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Original Article

Comparison of the quality of life in cerebral palsy children with physical therapy more and less than 10 months

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Abstract

Background Cerebral palsy (CP) is the most common cause of severe physical disability in childhood. These limitations may cause lower level experience or quality of life (QoL). Physical therapy (PT) plays a central role in managing CP.

Objective To compare QoL in CP children with PT more and less than 10 months and to compare gross motoric level before and after PT.

Methods A cross sectional study was performed from June 2012 to March 2013 in Medan. Eligible population were four to twelve year old CP children who received PT. Subjects were divided into 2 group, group I was CP children with PT more than 10 months, group II was CP children with PT less than 10 months. Parents were asked to fill CP QOL questionnaires. To evaluate motor impairment level we used gross motor function classification system (GMFCS) that classified the motoric impairment into 5 levels. Data was analyzed by using independent T-test and Mann-Whitney U test with 95% confidence interval.

Results There were 60 CP children divided into 2 groups of 30 children. The mean duration of PT in group I was 35.7 (SD 19.37) months and group II was 4.2 (SD 3.13) months. Gross motoric level in both group increased from GMFCS IV to GMFCS II in group I (P=0.0001) and from GMFCS IV to GMFCS III (P=0.002) in group II. The mean total CP QoL scores in group I and II were 79.63 (SD 5.73) and 47.71 (SD 6.85), respectively (P=0.0001).

Conclusions Cerebral palsy children who received more than 10 months PT have higher QoL than children with less than 10 months PT. There was significant gross motor improvement after PT in both groups. **[Paediatr Indones. 2015;55:287-92]**.

Keywords: *cerebral palsy, quality of life, physical therapy*

Cerebral palsy (CP) is the most common severe physical disability in children, characterized by limitation in activities that are caused by motor disorders, such as spasticity, muscle paresis, and impaired muscle control.[1] The incidence of CP approximately 2 to 2.5 per 1000 live birth.[2] Cerebral palsy cannot be cured, but a host of interventions can improve functional abilities, participation, and quality of life.[3]

In recent years there has been increasing interest in measuring the quality of life (QoL) of children with CP. Quality of life is defined by the World Health Organization (WHO) as a subjective individual perception about his own position in life.[4] The QOL is often used as a generic label for assortment of physical functioning and psychosocial variables.[5] The children with CP were reported to have lower QoL compared

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to children in the general population. The QoL was moderately associated with gross motor abilities, and negatively associated with internalizing mental health problems.[4] Measuring QoL was a vital part to assess the health condition of CP children and to evaluate treatment.[6]

Several interventions applied to reduce mobility limitation in children with CP, such as spasticity treatment, orthopedic surgery, and physical therapy (PT). Evaluation of the effectiveness of these interventions with adequate measuring instruments is important for further improvement of rehabilitation care.[7] Physical therapy played a central role in managing CP.[8] An observational, longitudinal study was carried out in Goiania, Goias, Brazil involving 100 mothers and children with CP. After ten months of rehabilitation the children's gross motor function and QoL had significantly improved.[9] In North Sumatera, Indonesia, there is no study that assess QoL in CP children nor a study that compares those with 10 months or less PT. This study was conducted to compare QoL in CP children with PT more and less than 10 months; also to compare gross motoric level before and after PT.

Methods

We conducted a cross sectional study in medical rehabilitation unit at Haji Adam Malik Hospital and Yayasan Pendidikan Anak Cacat (YPAC) Medan, between June 2012 until March 2013**.** The study population were children aged 4 to 12 years who were diagnosed as CP by a pediatric neurologist and had been receiving PT. Children suffered from neurodegenerative or psychiatric illness, underwent surgical therapy, and had been using spasticity drug were excluded.

To standardize the evaluation of motoric impairment level, we used gross motor function classification system (GMFCS), that classified the motoric impairment into 5 levels (level I as the mildest up to level V as the most severe impairment).[10] Evaluation of QoL was done with CP QoL-child questionnaires (the primary caregiver-proxy version was used for parents of children aged 4 to 12 years, and the child self-report version was used for children aged 9 to 12 years). This instrument assess seven domains of QoL, those were social well-being and acceptance, feelings about functioning, participation and physical health, and emotional well-being.[11]

Data was collected from interview to parents. Motor level were assessed by using GMFCS. Motor level before PT was taken from their physical therapy and motor level after PT was assessed during interview. Children who received PT more than 10 months were put into group I and children who received PT less than 10 months were into group II. Parents were asked to fill CP QoL questionnaires, the primary caregiver-proxy version. This study was approved by the Medical Ethics Committee of the Faculty of Medicine, University of Sumatera Utara.

