



RESEARCH ARTICLE

The Relationship Between Clinical Motor and Communication Levels of Children with Cerebral Palsy, And Competencies From Parents' Perspectives

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Abstract

In this study, it was investigated whether there is a relationship between the clinical motor and communication levels of children with CP in terms of physiotherapy and the perceived competency levels from the parents' perspective. The Gross Motor Function Classification System (GMFCS) was used for motor ability level; the Communication Function Classification System (CFCFS) was preferred for communication level. The children' communication levels from the parent's perspective were evaluated with the Visual Analog Scale (VAS) and the Katz Index was used for measuring the children' activities of daily living. A total of 110 children with CP (mean age: 6.74±3.48 years) and their caregivers participated in the study. Communication levels were good for 30.6% of the children, and motor levels were good for 27.9% of them. The mean activity of daily living was 9.11±8.52. The child's proficiency level, according to the perspective of the parents, was found to be 6.22±3.29 on average. Positive correlations were found between the level of child communication skills as perceived by the parents, the CFCFS level ($r = 0.770$; $p < 0.001$), GMFCS ($r = 0.652$; $p < 0.001$) and the Katz scale ($r = 0.636$; $p < 0.001$). Adherence to treatment and continuity to rehabilitation regularly are important in the physiotherapy and rehabilitation process of children with CP. At the end of our study, it was determined that there was a good correlation between the communication competency. Within the scope of education programs, training parents to follow the development of their children and increase their awareness can increase their treatment adherence.

Keywords

Cerebral Palsy, Motor Level, Communication Skills, Parent Perspective

INTRODUCTION

Cerebral Palsy (CP); Surveillance of Cerebral Palsy in Europe (SCPE) defined it in 2004 as "The condition that develops with brain damage due to any reason before, during or after birth, which is non-progressive but hinders general life activities, in posture and motor development, permanent disorder" (Krageloh-Mann & Cans, 2009). CP; It is a common motor developmental disorder seen in childhood, often accompanied by

other medical conditions such as sensory and cognitive dysfunctions. Persistent motor disability and posture disorders are characterized by abnormal muscle tone and movement. This situation limits the activities of daily living of children with CP (Kakooza-Mwesige et al., 2017; Stavsky et al., 2017).

The incidence of CP is 1.5-2.5/1000 in developed countries, and it is among the most common causes of motor disability in childhood (Drougia et al., 2007). In our country, the

incidence of CP has been reported as 4.4/1000 (Serdaroğlu et al., 2006).

Many risk factors can come to the fore in CP. With the new studies on CP, new risk factors are defined and existing risks are better understood. In the light of current information, general risk factors for CP are defined as premature birth, fetal growth restriction, multiple pregnancies, infections in the fetal or neonatal period, birth asphyxia, perinatal stroke, and congenital developmental disorders (Wood, 2006). In addition, related risk factors are classified as prenatal, perinatal and postnatal (Hankins and Speer, 2003).

Motor developmental delay is prominent in children with CP. However, in addition to motor dysfunction in these children; Communication problems, mobility difficulties, vision and hearing problems, learning difficulties, mental problems, language and speech pathologies, seizures and other health problems are also common (O'Shea, 2008). When SCPE data is examined; It is reported that 31% of children with CP have mental problems, 11% have severe visual disturbances and 21% have epilepsy (Cans et al., 2008).

Motor deficits, communication problems and additional problems that limit daily living activities that can be seen in children with CP affect the quality of life negatively. Thus, it is not only the problem that creates a problem in the child with CP, but also negatively affects the quality of life of the family and/or caregiver, who are primarily responsible for the care of the child. Rehabilitation approaches in CP, a neurodevelopmental disorder; plays an important role in the treatment in terms of the child's motor skills, functional capacity, communication level and participation in life. It is common to use classification systems and scales with clinical validity and reliability tested in the evaluation of these parameters. The Gross Motor Function Classification System (GMFCS) is widely used for defining motor function level and disability level in CP. The GMFCS E/R is easy to use and categorizes children into <2 years, 2–4, 4–6, 6–12, and 12–18 years age groups. So it is preferred by the clinicians. On the other hand, the Communication Function Classification System (CFCS) is a method used to categorize a cerebral palsy patient's everyday communication into one of five categories based on its efficacy. It has five levels that indicate a person's ability to

