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Effects of Family-Centered Training on Functional Balance and Activities of Daily Living in Children with Cerebral Palsy

This study was conducted to examine the effects of the application of family-centered training over the 12-week period by the pediatric physiotherapist on functional balance and activities of daily living in children with cerebral palsy. Among the 26 children with cerebral palsy as the subjects were allocated to the experimental and control group. Both groups were subjected to neurodevelopmental treatment by the pediatric physiotherapist. The experimental group, participated in family-centered training program 3 times a week over a period of 12 weeks for the total of 36 sessions, functional balance and activities of daily living were verified through intergroup comparison. There was no significant difference between the outcomes prior to training and after 6 weeks of training, ($p>.05$) Pediatric Berg's Balance Scale(PBS) and Functional Independence Measure for children(Wee-FIM) increased significantly from those measures after 6 weeks to those after 12 weeks of training ($p<.05$). Therefore, these results suggest that on family-centered training on children with cerebral palsy has beneficial effects on functional movements and physical activities.

Key words: *Cerebral palsy, Family-centered training, Functional balance, Activities of daily living*

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INTRODUCTION

Cerebral palsy is a non-progressive damage to the brain of fetus or infant and clinical syndrome that generates restrictions in activities by inducing disability in movement and posture. Although there are cerebral palsies that display only the problems in posture and motor control, majority of cerebral palsies are accompanied by composite disabilities including epilepsy, sensory, cognition, perception, communication and behavioral disability, etc. Moreover, it will induce secondary problems of musculoskeletal system [1]. That is, damages to posture control and balance ability of children with cerebral palsy degrades adaptation ability of sensory motor in accordance with changes in a diverse range of tasks and environmental requirements [2] and restricts the extent of daily life according to physical functions [3], thereby generating restrictions in various social activities and participations [4].

The common goal for rehabilitation of disabled children is to enhance their functional activities. In particular, in the case of cerebral palsy, which is a disorder of central nervous system, it is necessary to prevent or reduce to the minimum the disability through early stage diagnosis and treatment, and to teach functional movements to link them to their daily life activities. However, although long-term supports are necessary from families, physicians and rehabilitation related medical specialists in the case of disabled children including those with cerebral palsy, there is substantial lack of specialized treatment institutions or therapists for disabled children. Accordingly, there are realistic difficulties in utilizing individualized manual therapy on regular basis with the reality of added economic burden of treatment costs incurred [5].

Family-centered training is a philosophical concept proposed in the process of developing early stage intervention program for disabled children in the USA and can be thought as an approach method to provide optimal medical services to disabled children and their families [6]. This treatment method must include all of the values, attitude and approach methods of disabled

children and their other family members in the application of therapeutic intervention to disabled children and their families since the role of family is very important in enhancing the physical and mental health of the entire constituent members of the family including the disabled children [7]. That is, family-centered training refers to the full participation of the family of disabled child in planning, provision and evaluation processes of therapeutic intervention services with the constituent members of the family providing support for the execution of these roles on the basis of their individual strengths and advantages.

Many clinical pediatric therapists are using broad-ranged family-centered training programs in rehabilitating disabled children such as those with cerebral palsy. Dodd et al.[8] conducted study on the effectiveness of home muscle strength training program on 21 youths with cerebral palsy accompanied by spasticity in both legs. He reported that muscle strength and gross motor function in legs increased significantly in the experimental group in the 6th week of experiment and after 12 weeks of follow-up test in comparison to those of the control group. In addition, Chen et a [9] also reported that gross motor function and knee extensor muscle strength were improved in the experimental group in comparison to those of the control group when 12 weeks of home circuit training program was conducted on 28 children with cerebral palsy who is able to walk. In addition, as the results of application of simple household task execution exercise program such as standing up from seated posture or walking up and down stairs for 6 weeks on 20 children in the age range of 7~13 years with traumatic brain damage or cerebral palsy capable of walking independently, although there was no significant difference in the maximum isometric muscle strength, walking and energy consumption indices, the experimental group had significant improvement in functional balance in comparison to the control group [10]

Occupational therapists asserted that, since home programs for disabled children it is possible to enabled the disabled children to reach successful level of learning by providing systematic and repetitive practice opportunities under daily life environment at home through a diverse range of preceding studies [11], it could be used more effectively than the traditional therapeutic services [12] In addition, experiential grounds for home program suggested that application of muscle strength training or intensive task protocols could be helpful in maintaining the motor skills and enhancing sports skill levels of children with cerebral palsy [8, 13]. Recently, although studies on application of constraint-induced therapy as home program for children with cerebral palsy are being carried out, [14, 15, 16] there is absolute lack of study on the effects of family-centered therapy on the motor development and daily life activities of children with cerebral palsy in Korea. Moreover, in the case of family-centered therapy on children with cerebral palsy, systematic program needs to be developed with focus on more than simply caring, handling and management stipulated by daily life activities by parents [17].

