

ORIGINAL ARTICLE

Prevalence of bodily functional changes in children with cerebral palsy,
Fortaleza, Ceará, 2006

Prevalência de alterações funcionais corpóreas em crianças com
paralisia cerebral, Fortaleza, Ceará, 2006

¹Ismênia de Carvalho Brasileiro, ²Thereza Maria Magalhães Moreira

ABSTRACT

Functional changes are present at a very young age in children with neurological disorders and the more severe the disease, the higher the degree of dysfunction. The present study aimed at investigating changes in the bodily functions of children with cerebral palsy (CP) treated at an early stimulation health clinic in the city of Fortaleza using the International Classification of Functioning, Disability, and Health (ICF) in order to detect possible interference in the functional performance. Thirty-two children with mild or moderate CP, aged ≥ 3 years, underwent continuous physical therapy treatment. The neurological impairment was varied: 43.7% (14) did not present cognitive deficit, 50% (16) showed mild attention deficit, 37.5% (12) had mild motor coordination difficulties and 56.2% (18) had moderate motor difficulties. Mild alteration of affection was observed in 59.3% (19) and in 53.1% (17), mild perceptive deficiency. Mild language deficits were present in 25% (8) and moderate ones in 15.6% (5). Around 60% suffered from visual deficiency and 81.2% had a proprioceptive dysfunction; 78.1% (25) presented mild respiratory alterations and 62.5% (20) had food intake difficulties. Joint mobility was compromised in 68.75% (22) and stability in 53% of them. Moderate muscular strength deficit was observed in 62.5% (20) of the hemiparetic group, 59.3% (19) of the paraparetic, and 71.8% (24) of the tetraparetic group. Recent studies have focused on the neurological and functional impact of CP, although most of them were directed at the disease itself and its consequences. Studies such as the present one are timely for understanding the functional capacities and limitations of children with CP.

KEYWORDS

International Classification of Functioning, Disability and Health, cerebral palsy, children

RESUMO

Alterações funcionais estão presentes em paralisados cerebrais desde a terna infância e quanto mais grave a tipologia maior as disfunções. O presente estudo teve por objetivo descrever as alterações funcionais corpóreas de crianças com paralisia cerebral (PC) atendidas em um núcleo de tratamento e estimulação precoce na cidade de Fortaleza, Ceará utilizando a Classificação Internacional de Funcionalidade, Incapacidade e Saúde (CIF). A amostra foi constituída de 32 crianças com PC leve ou moderada, a partir de três anos, assíduas ao tratamento fisioterápico. Os déficits encontrados foram difusos; 43,7% (14) não possuíam déficit cognitivo; 50% (16) apresentaram déficit leve de atenção, dificuldades leves de coordenação motora em 37,5% (12) e, em 56,2% (18) moderada. Em 9,3% (19), foi observada alteração leve de afetividade e em 53,1% (17) déficit perceptivo leve. Déficits leves de linguagem estiveram presentes em 25% (8) e em 15,6% (5) moderado. Cerca de 60% apresentou déficit visual e 81,2% proprioceptiva; 78,1% (25) apresentaram alteração respiratória leve e, 62,5% (20) dificuldades na ingestão de alimentos. A mobilidade articular esteve inadequada em 68,75% (22) e a estabilidade em 53%. Observaram-se déficits moderados de força muscular em 62,5% (20) dos hemiparéticos, 59,3% (19) dos paraparéticos, e 71,8% (24) dos tetraparéticos. A atenção para o impacto neurológico e funcional da PC tem sido alvo de estudos recentes embora que ainda centralizados na descrição da doença e em suas conseqüências. Estudos como estes são oportunos para o conhecimento das capacidades e limitações funcionais da criança acometida.

PALAVRAS-CHAVE

Classificação Internacional de Funcionalidades, Incapacidades e Saúde, paralisia cerebral, criança

1 Physical Therapist at Núcleo de Tratamento e Estimulação Precoce – UFC; Assistant Professor at Faculdade Integrada do Ceará

2 Professor Doctor at Universidade Estadual do Ceará – UECE

MAILING ADDRESS:

Ismênia de Carvalho Brasileiro
Rua Carvalho Mota, 260 - Parquelândia - Fortaleza / CE - CEP 60450-630
E-mail: ismenibrasileiro@hotmail.com

INTRODUCTION

Functional alterations and body structures are present in children with neurological dysfunction since early infancy and, the more severe the neurological sequelae, more evident are the neuromotor and sensory deficits.