communicate on a daily basis. A person who is familiar with the individual's communication in typical contexts makes the classification on the CFCS. The efficacy of communication between a sender and a receiver of information determines classification. At this point, the most important handicap is the necessity of providing training to this person (caregiver) about the system in advance. Lack of education can lead to under-appraisal. We think that simpler, understandable numerical grading tools can help families and physicians in this regard. In the success of the physiotherapy and rehabilitation process, the family's perspective on treatment, acceptance of the effectiveness of the treatment; treatment adherence and continuation are key points (Leung et al., 2003; Lim and Wong, 2009). To be able to see the effect of the applied treatment and rehabilitative method on the child; Experiencing the motor level developments of the child in daily life can be considered as one of the most important factors that have a facilitating effect on the continuation and compliance with the treatment for the family and the caregiver.

In this study, it was investigated whether there is a relationship between the clinical motor levels and communication levels of children with CP in terms of physiotherapy and rehabilitation, and the perceived competence levels that classified numerical, from the parents' eyes.

MATERIALS AND METHODS

This study was carried out with the participation of 110 children with the diagnosis of cerebral palsy, who were referred to the physiotherapy and rehabilitation unit and volunteered for the study, and their parents responsible for their care.

This study pertains children with CP, aged between 1.5 years and 18 years older. Children with mental retardation, who have additional hearing and speech problems, and who have previously received oral motor therapy were excluded from the study.

The study has been carried out in accordance with the "Helsinki Declaration" and ethically approved by "Clinical Research Ethics Committee" of Marmara University (protocol code: 09.2018.337).

Demographic information such as age (year), gender, and disease-specific data such as cerebral

palsy type and spasticity were recorded before the evaluation of the individuals included in the study. The evaluations to be made of all individuals were explained in detail before they were included in the study.

Children's communication levels were assessed using the Visual Analogue Scale (VAS) (Carlsson, 1983) from the parents' perspective. According to this scale, children's communication level was defined as 0: unable to communicate and 10: no problem in communicating, on a 10 cm horizontal line, including with strangers. Parents were asked to mark their child's communication skills on this 10 cm line. Afterwards, the distance between the marked point and the leftmost point (0 point) was measured with the help of a ruler and recorded.

The Katz Activities of Daily Living (ADL) Scale was created in 1963 by Katz et al. The Katz index was designed to assess children's everyday activities. The Katz index assesses a patient's capacity to do everyday tasks. This scale is the most well-known of the non-disease-specific measures that may be used by a variety of disability groups. It assesses six fundamental activities. The Katz ADL scale is the most well-known non-disease-specific measure that may be utilized by a broad variety of impairment groups. This scale assesses the patient's ability to undertake tasks that he or she must conduct on a daily basis. It assesses the patient's reliance on others in the tasks at hand. It is made up of six questions. If the patient creates each thing independently, he or she receives 1 point; if the patient makes it dependent, he or she receives 0 points. A total score of 6 shows that the patient is self-sufficient, while a score of 0 indicates that the patient is completely reliant (Katz et al., 1963).

The Gross Motor Function Classification System (GMFCS) was developed to categorize children's motor abilities. To define a child's ability level, the GMFCS employs gross motor abilities such as head control, movement transition, walking, running, leaping, and navigating on slopes or uneven terrain. The goal is to demonstrate that a kid can be self-sufficient at home, school, and both inside and outdoors. The GMFCS has levels (level V) that indicate skills ranging from unconstrained walking (level I) to significant head and trunk control impairments that need assistive technology, physical support, and substantial wheelchair usage. The essential

condition is that the distinctions between levels be significant in everyday life. The distinctions are based on functional constraints, hand-held mobility, the use of assistive equipment (walker, crutches, or cane), or wheeled mobility devices, and less on movement quality (Palisano et al., 1997).

The Communication Function Classification System was used to assess the individuals' communication level/performance in the research (CFCS). The goal of CFCS is to categorize everyday communication performance in people with CP ranging from I to V. The performance of the sender and receiver roles, the communication flow, and the kind of communication partner all influence level separation. The CFCS is based on the World Health Organization's (WHO) worldwide categorization of function, disability, and health, which defines degrees of activity and involvement. When determining the CFCS level, all aspects of communication performance are considered. In CFCS, low values are considered strong communication performance (Hidecker et al., 2011).