All analyses were conducted with software *SPSS version 19.0*. Independent T-test and Mann-Whitney U test were used to compare QoL scores between group I and II. Marginal homogeneity test was used to compare gross motor level between before and after getting PT in both groups. Statistical significance is considered if P level was less than 0.05 with a 95% confidence interval.

Results

We enrolled 60 children with CP consisted of 30 children in each group. Mean age was 9.7 (SD 2.45) years in group I (>10 months of PT) and 6.9 (SD 1.74) years in group II (<10 months of PT). Gender distribution was almost the same in both groups. Nutritional status and head circumference were mostly normal in group I and grup II (**Table 1**). Spastic

Table 1. Characteristics of subjects

Characteristics	Group I (n = 30)	Group II (n = 30)
Gender, n		
Male	17	15
Female	13	15
Mean age (SD), years	9.7 (2.45)	6.9 (1.74)
Nutritional status, n		
Normoweight	16	21
Mild malnutrition	8	9
Moderate malnutrition	1	0
Overweight	5	0
Head circumference, n		
Normal	18	18
Microcephaly	9	11
Macrocephaly	3	1

Table 2. Neurological characteristics of subjects

Characteristics	Group I (n=30)	Group II (n=30)
Physiology type, n		
Spastic	22	23
Hypotonia	7	6
Mixed	1	1
Topography type, n		
Hemiplegia	0	1
Diplegia	13	8
Tetraplegia/quadriplegia	17	21
Other disorders, n		
Speech	14	22
Speech and visual	1	3
Speech and hearing	3	4
None	12	1
Mean duration of PT (SD), months	35.7	4.2
Frequency of PT per week, n		
Once	1	0
Twice	3	0
Three times	15	22
Four times	11	8
Motor level before PT, n		
GMFCS II	1	5
GMFCS III	9	9
GMFCS IV	15	10
GMFCS V	5	6
Motor level after PT, n		
GMFCS I	2	
GMFCS II	19	9
GMFCS III	9	10
GMFCS IV	0	6

tetraplegia was the most CP type in both groups. The mean duration of PT in group I was 35.7 (SD 19.37) months and group II was 4.2 (SD 3.13) months. The frequency of PT was mostly three times a week in both groups (**Table 2**).

Table 3 shows the comparison of QOL scores between group I and group II. Group I had higher QOL scores than group II significantly in general or in specific domain (P=0.0001).

The marginal homogeneity analysis showed that gross motoric level increased significantly from GMFCS IV to GMFCS II in group I (P=0.0001) and from GMFCS IV to GMFCS III in group II (P=0.002) (**Table 4**).

Discussion

Cerebral palsy is described as a group of permanent disorders in the development of movement and posture that cause limited activity. These disorders are attributed to non-progressive disturbances that occurred in fetal or infant's brain development. The motor disorders in CP are often accompanied by disturbances of sensation, perception, cognition, communication, and behavior; by epilepsy and by secondary musculoskeletal problems.[11] Spastic CP is the most common type, accounting for 70% to 85% of all cases.[12] A study in Brazil showed that relative to topography, fifty-two children were quadriplegic, thirty-three diplegic and fifteen hemiplegics. As for motor type, eighty-eight children presented spasticity.[13] In this study spasticity was found more than 70% in both groups, quadriplegic was found approximately 56% in group I and 70% in grup II. Speech disorder was the most symptoms after motor limitation in both groups. The spastic muscles of children with CP caused by increased collagen, that lead to increased muscle stiffness and contractures.

Poor growth and nutritional status are commonly reported in children with CP. It was due to inadequate dietary intake, secondary to impaired oral motor and swallowing competence.[14] Conversely, there is evidence to suggest that certain children with

Table 3. Scores of QOL in group I and group II

Domain, mean scores (SD)	Group I	Group II	95% CI of differences	P value
Social well-being and acceptance	82.5 (8.34)	52.3 (8.46)	25.94 to 34.62	0.0001[a]
Participation and physical health	80.8 (7.52)	44.3 (10.56)	31.81 to 41.29	0.0001[a]
Functioning	69.3 (5.30)	42.3 (9.37)	-	0.0001[b]
Emotional well-being	82.2 (10.51)	41.9 (16.14)	-	0.0001[b]
Pain and impact of disability	71.9 (9.44)	34.0 (8.52)	33.32 to 42.62	0.0001[a]
Access to services	81.9 (6.03)	54.0 (8.14)	-	0.0001[b]
Family health	88.7 (6.19)	65.3 (9.81)	-	0.0001[b]
Total	79.6 (5.73)	47.7 (6.85)	28.66 to 35.18	0.0001[a]