Cerebral palsy (CP) is the consequence of a static lesion that occurred in the pre-, peri- or post-natal period that affects the central nervous system during the functional and structural maturation phase. The dysfunction is, predominantly, a sensorimotor one, involving disorders of muscular tonus, posture and voluntary movement.¹

The non-progressive chronic disorders of movement and posture start early and are characterized by the lack of control over the movements and modifications. Muscular shortening, range of movement (ROM) limitation, biomechanical misalignment, tonus alteration, lack of coordination, muscular weakness with selective loss of motor control constitute the main neuromotor and musculoskeletal problems.²

Although the main characteristic of CP is the motor deficit, there is often an association with one or more disorders caused by the neurological lesion, such as seizures, cognitive deficit, hearing deficit, visual alterations, language and deglutition disorders, alterations in the cardiorespiratory and gastrointestinal systems, among others. The associated disorders interfere with the child's motor function and evolution, determining prognosis modifications.^{3,4}

The International Classification of Functioning, Disability and Health (ICF), a taxonomy developed by the World Health Organization⁵ reflects a change of investigative approach and prioritizes functionality as a health component,⁶ focused on the patient's limitation and activity performance.

The description of how the child with CP lives with its health condition is pertinent, given the necessity of understanding it as a whole, as movements and actions are interconnected with perception and cognition and that the capacity to carry out tasks is directly related to its interaction with the environment, determining its functional capacity.

OBJECTIVE

Considering such concepts and the researcher's interest as a physical therapist working with a children's rehabilitation team, the present study sought to describe the prevalence of functional alterations in a group of children with CP treated at the Treatment and Early Stimulation Center in the city of Fortaleza, state of Ceara, Brazil, using the ICF.

The findings of the present study will contribute to the knowledge and description of functionality in this group of children and will allow the comparison with other samples of children with CP with different degrees of severity and clinical manifestations.

This study is part of the Master's Degree Dissertation called "Functional Profile of Children with Cerebral Palsy in an Institution of the city of Fortaleza, state of Ceara, Brazil", developed during the Professional Master's Degree Course in Children's and Adolescents' Health, in 2007.

Other articles addressing the other aspects of functionality, disability and health regarding the body structures, activities and participation and the interference of environmental factors in the daily activities of these children are being carried out and will be submitted to publication.

METHODS

This is an exploratory study, predominantly quantitative and transversal, developed at the Nucleo de Tratamento e Estimulação Precoce (NUTEP - Center of Treatment and Early Stimulation), a non-profit organization located in the hospital complex of the School of Medicine of the federal University of Ceara (UFC).

The target-population of the study consisted in all children with cerebral palsy (CP) that were undergoing physical therapy treatment at NUTEP; the children were treated twice a week until May 2006, totaling 140 children.

The inclusion criteria adopted for the sample were: children with a definitive diagnosis of cerebral palsy and mild or moderate neuromotor dysfunction, aged ≥ 3 years and treatment adherence. A total of 32 children were selected. Children with sensory deficits, such as disabling visual and/or hearing impairment, difficulty in communicating with the examiner (mental retardation), seizure crises that were difficult to control and severe CP were excluded from the study.

The data collection tool was designed in agreement with the ICF and adapted by the examiner herself, according to the specificity of the studied population.

To analyze body functions, the first qualifier recommended by the ICF was used regarding the degree of the disability.

All data were collected at the Service of Physical Therapy of the Institution, in an adequate environment, free of external interference, on a previously set day and time schedule, from July to September 2006. The family member or tutor responsible for the child remained in the room throughout the evaluation.

The data were grouped by the program SPSS version 13.0, with posterior analysis and interpretation. A statistician was available for support throughout the entire process.