Parents and family members of disabled children are not the subjects of education and instruction. Rather, they know about the best conditions of the children better than anyone else and have particularly stronger desires for and expectations on their children. Therefore, when execution evaluation of or deciding and applying the optimal therapeutic methods for disabled children, it is necessary to maintain cooperative relationship in all processes of therapeutic intervention by respecting them and acknowledging them as experts on equal footing. In addition, in order for disabled children to grow ideally within the local community background, participation and support of all the constituent members of the family are necessary. Therefore, this study was conducted to examine the effects of application of family-centered training on children with cerebral palsy over 12-week period by pediatric physiotherapist, by acknowledging the families of disabled children as experts and maintaining mutually cooperative relationship throughout the entire processes of rehabilitation, on functional balance and activities of daily living in children with cerebral palsy. Furthermore, it was implemented to provide basic data for the provision of family-centered training for children with cerebral palsy as an efficient and reliable clinical intervention program for development of functional movements and physical activities of children with cerebral palsy.

METHODS

Subjects

This study was conducted on children diagnosed with cerebral palsy by specialists in neurosurgery and rehabilitation medicine as the subjects. Detailed selection criteria for subjects included the following: first, pre-school children of spastic diplegia who participated in the pediatric physical therapy launched by the "B brain lesion welfare center" in Busan; second,

children corresponding to stages II~III under the Gross Motor Function Classification System (GMFCs); and last, children capable of executing simple tasks and communication in daily life with the assistance and supervision of researcher. However, children administered with drug regularly due to unstable convulsion were excluded. Among the 26 children with cerebral palsy as the subjects, those who can participate in the evaluation of measurement tools prior to and after the experiment were allocated to the control group while those who can participate in the 12 weeks family-centered training were allocated to the experimental group.After having heard detailed explanations on the purpose, method, procedure and inconveniences of the study, subjects consented to participate in this study voluntarily. General characteristics of the subjects were computed in terms of frequency (%) and descriptive statistics, as illustrated in the Table 1 below.

Table 1. Characteristics of the subjects (N=26)

Variables	Experimental group(N=13)	Control group(N=13)
Gender(male/female)[a]	7(26.9%)/6(23.1%)	8(30.8%)/5(19.2%)
Age(years)[b]	8.15±2.15	7.08±1.71
Height(cm)[b]	118.20±16.40	115.70±12.12
Weight(kg)[b]	23.68±8.15	21.64±6.13
Gestational age(weeks)[b]	33.77±2.86	34.08±5.25
Birth weight(g)[b]	2,29615±679.49	2,129.23±793.19
Incubator care(weeks)[b]	6.31±3.73	5.54±5.35

[a] Number(%).[b] Mean(SD)

Family-centered Training Procedures

This study was executed with two group, before-after measurement quasi-experimental study design in order to examine the effects family-centered training on functional balance and activities of daily living in children with cerebral palsy. Experimental and control groups were subjected to neurodevelopmental treatment by pediatric physiotherapist. The experimental group, participated familiy-centered training program for 3 times a week over a period of 12 weeks for the total of 36 sessions. Functional balance and activities of daily living were verified through intergroup comparison.

Family-centered training on children with cerebral palsy was performed through the following detailed stages on the basis of the family-expert cooperative model that grants authorities on the innate desires of family, sharing of duties and training program:

First, pediatric physiotherapist examined the current status of daily life, desires and preferences of the child and family after having had preliminary interview with the subjects and guardian (legal representative).

Second, after having discussed the difficulties in daily life activities based on the preferences of the children and family, goals were set on the basis of the functional levels that the children can execute at the moment.

Third, pediatric physiotherapist prepared family-centered training program by selecting the activities that can be estabilished with family at home with considerations for environment at home and school of the guardian and children, and advantages of the family. In addition, pediatric physiotherapy program was corrected in order to further improve the effectiveness of family-centered training program and to enhance the level of accomplishment of therapeutic goals planned. In this study, family-centered training program prepared by pediatric physiotherapist for children with cerebral palsy is illustrated in the Table 2 and the program of pediatric physiotherapy clinic for accomplishment of training goals and enhancement of effectiveness of training is presented in the Table 3.

Fourth, pediatric physiotherapist held consultations once a week during the course of family-centered training and shared the status of progress in the program in order to correct the plan if there are problems or difficulties in continuing with the program.

