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Research Paper: The Relationship Between the Parent Report of Gross Motor Function of Children With Cerebral Palsy and Their Participation in Activities of Daily Livings

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ABSTRACT

Introduction: This study aimed to assess the relationship between the parent reports of gross motor function of children with Cerebral Palsy in activities of daily living.

Materials and Methods: Sixty mothers of children with Cerebral Palsy (CP) who were recruited by convenience sampling method were participated in this cross-sectional study. Children were between 6 to 12 years old. For assessing the participation of children with CP in life areas, the Children Participation Assessment Scale-Parent version (CPAS-P) was used and for assessing the gross motor function level of these children, the Gross Motor Function Classification System-family report was used. For data analysis, the Pearson correlation coefficient, and ANOVA tests were used. All statistical analyses were done by SPSS v.21.

Results: The mean age of children was 8.92 years (age range: 6-12 years). A total of 22 of them were males and 30 were females. The relationship between the Gross Motor Function Classification System (GMFCS) of children with CP and their participation in all objective aspects of Activities of Daily Livings (ADL) and Instrumental Activities of Daily Livings (IADL) were moderate to good and this relationship was significant $P<0.05$. The difference of participation in ADL and IADL between levels of GMFCS was significant ($P<0.05$).

Conclusion: The results of this study showed a good relationship between gross motor function level of CP children with their participation in ADL and IADL.

1. Introduction

Cerebral Palsy (CP) is a term to describe the onset of motor dysfunction in the early years. This disability is the result of injury or dysfunction of the brain. The brain lesion is not progressive and happens in the early stages of brain development [1]. The prevalence of CP among different countries is varied from 0.6 to 5.9 per 1000 live births but most statistics has around 2 CPs per 1000 live births [2].

Because of high prevalence of CP and its associated complications, it seems necessary to address this prob-

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lem. Understanding the needs of people with CP in the field of rehabilitation, and their prerequisites to do Activities of Daily Living (ADL) is of utmost importance [3]. According to the Occupational Therapy Practice Framework (OTPF) of American Occupational Therapy Association (AOTA), these needs are defined as participation in occupation [4]. According to the International Classification of Functioning (ICF), Disability and Health, participation is defined as involvement in life situations [5].

In the recent century, the importance of enhancing the performance of children with neurological problems has been highlighted. Traditionally, the goal of physical rehabilitation of children with CP is to normalize their movement patterns, reducing their neurological symptoms, and minimizing their secondary damages. This approach is based on the assumption that increased mobility would reduce their limitation and seclusion and vice versa [6-8]. In this regard, we tried to find whether improving in the gross motor function level of CP children can increase their participation in life areas. According to the OTPF, the areas of participation or areas of occupations consist of Activities of Daily Living (ADL), Instrumental Activities of Daily Living (IADL), play, leisure, social participation, education, work, and rest/sleep [4].

Many studies have been done in the field of CP children participation in life areas [9-14]. However, no study has ever assessed the effect of gross motor function level of CP children on their participation in life areas, especially in the areas of ADL and IADL, which are the basic and important parts of the occupations, so the rehabilitation interventions should promote these two important areas. Thus, the rehabilitation interventions in CP children should mostly focus on promoting the performance skills, especially physical and mental components. In this regard, this question arises that whether focus on the functional components such as gross motor function level of CP children can promote their participation in occupational performance areas, especially ADL and IADL. This study was designed to assess the effect of gross motor function level of 6-12 years old children with CP on their occupational performance areas, especially ADL and IADL.

2. Materials and Methods

Participants

A total of 60 parents of CP children were participated in this cross-sectional study. The samples were collected from occupational therapy clinics and CP children's schools in Zanjan City, Iran. The project proposal was approved (ethics code: ZUMS.REC.1395.75) at Zanjan University of Medical Sciences. Then Armed with an introduction letter from University, the researchers referred to occupational therapy clinics and exceptional children's schools for sampling and getting information. Study samples were selected by convenience sampling method. This means that after attending the clinics and schools, children who met the inclusion criteria were enrolled in the study.

The inclusion criteria comprised children aged 6-12 years; having CP diagnosed by a neurologist or pediatric neurologist; lacking epilepsy or seizure disorder resistant to treatment, other disorders such as progressive neuromuscular disorders, orthopedic surgical pathologic and Botox injections in the past 12 months, blindness and deafness; and having the IQ>70. The exclusion criteria comprised declining to continue participation in the study, failure to fully complete the questionnaire, or filling the questionnaire by others instead of the parents or caregivers of CP children.