The present study was developed according to Resolution #196 of October 10, 1996, by the National Council of Health.⁷

The parents or tutors of the children received all the information about the study and signed a free and informed consent form prior to the enrollment. The project was submitted to the appreciation of the Ethics Committee in Research of the Federal University of Ceara and was approved by the institution and its director.

RESULTS

According to the list of body functions presented at the ICF, the following results were observed: regarding the mental functions of the studied children, no significant alterations were observed, as the children were classified as having mild or moderate CP. Although motor alterations are the most relevant ones, the deficits are diffuse, causing alterations in other functions performed by the brain.

Of the studied group, 56.2% (18) did not present alterations in the state of awareness. Cognition was normal in 43.7% (14) of the children; 43.7% (14) and 12.5% (4) of the children presented mild and moderate cognitive deficit, respectively.

Around 28.1% (9) of the studied children presented mild difficulty in performing tasks that required logic and 34.3% (11) presented moderate difficulty. The social interaction was considered mild difficulty in 37.5% (12) of the children and, in 56.2% (18), it was adequate. The great majority, 87.5% (28) of the children, did not present sleep disorders.

Half of the children (16) presented mild attention deficit and 9.3% (3) presented moderate attention deficit. Most of them, 71.8% (23), did not present memory deficit. The difficulty in motor coordination was present in almost all cases at variable degrees: 37.5% (12) mild, 56.2% (18) moderate and 3.1% (1) severe.

In 59.3% (19) of the children, a mild affective difficulty was observed and in 53.1% (17) a mild perceptive deficit was verified. Language alterations were observed, including communication, oral and gesture expression and capacity to understand, which were present in 25% (8) at mild and in 15.6% (5) at moderate degree.

The emotional function involvement observed indicates dissatisfaction and displeasure on the part of child to perform some activity due to the motor disability.

The present study showed that a large number of the children, 59.3% (16 mild and 3 moderate) presented visual deficits, with 25% (8) of them wearing glasses and/or patches for muscular correction and 9.3% (3) having undergone surgical eye corrections.

Only two children presented mild hearing deficits and one presented moderate deficit, needing bilateral hearing prosthesis. As for the gustative and olfaction functions, almost the totality of the children, 96.8% (31), did not present significant alterations.

It was observed that 81.2% of the children presented difficulty to feel the relative position of the body parts or proprioception, being 50% (16) at a mild degree and 31.2% (10) at a moderate degree, as well as feeling the surface of objects, their texture, or tactile quality, in 75% (24) at a mild degree and 9.3% (3) at a moderate degree.

More than one third of the children referred some type of pain. The most frequently mentioned pain was pain the lower limbs (31.3%) in children presenting independent gait, in addition to headaches (6.2%), stomachache and earache (6.2%). The study of pain is subjective and requires a complex assessment for its designation.

Alterations in articulatory phonetics were observed in 62.5% (17) regarding the voice, and 65.5% (18) in the sounds of speech, and in 9.3% (3) of the cases, a severe disability was observed, such as non-acquired oral communication capacity.

The great majority, 96.8% (931) did not present cardiac problems or problems related to immunological protection. However, 78.1% (925) presented some type of respiratory alteration, with colds being the most frequent ones.

A large number of them, 62.5% (20) had difficulty to ingest and manipulate solid foods or liquids through the mouth, at a proportion of 31.2% (10) 28.1 (9) and 3.1% (1) for mild, moderate and severe cases, respectively. A small group was incapable to feeding by the mouth due to the difficulty to chew and swallow,

which could develop a picture of malnutrition; a nasogastric tube or gastrostomy was necessary in these cases. It was observed that 31.2% of the children presented difficulty in obtaining the right amount of nutrients.

Problems regarding transportation, decomposition and absorption of the foods are uncommon in 34.3% (11) of the cases. In more severe cases, gastroesophageal reflux is common. One-third (11) presented evacuation difficulties. Almost all cases, 96.8% (922) did not have endocrine disorders and 78.1% (25) did not have genitourinary alterations.

As for joints and bones, the joint mobility showed a mild degree of disability in 68.75% (922) of the children.

