed the identification of higher prevalence of neurological disorders and incidence of inflammation in the central nervous system and CP in male subjects. The swallowing pattern was altered in these diseases, and no changes were identified in cases of epilepsy and hydrocephalus. Further research with larger sample sizes is required to identify possible relationships or distinctions with physical disorders of the central nervous system, disorders related to message transmission, and biological control of brain functions with dysphagia.

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