Fifth, at the time of execution of interim evaluation 6 weeks after the execution of family-centered training, discussions were carried out on the extent of accomplishment of planned goals, and cooperation and problems of family in the course of execution of the program in order to change to new method or newly establish new goals.

Table 2. Family-centered training program for children with cerebral palsy

Time of training	Home activities	Assistant
Morning	■ Teach the children to perform the action of sitting on and getting up from toilet bowl on their own in kindergarten. ■ Teach the children to succeed in activities of using teaching aids with the use of hand muscles on their own as much as possible.	.042*
Afternoon	■ Playing percussion instrument in accordance with the beat of given music by tightly holding percussion instrument sticks with thick handle ■ Playing with Lego blocks with large and thick pieces by using both hands	.779
Evening	■ Eating meal on their own without the assistance of other family members by holding spoon with thick handle with dominant hand ■ Maintaining standing posture by slightly leaning on a wall while the mother reads fairy tale story ■ Clapping hand in accordance with the beat of given music or playing with toy placed on a table while maintaining with erect posture of knees	.681

Table 3. Programs of physiotherapy clinic for children with cerebral palsy

Categories	Detailed procedures to be performed
Goal 1 Is able to eat meal successfully more than 2 out of 10 times by using spoon with thick handle while seated at dinner table	■ Conduct 5 extension movement of extensor muscles of fingers for 15 seconds each. ■ Is able to achieve the task of piling up 5 cups with different sizes by moving them for more than 5 times ■ Complete the activity of spreading out thick stick of rubber clay with different color by rolling, or lumping and rolling it by using both hands
Goal 2 Is able to maintain standing posture for more than 15 seconds independently without the assistance of others or without holding onto any supporting items such as furniture, etc.	■ Accomplish 3 sets of 10 sit-ups by slowly sitting down and standing up while holding on to a ladder ■ Implement 3 sets of grabbing toy hung above the head 10 times while in the posture of erected knees ■ Correctly align the body and enforce shifting of the center of body weight onto each foot alternatively while in standing posture under the supervision of therapist
Goal 3 Is able to play percussion instrument in accordance with other musical instrument played by sibling at home and is able to succeed in playing percussion instrument more than 5 out of 10 attempts	■ Execute beating small toy drum with both hands for 2 minutes in accordance with the beat of metronome 3 times ■ With both arms fully extended forward in parallel position in seated posture, grab one end of stick with thick handle and pull while the therapist grabs and pulls the opposite end for 1 minute and repeat 5 times ■ Fulfill 30 repetitions of throwing and catching ball with pediatric physiotherapist by using both hands held above the head while in the posture of erected knees

Measurement tools and Methods

Functional balance in children with cerebral palsy was measured by using Pediatric Berg's balance Scale(PBS), while Functional Independence Measure for children (Wee-FIM), which is a modified version of Functional Independence Measure (FIM), was used for daily living activities. Evaluation of functional balance and activities of daily living in children with cerebral palsy was conducted by a single pediatric physiotherapist with more than 5 years of experiences who has undergone specialized training on neurodevelopmental treatment and familiarized with guidelines on computation of scores for items of evaluation tool.

PBS measures the functional balance of children with motor disorders such as brain injury and development disorder, which is required in everyday life [18]. This measurement tool has no particularly specified age range and is composed of a total of 14 items in 3 domains including sitting, standing and transition of posture. Scores are given with 5-point scale (0~4) in accordance with the extent of independent execution of each item with the total scores in the range of 0~56. Higher score signifies the subject has greater balance ability [19]. It is possible to evaluate functional balance within 20 minutes at school and clinical institution under general task situations without specialized equipment [20]. According to a study on the reliability of PBS with cerebral palsy, intra-rater correlation coefficient is .99 and intra-rater correlation coefficient is .99 [19]. Therefore, PBS is a standardized evaluation method capable of measuring intermediate to severe motor damages [19], including typical development disorders and light motor disorder [21].

Functional Independence Measure for children(Wee-FIM) is a tool capable of evaluating the level of functional independence of ordinary children in the age range of 6 months ~ 8 years, children with development disorder in the age range of 6 months ~ 12 years and children with intelligence age of less than 7 year, and can be applied without distinction of health state, development stage, educational level and local social environment [22]. This measurement tool is composed of a total of 18 items belonging to 6 major measurement categories including self-help activities, sphincter muscle control, movement, transfer, communication and social perception. In addition, 7-point scale is applied to each item (6~7: needs no assistance, 3~5: needs assistance, 1~2: completely dependent) with the total score in the range of 18~126. This measurement tool evaluates disability by measuring the extent to which the subject is capable of performing independent daily life activities rather than measuring damages [23]. Test-retest reliability of evaluation of daily life activities of school-aged children was reported to be in the range of .83-.99 while the intra-rater reliability was reported to be in the range of .74-.96 [22].