No scapular mobility alteration was observed in 34.3% (11) of the children, whereas 59.3% presented mild difficulty. The pelvic girdle assessment showed that 56.2% (18) of the children presented mild difficulty and around 20% (7) of the cases presented moderate difficulty.

As for the carpal mobility, a large number of the children 62.5% (20) presented mild alterations in the hand bones and 56.2% (18) presented moderate alterations in the foot bones. It was observed that the distal extremities (feet) were the most often affected segments.

An alteration in stability can result in damage such as hip dislocation or shoulder instability. Around 40% (913) of the cases presented joint stability and 53% presented mild instabilities.

Muscular strength and tonus were measured according to the lesion topography. A large number of the hemiparetic, 62.5% (20) and paraparetic children, 59.3% (19), presented moderate deficits of muscular strength and 71.8% (24) of the tetraparetic presented moderate deficit.

Mild alterations in muscular resistance were observed in 25% (8) and moderate alterations in 50% (16). Around 75% of the tetraparetic children presented moderate alterations.

This study did not disclose any case of pure hypotonia, with a clear predominance of hypertonia. The detected tonus alterations were proportional to the strength deficits.

Around 60% (19) of the children presented mild alterations regarding motor reflexes. About half of them presented moderate deficit of voluntary control movement. In 37.5% (12) of the cases, a mild deficit in the balance reactions was observed, which involves rectification, protection and balance and in 46.9% (15), a moderate deficit was observed.

DISCUSSION

Cerebral palsy occurs during an accelerated period of development, resulting in the impairment of the process of capacity acquisition, with a consequent impact on function inference.⁸ The sequelae are variable in intensity and location, depending on the affected encephalic region and the extension of lesion.

There are several classifications for cerebral palsy that encompass clinical parameters and describe the degree of involvement of the neuromotor dysfunction. Normally, the combination of the anatomic and the clinical classification is used, such as for instance, severe

spastic hemiparesis.¹

However, little has been described on the complications caused by the initial lesion. In addition to the injury that occurred during the initial phases of treatment, CP increases the child's vulnerability to secondary conditions of survival and health that impair the process of new capacity acquisition and interferes with the functional state makes it difficult to perform activities that are normally performed by normal children.

There has been an increase in the number of scientific international publications considering the use of the ICF applied to healthcare, education and research, considering that its use is pertinent to feed multidisciplinary aspects in healthcare.⁹ In the present study, we chose to use the ICF to describe the body functions of children with CP.

No significant alterations were observed regarding the children's mental functions, considering that all of them presented mild to moderate CP. Studies have shown that the mental retardation is present in two thirds of the cases with CP and that it can occur simultaneously with other learning deficits.¹⁰

The difficulty to sleep and irregular sleep pattern can be present in some of the CP patients and, in some cases, the use of sedative drugs is necessary.¹⁰ Most of the studied children did not present sleep disorders.

Attention deficit and lack of motor coordination were important findings in this research. When these were correlated with the motor dysfunction, they generate difficulties for the child to perceive and interact effectively with the surrounding objects, people and environment.

Many patients with CP have normal intelligence, although they cannot always express it adequately due to the language difficulties, being seen as mentally disabled individuals.¹¹

Many mothers report that their children have a low tolerance level and are more irritable and sensitive than the other children. When the emotional aspects are not well conducted by the family, the children with CP can develop a high level of frustration and depression in adolescence.

One important aspect reported in the literature refers to the need to consider the lifestyle of these children during the careful assessment of personality and social interaction, which many times is not a normal one, as they are forced to undergo an intense routine of therapies, medical visits and hospitalizations. Considering that, they are separated from their parents at an earlier age than the average child, being forced to face unpredicted situations; they lack the time and physical opportunity to play freely.¹²

Visual deficits are common in CP. A large number of the studied children presented visual alterations. The association with eye diseases is present in around 30 to 82% of the cases. Around 40% of the children have abnormalities such as myopia, visual field defects and cortical blindness. The premature children present alteration secondary to the retinopathy of prematurity. Strabismus is common and can develop into amblyopia.^{10,13}

Deficits in the processing of sensory information are also associated with CP pictures. The proprioceptive, tactile and visual systems are part of the so-called Sensory Integration and must

be interconnected to promote a satisfactory motor and emotional performance in the environment.