Statistical Analysis

The SPSS 15.0 (Statistical Package for Social Sciences; SPSS Inc., USA) program was used to analyze the data in the study. For the analysis of the data, the normal distribution characteristics were examined with the Shapiro-Wilk test. Non-parametric data were expressed as percentages and numbers; parametric data were expressed as mean and standard deviation. Spearman correlation was used for investigating the relationship between the parameters. A statistically significant level of $p < 0.05$ was accepted.

The sample size was estimated using the G*Power 3.1 software. Using with effect size=0.3, a sample size estimation with 85% power ($\alpha=0.05$) was performed. Assuming 15% drop out, min 107 patients were calculated to be included in study.

RESULTS

Within the scope of our study, 110 children with CP and their caregiver parents were evaluated.

The demographic data of the children included in the study are shown in Table 1.

Table 1. Demographic data of children

Demographic Data	n=110
Age (year) (mean ± sd)	6.74 ± 3.48
Female n (%)	51 (46.4%)
Male n (%)	59 (53.6%)

Most of the children participating in the study had a diagnosis of hemiplegic CP (36.4%). Diagnoses of diplegia and quadriplegia CP followed.

The distribution of 110 children evaluated within the scope of the study by CP types is shown in Table 2.

Table 2. Distinctions of children according to CP types

CP Types	n=110
Diplegic	27 (24.5%)
Hemiplegic	40 (36.4%)
Quadriplegic	22 (20%)
Dyskinetic	3 (2.7%)
Hypoton	12 (10.9%)
Other	6 (5.5%)

Approximately half of the children (48.2%) included in the study had spasticity. Communication level/performance of 30.6% of children; the motor level of 27.9% of them was at

Table 4. Relationship between children's age, CFCS, GMFCS, katz and vas results

	Age	VAS	CFCS	Katz	GMFCS
Age	NS	$r_s=0,548$ $p<0,001$	$r_s=0,632$ $p<0,001$	$r_s=0,783$ $p<0,001$	$r_s=0,650$ $p<0,001$
VAS	$r_s=0,548$ $p<0,001$	NS	$r_s=0,770$ $p<0,001$	$r_s=0,636$ $p<0,001$	$r_s=0,652$ $p<0,001$
CFCS	$r_s=0,632$ $p<0,001$	$r_s=0,770$ $p<0,001$	NS	$r_s=0,719$ $p<0,001$	$r_s=0,682$ $p<0,001$
Katz	$r_s=0,783$ $p<0,001$	$r_s=0,636$ $p<0,001$	$r_s=0,719$ $p<0,001$	NS	$r_s=0,858$ $p<0,001$
GMFCS	$r_s=0,650$ $p<0,001$	$r_s=0,652$ $p<0,001$	$r_s=0,682$ $p<0,001$	$r_s=0,858$ $p<0,001$	NS

NS: Not significant, GMFCS: Gross Motor Function Classification System, CFCS: Communication Function Classification System, VAS: Visual Analog Scale

a good level. The mean activity level of daily living was 9.11 ± 8.52 (min-max: 0-26).

The child's proficiency level was found to be 6.22 ± 3.29 on average from the perspective of the parents. The CFCS, GMFCS, Katz and VAS evaluation results of the children are shown in Table 3.

Table 3. Children's CFCS, GMFCS, katz and vas results

Scales	Mean ± sd
CFCS (min.-max.; 1-5)	$2,54 \pm 1,36$
GMFCS (min.-max.; 1-5)	$2,97 \pm 1,54$
Katz (min.-max.; 0-26)	$9,12 \pm 8,53$
VAS (min.-max.; 0-10)	$6,22 \pm 3,29$

GMFCS: Gross Motor Function Classification System, CFCS: Communication Function Classification System, VAS: Visual Analog Scale

There is a positive correlation between the parent's perceived communication competence (VAS) and the CFCS level based on clinical evaluation ($r=0.770$; $p<0.001$), GMFCS ($r=0.652$; $p<0.001$) and Katz scale ($r=0.636$; $p<0.001$). relationship was found. The relationship between age, VAS, CFCS, Katz and GMFCS results is indicated in Table 4.

DISCUSSION

In our study, the relationship between motor and communication levels in children with CP and perceived competence levels from the perspective of parents was investigated. It was determined that there was a positive correlation between the level of communication competence perceived by the parents and the CFCS level based on clinical evaluation.