Data analysis

Data collected in this study was analyzed by using SPSS 23.0 program for Windows (IBM Corp, USA) and the level of significance for statistical verification (α) was set at .05. After having confirmed the normality of measurement variables of the subjects through Shapiro-Wilk test, parametric test method was used. Repeated measure ANOVA was implemented to examine the changes in accordance with the passage of time of the measurement times (prior to, and after 6 and 12 weeks of training) for functional balance and activities of daily living in the experimental and control groups. If there was interactive effect between the two groups, the differences in the changes between prior to and after 6 weeks of training, and after 6 and 12 weeks of training were analyzed by means of independent sample t-test.

RESULTS

Functional balance

Mean changes in the PBS in the experimental and the control group in accordance with passage of time are given in the Table 4.

Results of interaction of the factor*group in the within-subjects effectiveness test are given in the Table 5. There was interactive effect between the factors and groups of PBS with significant difference in accordance with the time of training.

Results of comparison of the changes in measurement results prior to, and after 6 and 12 weeks of training of PBS for which there was interactive effect between the experimental and the control groups are given in the Table 6. Although there was no significant difference in the PBS between prior to training and after 6 weeks of training, the mean scores of the experimental group increased more after 6 and 12 weeks of training than those of the control group with significant difference between the groups.

Table 4. Average change of Pediatric Berg's balance Scale(PBS) according to time progress in each groups.

Group	Pre-training	Post-6weeks	Post-12weeks
Experimental(N=13)	29.38±7.26	31.62±6.65	34.31±6.38
Control(N=13)	31.38±8.04	32.69±8.38	33.85±8.21

Mean±SD(scores)

Table 5. Tests of within-subjects effects on Pediatric Berg's balance Scale(PBS).

Source	TypeIIISS	df	MS	F	p
PBS	177.333	1.808	98.088	110.362	.000*
PBS*Group	20.103	1.808	11.119	12.511	.000*
Error	38.564	43.390	.889		

TypeIIISS : TypeIII Sum of Squares, df : Degree of Freedom, MS : Mean Squares
* p<.05

Table 6. Comparison of Pediatric Berg's balance Scale(PBS) between the two groups during training period

Training period	Experimental(N=13)	Control(N=13)	t	p
Pre-training vs Post-6weeks	2.23±1.54	1.31±0.94	1.844	.078
Post-6weeks vs 12weeks	2.69±0.85	1.62±0.96	3.019	.006*

Mean±SD(scores), * p<.05

Activities of daily living

Mean changes in the Wee-FIM in the experimental and the control group in accordance with passage of time are given in the Table 7.

Results of interaction of the factor*group in the within-subjects effectiveness test are given in the Table 8. There was interactive effect between the factors and groups of Wee-FIM with significant difference in accordance with the time of training.

Results of comparison of the changes in measurement results prior to, and after 6 and 12 weeks of training of Wee-FIM for which there was interactive effect between the experimental and the control groups are given in the Table 9. Although there was no significant difference in Wee-FIM between prior to training and after 6 weeks of training, the mean scores of the experimental group increased more after 6 and 12 weeks of training than those of the control group with significant difference between the groups.

Table 7. Average change of Functional Independence measure for children(Wee-FIM) according to time progress in each group.

Group	Pre-training	Post-6weeks	Post-12weeks
Experimental(N=13)	72.69±18.35	74.85±17.53	79.00±15.53
Control(N=13)	78.23±18.66	79.54±17.79	81.15±17.72

Mean±SD(scores)

Table 8. Tests of within-subjects effects on Functional Independence measure for children(Wee-FIM).

Source	TypeIIISS	df	MS	F	p
WeeFIM	282.692	1.270	222.523	44.741	.000*
WeeFIM*Group	40.333	1.270	31.749	6.383	.012*
Error	151.641	30.490	4.974		

TypeIIISS : TypeIII Sum of Squares, df : Degree of Freedom, MS : Mean Squares
* p<.05

Table 9. Comparison of Functional Independence measure for children(Wee-FIM) between the two groups during training period

Training period	Experimental(N=13)	Control(N=13)	t	p
Pre-training vs Post-6weeks	2.15±1.21	1.42±1.68	1.267	.218
Post-6weeks vs 12weeks	4.15±3.36	1.62±0.50	2.691	.019*

Mean±SD(scores), * p<.05

DISCUSSION

This study was conducted to examine the effects of application of 12 weeks of family-centered training on the functional balance and activities of daily living in children with cerebral palsy by pediatric physiotherapist by acknowledging the family of disabled children as experts and maintaining cooperative relationship in all the processes of rehabilitation. Although accurate comparison with the preceding studies would be difficult since the method and duration of application of family-centered training, including physical characteristics, clinical appearances and functional level of subjects of this study are not the same, considerations were made by associating the similarities mainly of the training method and measurement results.

