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Evaluation of the association between gross motor function classification system levels and implementation of home programs in children with cerebral palsy

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Abstract

The aim of this study is to evaluate the association between gross motor function classification system levels and implementation of home programs in children with cerebral palsy. Material-Method: This study is a cross-sectional study. The study group consists of 247 cerebral palsy patients who referred to rehabilitation centers and who agreed to participate in the study and their relatives. Gross Motor Function Classification System was used to find out the severity of cerebral palsy. The state of implementing home program was questioned through the parents of the children within the rehabilitation program. 51.6% of the children in the study were male, while 48.4% were female. Average age of the participants was 9.5 ± 0.5 years (min.:0, max.:21). When the reasons for cerebral palsy were examined, 17.5% were found to be prenatal, 54.2% were found to be natal and 27.3% were found to be postnatal. Distribution of the children in terms of Gross Motor Function Classification System levels was found as 4.9% in level 1, as 21.9% in level 2, 34.4% in level 3, 25.1% in level 4, and 13.8% in level 5. Average age of the participant parents was found as 36.4 ± 12.4 years (min.:18, max.:73). 93.8% of the parents were mothers, while 6.2% were fathers. Home program given by physiotherapist was applied to only 35.6% of the children by the parent. In this study, statistically significant difference was found between Gross Motor Function Classification System levels and application of home programs ($p < 0.05$). We believe that families need to be informed about the efficiency of home programs. Families should be stated that home programs are effective in all motor function levels. Necessary arrangements should be made to increase the efficiency of home programs.

Keywords: Home programs, gross motor function classification system, cerebral palsy

Introduction

Cerebral palsy (CP) is a group of motor disorders which develop secondary to brain anomalies or lesions that occur in early periods of development; they are not progressive, but they change frequently. In children with CP, a great number of physical, sensory, cognitive and emotional problems are seen together [1,2]. CP is the most common disorder causing a severe deterioration in motor function in children. While the CP prevalence in developed countries is 1-2 in each 1000 live births, this rate was found to be 4,4 in each 1000 live births in a study conducted in Turkey [3,4].

Neuroplasticity is the brain's ability to reshape itself. It can be explained with a great number of mechanisms. Since too many synapses are formed in childhood due to repetition and learning, recovery is much better after brain injury when compared with adults. Neuroplasticity development increases with the practice and repetition of applications [5].

Home programs are used to increase the intensity of physiotherapy and to increase the success of rehabilitation during the time left from physiotherapy sessions. In terms of content, home program consists of therapeutic activities which can be performed at home with the help of parent and which are designated to reach successful results about the child's health. Home programs are applied at home by the family with the guidance and support of a therapist [6,7]. There is high quality evidence that goal oriented and task based home programs develop motor skills of children with CP. In addition to their positive effects on motor skills and functional development, home programs are also reported to increase the child's and the family's motivation [8,9].

Gross Motor Function Classification System (GMFCS), which defines both the severity and the course of the disease, is used to classify motor disorder in children with CP. This system is a system which is used in informing the family about the instantaneous performance of the child. In addition, the classification in terms of GMFCS can also be used during the process of deciding on which treatment intervention is suitable within time [10].

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Participation of families to home program and the factors

influencing this participation are not fully known. The aim of our study is to evaluate the association between GMFCS levels of children with CP and the participation of families to home programs.

Material and Methods

This study is a cross-sectional study which was conducted in eight private education and rehabilitation centers in the city center of Malatya province. The study group consists of 247 children with CP and their parents who accepted to participate in the study. The inclusion criteria in children was being younger than 21 years old, having met the definition of CP and having been given a home program specially planned by a physiotherapist, while the inclusion criteria for parents was being the person who undertook the implementation of the home program. The study protocol was approved by Inonu University Scientific Research and Publication Ethics Board. The parents who were primarily responsible for the care of children were informed about the study and they signed a consent form that they volunteered to participate and thus the study was performed in compliance with the Declaration of Helsinki. The study form was structured in three parts. In the first part, the parents' and children's sociodemographic characteristics and general health were assessed. In the second part, parents' participation in the home program was analyzed, while in the third part gross motor function levels of children with CP were evaluated. Parents' participation in the home program was analyzed by questioning "the state of implementing the home program planned specifically for the child by the physiotherapist every day during the last week". GMFCS was used to classify the severity of the disorder in gross motor functions of children with CP. GMFCS is a valid and reliable standardized system which classifies in five levels the gross motor functions of children with CP between 0-12 years of age. Children with CP are least dependent in level 1 and most dependent in level 5 in motor functions (Table 1) [11].