First of all the consent forms were taken from the parents of CP children and after that two questionnaires of Children Participation Assessment Scale-Parent version (CPAS-P) and GMFCS family report were completed by parents of CP children. The questionnaires were given to 60 that met inclusion criteria. However, 8 parents did not complete the questionnaires, so they were excluded from study and finally 52 samples remained for final analysis.

Outcome measurement

In this study, two questionnaires were Children Participation Assessment Scale-Parent version (CPAS-P) and Gross Motor Function Classification System (GMFCS) family report were used.

Children Participation Assessment Scale-Parent version (CPAS-P)

To collect information about the CP children participation in Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) areas of occupational performance, we used the Children Participation Assessment Scale-Parent version (CPAS-P). This questionnaire was developed by Amini et al. in 2016 [15, 16]. It has 8 subtests; ADL, IADL, play, leisure, social participation, education, work, and rest/sleep. In this study the subtests of ADL (11 activities) and IADL (10 activities) were used. This scale assesses each activity from 5 objective dimensions (diversity, intensity, with whom, enjoyment, and parent satisfaction) [15].

Gross Motor Function Classification System family report questionnaire (GMFCS)

To collect information about the level of gross motor function of CP children, GMFCS family report questionnaire was used [17]. Validity and reliability of this questionnaire in Iran was assessed by Riahi et al. that the reliability for the total score of the questionnaire has been reported acceptable (ICC=0.92) [17]. GMFCS family report questionnaire is an observational standard classification system by which CP children are divided in 5 levels based on the current gross motor abilities, limitations in gross motor function and the need for assistive devices [17].

Data analysis method

SPSS v.21 was used to analyze the data. To determine the normal distribution of data, the Kolmogorov-Smirnov test was used, and to measure the relationship between variables, the Pearson correlation test was used. The Pearson correlation values are classified as follows: >0.75 (good to excellent), 0.75-0.50 (moderate to good), and 0.50-0.25 (moderate to weak) [18, 19]. Another classification method is as follows: 0-20 indicates very low correlation), 20-40 low correlation, 40-60 moderate correlation, and 60-80 high correlation, and 80-100 as very high correlation [20]. Finally, to assess the differences between the gross motor function levels separately, the Fisher's Least Significant Difference (LSD) post hoc test was used.

3. Results

Descriptive statistics

The mean age of children was 8.92 years (minimum: 6 and maximum: 12 years), and 22 of the children were male and 30 were female (Table 1).

Statistics analysis

The normal distribution of data was evaluated by K-S, that was found to be normal (P>0.05). So to analyze the relationship between variables, the Pearson test was used. The results of analysis of the relationship between the gross motor function level of CP children and their

Table 1. Demographic characteristic of samples

		No.	%
Age	6 years old	5	9.6
	7 years old	9	17.3
	8 years old	9	17.3
	9 years old	9	17.3
	10 years old	8	15.4
	11 years old	6	11.5
	12 years old	6	11.5
Gross Motor Function Classification System (GMFCS levels)	I	11	23.1
	II	9	3.8
	III	9	11.5
	IV	11	28.8
	V	12	32.7
Gender	Male	22	42.3
	Female	30	57.7
Type of Cerebral Palsy (CP)	Hemiplegia	14	26.9
	Diplegia	25	48.1
	Quadriplegia	13	25.0

Table 2. The correlation and the significant level of gross motor function of CP children with their participation in ADL and IADL areas of occupational performance

	Objective Dimension	N	Mean	SD	R	P
Activities of Daily Living (ADL)	Diversity	52	6.42	4.26	0.65	0.00
	Intensity	52	34.57	24.17	0.63	0.00
	With whom	52	10.40	7.91	0.45	0.001
	Enjoyment	52	23.09	17.36	0.58	0.00
	Parent satisfaction	52	21.55	15.36	0.64	0.00
Instrumental Activities of Daily Living (IADL)	Diversity	52	4.28	3.72	0.54	0.00
	Intensity	52	19.42	17.24	0.52	0.00
	With whom	52	6.90	5.99	0.50	0.00
	Enjoyment	52	17.01	15.47	0.48	0.00
	Parent satisfaction	52	14.80	13.02	0.50	0.00

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participation in ADL and IADL are presented in Table 2. Moreover, to assess the differences between the groups, the ANOVA test was used. The analysis showed that differences between groups compared with the five levels in all variables were significant (P<0.05) and finally, to assess the difference between the levels of gross motor function, the LSD post hoc test was used. For example in ADL diversity section, the differences between diversity of ADL of GMFCS level I with level II was not significant (P>0.05). However, the differences between diversity of ADL of GMFCS level I with level III, IV and V are significant (P<0.05). The complete results of this analysis are presented in Table 3.