Respiratory complications, observed in the study and described in the literature, are the most frequent cause of death among CP children, which include pulmonary aspiration due to gastroesophageal reflux; repeated respiratory infection and chronic pulmonary disease, aggravated by the weakness of the chest musculature.¹⁰

Children with CP supposedly have strength as well as tonus alterations, many times due to the lack of use or misuse of the body and limbs due to the severity of the involvement or to bad positioning and can present localized or widespread muscular hypotrophy. The impact of muscular weakness on the functional capacities is real and must be elucidated and adequately treated.¹⁴

The functional and structural alterations that are implicit in CP did not allow the harmonic performance for a coordinated movement in the affected children.

CONCLUSION

The present study constituted a characterization of the body functional changes of children with CP treated at a Treatment and Early Stimulation Center in the city of Fortaleza, Ceara, using the International Classification of Functioning, Disability and Health (ICF).

The ICF has shown to be an adequate model of assessment to describe how children with CP live with their health condition. Its use gives the opportunity to appreciate data that were until recently, little explored, facilitating the process of understanding the child regarding its functional performance, providing a better communication among the members of the multidisciplinary team and allowing the adequacy of therapeutic programs, of which main role is to address the patient's biopsychosocial aspects.

Other studies are being developed through the use of ICF in children with CP. The Children and Young ICF is available at the site of World Health Organization. When the present study was being carried out, such tool was not totally available and was not compatible with the desired objectives.

REFERENCES

1. Ferraretto I. Paralisia cerebral: aspectos práticos. São Paulo: Memnon; 1998.
2. Allegretti AL, Mancini MC, Schwartzman JS. Estudo do desempenho funcional de crianças com paralisia cerebral diparética espástica utilizando o Pediatric evaluation of disability inventory PEDI. *Temas Desenvol.* 2002;11(64):5-11.
3. Lima CA, Fonseca LF. Paralisia cerebral: neurologia, ortopedia e reabilitação. São Paulo: Roca; 2004.
4. Ostensjo S, Carlberg EB, Vøllestad NK. Motor impairments in young children with cerebral palsy: relationship to gross motor function and everyday activities. *Dev Med Child Neurol.* 2004;46(9):580-9.
5. Organização Mundial de Saúde. CIF: Classificação Internacional de Funcionalidade, Incapacidade e Saúde. São Paulo: Edusp; 2003. 325 p.
6. Mancini MC, Alves ACM, Schaper C, Figueiredo EM, Sampaio RF, Coelho ZA, et al. Gravidade da paralisia cerebral e desempenho funcional. *Rev bras fisioter.* 2004;8(3):253-60.
7. Brasil. Resolução CNS n.º 96, de 10 de outubro de 1996. Aprova diretrizes e normas regulamentadoras de pesquisa envolvendo seres humanos. *Diário Oficial da Republica Federativa do Brasil, Brasília (DF);*1996 out 16; Seção 1:21082.

8. Rotta NT. Paralisia cerebral, novas perspectivas terapêuticas. *J Pediatr.* 2002;78(supl.1): S48-S54.
9. Florin J, Ehnfors M, Ostlinder G. Developing a national integrated classification of health care interventions in Sweden. *Int J Med Inform.* 2005;74(11-12):973-9.
10. Maranhão MV. Anestesia e paralisia cerebral. *Rev Bras Anesthesiol.* 2005;55(6):680-702.
11. Schwartzman JS. Paralisia cerebral. *Arq Brás Paralisia Cerebral.* 2004;1(1):4-17.
12. Nelson CA. Paralisia Cerebral. In: Umphred DA. *Fisioterapia neurológica.* 3 ed. São Paulo: Manole; 2003. P.237-56.
13. Celino AC, Trigueiro S, Ventura LO, Toscano J, Barroca R. Alterações oculares em crianças portadoras de paralisia cerebral. *Rev bras oftalmol.* 2003;62(4):248-51.
14. Bella GP, Godoy ALD. Efeitos do fortalecimento muscular na paralisia cerebral hemiparética espástica. *Temas desenvol.* 2005;14(82):15-22.