Statistical Analysis

Study data were uploaded to a computing environment and were evaluated using Statistical Package for Social Sciences (SPSS) for Windows version 22.0 (SPSS Inc, Chicago, IL). The suitability of the variables for normal distribution were assessed using Kolmogorov Smirnov Test. Arithmetic averages are expressed with standard errors. Chi-square and Spearman correlation analysis were used for the analysis of data. Total type-1 error level was used as 5% for statistical significance.

Results

In our study, 51.6% of the children were male, while 48.4% were female. Average age of the participants was 9.5 ± 0.5 years (min.:0, max.:21). 60% of the children were younger than 10, while 40% were older than 10. 65.9% of the cases were spastic (n:163), 5.6% were dyskinetic (n:14), 14,1% were hypotonic (n:35), 4.4% ataxic (n:11) and 9.7 % were mixed type.

71.6% of the children were found to live in cities, while 28.4% were found to live in rural area. Average age of the participant parents was found as 36.4 ± 12.4 years (min.:18, max.:73). 93.8% of the parents were mothers, while 6.2% were fathers. Table 2 shows the education levels, income levels and occupations of the parents (Table 2).

In our study, it was found that while the home program given to the child by physiotherapist was applied to 35.6% of the children, it was not applied to 64.4%.

Distribution of the children in terms of GMFCS levels was found as 13 patients (4.9%) in level 1, 54 patients (21.9%) in level 2, 854 patients (34.4%) in level 3, 62 patients (25.1%) in level 4, and 34 patients (13.8%) in level 5.

Distribution of home program participation levels according to GMFCS levels is given in Figure 1.

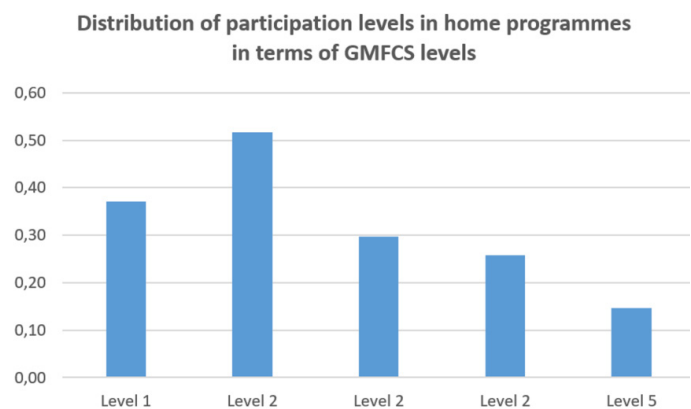


Figure 1. Distribution of participation levels in home programmes in terms of GMFCS

Statistically significant difference was found between GMFCS levels and application of home programs ($p < 0.05$) (Table 3). It was found that as motor function deficits of children with CP increased, parents' habits of making their children do exercise decreased.

Table 1. Gross motor function classification system

Level	Description
Level I	Can walk without limitation, limitation in more advanced gross motor skills
Level I	Can walk without assisting device, limitation in walking outside the house and in public
Level III	Can walk with devices helping mobility, limitation in walking outside the house and in public
Level IV	Limited self-movement, children are carried or they use energized mobility devices outside the house and in public
Level V	Self-movement is limited even with assisting technology

Table 2. Education, Income and Occupation status of parents within the study

Socio-Demographic Characteristics	Number	%
Income		
Low	63	25.5
Moderate	141	57.08
High	43	24.4
Level of Education		
Secondary school and lower	205	83.0
High school and upper	42	17.0
Occupation		
Housewife	213	85.7
Employee with social security	27	10.9
Other	7	3.4
Total	247	100.0