4. Discussion

This study aimed to evaluate the effect of gross motor function of CP children (6 to 12 years old) on their participation in ADL and IADL. It is the first study on this topic. Previous studies assessed the effect of activity level of CP children on their functional walking (i.e. GMFCS, 6-min walk test, 10-min walk test) during their life habits [21-24]. The Pearson correlation analysis showed that a good to moderate significant correlation between the gross motor function level of CP children and their participation in ADL and IADL. These results are in a line with the results of Bjornson et al. who reported significant correlation of CP children's walking performance with their participation in personal care, housing, and recreation of their life habits [25].

Our study findings are consistent with Lepage et al. [23] study results that confirmed a reverse association of locomotors limitations on the accomplishment of life habits in 96 children (aged 5-17.8 years) with CP across all GMFCS levels. They reported lower participation in life habits in children using assistive mobility devices for walking compared to independent walkers for life habits total scores and the sub-categories of home participation, mobility, community and leisure [23]. The results of post hoc analysis showed that closer the levels of gross motor function, the lower would be the mean differences between them and vice versa. In other words, the results of post hoc analysis among all gross motor function levels showed that the mean differences between the level I and level II wasn't significant but the mean differences between level I with level III, IV, and V were significant.

Therefore, participation of CP children with the gross motor function level 1 had significant differences with the CP children with other gross motor function levels, especially with the levels higher than III. In this study the parent report version of GMFCS was used in which the level V means totally independent walking and the level I mean totally dependent walking [17]. Based on the results, when CP children walks independently, they can have good participation in ADL and IADL areas of occupational performance. According to the post hoc analysis, walking especially independent walking is a main factor for promoting the CP children participation in ADL and IADL areas of occupational performance. Bjornson et al. showed that the CP children's walking

Table 3. ANOVA to evaluate the changes between groups (between gross motor function levels)

	ANOVA Between Groups (Levels)					Post Hoc LSD			
	Sum of Squares	df	Mean Square	F	Sig.	GMFCS	Mean Difference	Std. Error	Sig.
Activities of Daily Living (ADL)									
Diversity	426.827	4	106.707	9.993	0.000	1	2	-3.08333	2.49576	0.223
							3	-5.75000*	1.63386	0.001*
							4	-6.45000*	1.26558	0.000*
							5	-7.23039*	1.23205	0.000*
						2	3	-2.66667	2.66808	0.323
							4	-3.36667	2.45985	0.178
							5	-4.14706	2.44277	0.096
						3	4	-0.70000	1.57846	0.659
							5	-1.48039	1.55170	0.345
						4	5	-0.78039	1.15758	0.504*
Intensity	12420.607	4	3105.152	8.397	0.000	1	2	-18.08333	14.6870	0.224
							3	-26.75000*	9.61495	0.008*
							4	-34.48333*	7.44771	0.000*
							5	-39.55392*	7.25038	0.000*
						2	3	-8.66667	15.7011	0.584
							4	-16.40000	14.4757	0.263
							5	-21.47059	14.3752	0.142
						3	4	-7.73333	9.28892	0.409
							5	-12.80392	9.13147	0.167
						4	5	-5.07059	6.81211	0.460
With whom	1191.554	4	297.888	6.990	0.000	1	2	-18.75000*	4.98593	0.000*
							3	-8.91667*	3.26406	0.009*
							4	-10.75000*	2.52833	0.000*
							5	-10.10294*	2.46134	0.000*
						2	3	9.83333	5.33018	0.071
							4	8.00000	4.91419	0.110
							5	8.64706	4.88006	0.083
						3	4	-1.83333	3.15338	0.564
							5	-1.18627	3.09993	0.704
						4	5	0.64706	2.31256	0.781

	ANOVA Between Groups (Levels)					Post Hoc LSD			
	Sum of Squares	df	Mean Square	F	Sig.	GMFCS	Mean Difference	Std. Error	Sig.
Activities of Daily Living (ADL)									
Enjoyment	5485.218	4	1371.305	6.511	0.000	1	2	-16.25000	11.0849	0.149
							3	-18.25000*	7.25644	0.015*
							4	-19.31667*	5.62081	0.001*
							5	-27.66176*	5.47189	0.000*
						2	3	-2.00000	11.8497	0.867
							4	-3.06667	10.9248	0.780
							5	-11.41176	10.8490	0.298
						3	4	-1.06667	7.01038	0.880
							5	-9.41176	6.89155	0.179
						4	5	-8.34510	5.14113	0.111
Parent satisfaction	5211.948	4	1302.987	8.970	0.000	1	2	-13.58333	9.20493	0.147
							3	-15.75000*	6.02604	0.012*
							4	-21.98333*	4.66775	0.000*
							5	-25.87745*	4.54408	0.000*
						2	3	-2.16667	9.84049	0.827
							4	-8.40000	9.07248	0.359
							5	-12.29412	9.00948	0.179
						3	4	-6.23333	5.82171	0.290
							5	-10.12745	5.72303	0.083
						4	5	-3.89412	4.26940	0.366
Diversity	218.104	4	54.526	5.245	0.001	1	2	-0.66667	2.46248	0.788
							3	-4.33333*	1.61207	0.010*
							4	-4.83333*	1.24870	0.000*
							5	-4.69608*	1.21562	0.000*
						2	3	-3.66667	2.63250	0.170
							4	-4.16667	2.42704	0.093
							5	-4.02941	2.41019	0.101
						3	4	-0.50000	1.55741	-0.5000
							5	-0.36275	1.53101	-0.3627
						4	5	0.13725	1.14214	0.905