"Communication" refers to verbal or non-verbal expressions. This includes how easy or hard it is for the child with CP to make decisions, talk about how they feel, or share details about their own experiences. Parents describe their children's ability to express their frustration in various ways when they are unable to use language or express their needs. There are also those who report that their children enjoy being with others and listening to their conversations. Speech and hearing problems are among the problems seen in children with CP, and this may also affect the quality of life of the parents (Yildiz et al., 2016). Coleman et al. In their study with children with CP, they evaluated with CFCS and GMFCS and reported that there is a relationship between motor skills and communication skills in children with CP (Coleman et al., 2015). In addition, the positive effects of including exercises that can affect speech-related oropharyngeal structures in the rehabilitation program were emphasized (Ejraei et al., 2021). The correlation between CFCS, GMFCS, Katz and VAS results in our study supports the literature. Because motor disorders such as spasticity and muscle imbalance seen in children with CP; it restricts activities of daily living such as sitting-standing, walking, dressing, eating. Thus, the evaluation results in those parameters also change in parallel with each other.

Mutlu et al. in their study, the distribution of GMFCS and CFCS according to the different body involvements of children with spastic CP and their relationship with each other were examined. In the retrospective cross-sectional study, 327 children were examined, and it was reported that all classification systems were in a significant relationship with each other (Mutlu et al., 2017). Considering the relationship between CFCS, GMFCS, Katz and VAS in our study, we can say that our data support the literature (Mutlu et al., 2017; Ejraei et al., 2021). Because motor disorders in children with CP affect the functional level of

oral motor muscles and cervical mobility. In addition, overcoming the limitations in motor functions or motor development achieved with a normal growth also plays a role in gaining childhood experience and increasing the quality of life. This explains the relationship between the communication skills of children with CP and the level of motor function. As a result, in our study the existence of correlation between classification systems, the level of motor performance and age expresses the skills gained over time with the effect of rehabilitative approaches.

Adherence to treatment and regular continuation of rehabilitation programs are important in the physiotherapy and rehabilitation process of children with CP. At the end of our study, it was determined that there was a good correlation between the communication competence levels obtained from the parents and the clinical motor levels of the children.

The importance of the trainings to be given to caregivers and parents as well as the applications to be made to the patient during the rehabilitation process is known. Having a sick child and knowing the need for support for an unknown period of time also negatively affect parents of children with CP mentally and psychologically. None of the caregiving parents who agreed to participate in this study had a diagnosed psychological problem, however, one of our limitations may be that we did not evaluate the psychological status of the parents. In addition, detailed analysis could not be performed in terms of CP subtypes and age groups. This issue can be investigated with larger sample groups in future studies.

Along the rehabilitation process, being able to support the family and addressing their needs and concerns, as well as raising their awareness of the positive effects of therapeutic approaches on the child, may positively affect the family's continuation of the treatment process and their adherence on rehabilitation. This may be particularly important for families with limited access to rehabilitation centers. Because of the modernization of health systems, some of these families will tend to prefer telerehabilitation applications. The correct guidance of rehabilitation specialists and the correct and healthy completion of the evaluation process will play an important role in the success of the treatment. Of course, we cannot expect parents and caregivers to know

motor assessment methods. However, the relationship of the child's communication skills with the motor gains can be used as a support in this direction.

Based on the relationship we found between the child's communication skills and motor acquisitions, we think that it would be beneficial to inform parents about children's communication skills within the scope of education programs. According to our findings, the Visual Analog Scale (VAS), a simple numerical scale, correlates with the Communication Function Classification System (CFCFS), the Gross Motor Function Classification System (GMFCS), and the Katz scale, all of which are valid and reliable clinic assessment tools. With this positive interaction, the VAS can be used as a secondary clinical assessment tool for information from parents. Moreover, gaining the ability to evaluate the achievements obtained in communication with simple numerical scales can also increase the family's awareness of the child's development. Thus, during the rehabilitation process, the child-family-health professional relationship can progress in a healthy way and increase the success of the rehabilitation. In addition, it may contribute to reducing the psychological burden of caregivers with a positive psychological effect.

Conflict of interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Committee

Clinical Research Ethics Committee" of Marmara University (protocol code: 09.2018.337). Participants who volunteered for the study were informed with a written informed consent form.

Author Contributions

Study Design, OA, GEG; Data Collection, GEG, NE; Statistical Analysis, OA, AYÖ; Data Interpretation, OA; Manuscript Preparation, OA, NE; Literature Search, OA, GEG, NE, AYÖ. All authors have read and agreed to the published version of the manuscript.

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