Table 3. Distribution of implementation of home programs in terms of gross motor function classification system

GMFCS levels	Implementation of home programs		Total
	Yes	No	
Level I-III	67 (44,4%)	84 (55,6%)	151 (61,1%)
Level IV-V	21 (21,9%)	71 (78,1%)	96 (38,9%)
Total	88 (35,6%)	159 (64,4%)	247 (100%)

P= 0.001 X²= 12.950 SD= 2

Discussion

The aim of this study is to analyze the association between motor function performance levels of children with CP and parents' participation in the implementation of home programs. The most important result found in the study is the finding that as motor function deficits of children with CP increased, parents' habits of making their children do exercise decreased.

Average age of the participant parents was found as 36.4±12.4 years (min.:18, max.:73). 93.8% of the parents were mothers, while 6.2% were fathers. In our culture, as in many cultures, generally fathers undertake the responsibility of make a living, while mothers stay at home and look after the children during the day.

88.2% of the participants reported that they had another child. For this reason, the mothers who take care of their child all day and do the housework also want to take care of their other children, too. This situation negatively affects their application of the home program. In planning the treatment program and in the assessment of treatment efficiency, a great number of assessment methods specific for children are used.

Functional states of children with CP are also assessed with various classification systems. GMFCS is generally used in clinic to classify the motor disorders of children with CP [12]. Similarly, GMFCS was used in this study to classify the motor disorders of children with CP. When the distribution of the patients was evaluated in terms of their GMFCS levels, it can be seen that the highest number of patients were in level 3 (n=85, 34.4%) and level 4 (n=62, 25. 1%). In another study conducted in our country which researched the risk factors and clinical profiles of 625 CP patients, a great majority of the patients were in level 3 and 4. In other studies in literature which assessed the motor functions of children with CP, most of the patients were found to be in level 3 and 4 [13,14]. This can be explained with the number of children with moderate and severe motor performance disorder who refer to rehabilitation centre being higher.

Literature review conducted showed that home programs and participation in these programs has positive effects on the developmental achievements of children with CP [7, 15]. Repetitive and experimental application of home program was found to be as important as other therapeutical approaches [16,17]. It can be thought that regular application of home programs can increase the efficiency of the treatment by maximizing the motivation of children and families.

In this study, it was found that home program given to children by physiotherapist was applied only in 35.6% of the children.

In literature, not following home exercise programs has been assessed as one of the factors influencing treatment results [18,19]. In spite of this, the participation of families in home programs is low. In their study, Rone-Adams found that home program given by physiotherapist was not followed in 66% of the children. In a study conducted by Başaran et al., it was found that home program was not followed in 64.4% of the children. With this study, it was found that parents' habits of making their children do exercise decreased as motor function disorders of children with CP increased (p<0.05). In a study conducted by Başaran et al. on 147 children with CP, it was found that as motor function disorders of children increased, parents became more compatible with home programs [19]. The reason for this can be the differences in sample size, families' sociodemographic characteristics and individual changes of children within the context of the study. The number of studies in current literature about compliance with home exercise programs and the factors influencing this compliance is limited. In existing studies, negative factors influencing the implementation of the home program were found as the child's age, families' sociodemographic characteristics, motivation loss in children and parents during the implementation of the program, parents' jobs and their productive activities, other programs children participated in, children's mood and their characteristic features during the day [17,20].

Limitations of the Study

The limitation of this study is the fact that of the factors that are thought to influence compliance to home programs, only motor function performance levels were assessed. Multicenter monitoring studies which assess compliance and the factors that influence compliance more detailed can be conducted.

Conclusion

Home program implementation to increase rehabilitation programs of children with CP are an indispensable part of rehabilitation programs. As a result of this study, it was found that families required to be informed about the efficiency of home programs. Families should be told that home programs are effective in all motor function levels.

Competing interests

The authors declare that they have no competing interest

Financial Disclosure

The author declared that this study has received no financial support.

Ethical approval

The study protocol was approved by Inonu University Scientific Research and Publication Ethics Board.

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