	ANOVA Between Groups (Levels)					Post Hoc LSD			
	Sum of Squares	df	Mean Square	F	Sig.	GMFCS	Mean Difference	Std. Error	Sig.
Activities of Daily Living (ADL)									
Intensity	4617.307	4	1154.327	5.147	0.002	1	2	-4.91667	11.4382	0.669
							3	-16.41667*	7.48807	0.033*
							4	-22.88333*	5.80023	0.000*
							5	-21.88725*	5.64656	0.000*
						2	3	-11.50000	12.2279	0.352
							4	-17.96667	11.2736	0.118
							5	-16.97059	11.1953	0.136
						3	4	-6.46667	7.23416	0.376
							5	-5.47059	7.11154	0.446
						4	5	.99608	5.30524	0.852
With whom	523.019	4	130.755	4.693	0.003	1	2	-0.33333	4.03146	0.934
							3	-6.16667*	2.63921	0.024*
							4	-7.33333*	2.04432	0.001*
							5	-7.33333*	1.99016	0.001*
						2	3	-5.83333	4.30981	0.182
							4	-7.00000	3.97345	0.085
							5	-7.00000	3.94586	0.083
						3	4	-1.16667	2.54972	0.649
							5	-1.16667	2.50650	0.644
						4	5	0.00000	1.86986	1.000
Enjoyment	3098.239	4	774.560	3.994	0.007	1	2	-3.58333	10.6360	0.738
							3	-16.41667*	6.96295	0.023*
							4	-17.01667*	5.39348	0.003*
							5	-18.84804*	5.25058	0.001*
						2	3	-12.83333	11.3704	0.265
							4	-13.43333	10.4830	0.206
							5	-15.26471	10.4102	0.149
						3	4	-0.60000	6.72685	0.929
							5	-2.43137	6.61283	0.715
						4	5	-1.83137	4.93319	0.712

ANOVA Between Groups (Levels)						Post Hoc LSD			
	Sum of Squares	df	Mean Square	F	Sig.	GMFCS	Mean Difference	Std. Error	Sig.
Activities of Daily Living (ADL)									
Parent satisfaction	2551.229	4	637.807	4.909	0.002	1	2	-2.91667	8.70599	0.739
							3	-12.75000*	5.69941	0.030*
							4	-17.25000*	4.41474	0.000*
							5	-15.79902*	4.29777	0.001*
						2	3	-9.83333	9.30709	0.296
							4	-14.33333	8.58071	0.101
							5	-12.88235	8.52113	0.137
						3	4	-4.50000	5.50615	0.418
							5	-3.04902	5.41282	0.576
						4	5	1.45098	4.03798	0.721

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performance had significant correlation with their participation in personal care, housing, and recreation of their life habits [25].

The results of Tobimatsu et al. studies confirm the results of the present study. In 2000, in a retrospective study they found that the ability of Japanese CP children in finding a good job is largely related to their performance in walking (r=0.86) [26]. All in all, according to the results of the present study and other similar studies, promoting the gross motor function level and independent mobility are the main factors that can enhance the participation of CP children in life areas, especially ADL and IADL. Thus, the rehabilitation interventions should be in line with promoting GMFCS level. For promoting the participation of CP children in the GMFCS level I and II, the rehabilitation interventions should be compensatory intervention type such as environmental modification, adaptation, assistive device and technology that can affect their independent mobility.

The results of this study showed that the gross motor function level of 6-12 years old CP children had significant influence on all dimensions (diversity, intensity, with whom, enjoyment and parent satisfaction), of ADL and IADL participation. The ability to walk independently is a factor that influences the participation of CP children in occupational performance areas, especially ADL and IADL, so the rehabilitation specialists, especially occupational therapists and physiotherapists should be careful about the participation of CP children in ADL and IADL area of occupational performance and try to promote the gross motor function level of these children.

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Conflict of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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