[a]T-independent test, [b] Mann-Whitney test

Table 4. Gross motor level comparison before and after PT

			GMFCS after PT					P value
			I	II	III	IV	V	
GMFCS before PT	Group I	II	1 (50)	0	0	-	-	0.0001
		III	1 (50)	8 (42.1)	0	-	-	
		IV	0	9 (47.4)	6 (66.7)	-	-	
		V	0	2 (10.5)	3 (33.3)	-	-	
	Group II	II	-	5 (55.6)	0	0	0	0.002
		III	-	4 (44.4)	5 (50)	0	0	
		IV	-	0	5 (50)	5 (83.3)	0	
		V	-	0	0	1 (16.7)	5 (100)	

CP are at risk of obesity, particularly those with marked spasticity and who are relatively inactive.[15] Our study showed nutritional status were mostly normal in both groups.

Head circumference, which is one of the most important measurement during childhood, reflects the intracranial volume of the brain under development. The presence of discrepancy in its proportion may suggest pathological processes. A previous study showed the mean values of weight, length, and head circumference were within the normal range for age and 21% of the patients had microcephaly.[16] A study in Brazil found a significant decrease in the head circumference of hemiplegic girls.[17] In present study, we showed 60% of the subjects had normal head circumference and one third had microcephaly.

Cerebral palsy is a non-progressive disorder, but some children show a deterioration of activities as they grow older.[18] It has been suggested to reduce levels of fitness and physical activity.[19] The focus of physiotherapeutic treatment programs has therefore shifted towards the improvement of fitness and promotion of physical activity.[20] A repeated measures design was used in a cohort of children with CP with three baseline assessments prior to the intervention period and two follow up assessments in the first and third weeks after the intervention. It showed that basic motor abilities and self-care improved in young children with CP after goal-directed focused physiotherapy with involvement of their local environment. After which their need for caregiver assistance in self-care and mobility decreased. The individualized training within a group context during a limited period of time was feasible and well-tolerated.[21] A pilot study using repeated measures design with participants tested with the *Gross Motor Function Measure* (GMFM) and *Pediatric Evaluation of Disability Inventory* (PEDI) at 6-weekly intervals (baseline, before and after Bobath therapy, and follow-up), showed a significant improvement in scores in the following areas following Bobath therapy: GMFM total scores, GMFM goal total, PEDI self care skills, and PEDI caregiver assistance total score. This demonstrates that in children with CP, gains were made in motor function and self care following a course of Bobath therapy.[22]

Our study showed an improvement in gross motor after receiving PT. Gross motor level in both group increased from GMFCS IV to GMFCS II in group I and from GMFCS IV to GMFCS III in group II. Physical therapy in this study proved to significantly improve motor function in children with CP.

There was a wide variation in the expertise and training of therapists who use Bobath or *neurodevelopmental therapy* (NDT) approach with various modifications.[23] There were also significant differences in NDT application in different countries. Typically, most sessions are of 1 hour duration each, and given at least 2 times per week.[24] Intensive NDT has been practiced by some with 1 hour per day for 5 days per week and reported to be more effective.[25] In this study, the frequency of PT was mostly three times a week, and 1 hour duration per day in both groups.

Physical activity is assumed to have a positive relation with health related quality of life and psychosocial functioning.[26] Impaired motor function and limitations in mobility restrict children with CP in their desired or age-appropriate activities. These limitations may cause children with CP to experience a lower level of well-being or QoL, in general or in specific life domains.[27,28] A recent international study of 8–12-year-old children showed no significant

differences in QoL between children with CP and normative samples, and within the CP group no associations were found with the severity of the CP and impairments.[29] This study demonstrated that QoL scores in more than 10 months PT group was significantly higher than less than 10 months PT group. It contained in the seventh domains of CP QoL-child questionnaires and the total scores between both groups.

Limitation of this study was gross motor development or improvement could not be singled out. This study didn't assess what frequency of PT improved the quality of life.

Our study demonstrates that QoL in group with more than 10 months PT was significantly higher than less than 10 months PT. There was significant general gross motor improvement after PT in both groups.

Conflict of interest

None declared.

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