Franjoine et al. [19] asserted that balance, that is, the ability to maintain balanced state is one of the important factors of movements that promote the ability to execute functional skills. Abnormal posture and movement of cerebral palsy have a direct effect on overall neuromuscular development and postural control mechanisms [24], and postural control defects that limit motor development [25]. In addition, motor disorder of cerebral palsy manifests along with poor balance control [10, 26] and there could be difficulties in maintaining balance due to the inability to resolve conflict between the sensory perceptions [27]. Therefore, balance ability for posture control is essentially required to recover from unexpected balance disturbances including walking, majority of functional skill, slipping, mistakes and instability, etc. [26].

Katz-Leurer et al. [10] conducted study on the effects of home-based task-oriented exercise program on the ability to maintain balance by randomly allocating 20 children in the age range of 7~13 year with severe traumatic brain damage or cerebral palsy who are able to walk independently into control and experimental groups. First, the control group was instructed to complete regular daily life activities while the experimental group was instructed to achieve home-based task-oriented exercises such as sit-ups and walking up and down stairs in addition to the daily life activities for 6 weeks. Although there was no change in the control group, the experimental group displayed reduction of 1.6+/-2.1 in the time up and go test (TUG) and average increase of 3~4cm in the functional reach test. However, in this study, the PBS increased significantly in both groups including the increase by 1.31±0.94 between that prior to training and after 6 weeks of training and by 1.62±0.96 between after 6 and 12 weeks of training for the control group, and increase by 2.23±1.54 between that prior to training and after 6 weeks of training and by 2.69±0.85 between after 6 and 12 weeks of training for the experimental group. Such difference was due to the difference in the criteria for selection although the ages of the subjects of preceding studies and this study were similar. While the subjects of this study were composed of children with II~III stage cerebral palsy under GMFCs, those of the preceding study were composed of children including 10 children with traumatic brain damage within 1 years of the damage, which is more than half of the subjects. In particular, the control group, with children capable of maintaining standing posture for more than 5 seconds and perform sit-ups independently without falling, was not subjected to any therapeutic intervention. Meanwhile, the experimental group displayed improvement of balance ability even after a relatively short period of intervention by having the subjects undergo repetitive activities including sit-ups and walking up and down stairs.

Kwon et al. [28] made comparison of increase rate in gross motor function between the assertive group and passive group when 5 months of home therapy by parents was applied to 30 children in the age range of 2~6 years with III~IV stage cerebral palsy under GMFCs as subjects. Although the gross motor function of subjects in the group in which the participation of the parents in home-therapy is passive increased by 5.56%, that of the assertive participation group increased by 9.10%, thereby illustrating significant difference. As such, it was asserted that there is strong positive correlation between the extent of participation of parents in home therapy and improvement

strong positive correlation between the extent of participation of parents in home therapy and improvement in gross motor function. Chen et al. [9] enforced randomized control group study in which 40 minutes practical bicycling training was applied as home-centered program over a period of 12 weeks at the rate of 3 times per week on 28 children with spastic cerebral palsy to improve their walking ability. It was reported that although the mean balance score and gross motor function score of the control group after the therapy decreased in comparison to that prior to the therapy, there was significant increase in the experimental group. However, in this study, scores for the PBS increased significantly after 6 and 12 weeks of training from that prior to training for both the control and the experimental groups. As the results of comparison of changes in the PBS between the two groups, although there was no significant difference in the increase from that prior to training to that after 6 weeks of training, there was significant difference in the increase from that after 6 weeks to that after 12 weeks of training between the two groups. These differences are due to the fact that this study was composed of children with II~III stage cerebral palsy under GMFCs while the 2 preceding studies were compose of children with I~II stage cerebral palsy under GMFCs.

Problems in balance ability of children with cerebral palsy not only increase the occurrence rate of fall but also increase the restrictions in and constrictions in participation in future mobility, motor functions and daily living activities [29]. Moon and Kim [30] compared the rate of change in gross motor functions and motility in daily living activities when home therapy is applied to children with cerebral palsy with mean age of 7.2 years over a period of 10 weeks at the rate of 2 times per week. Gross motor function after the execution of home therapy increased further in the experimental group (14.43%) than in the control group (8.77%) when compared to that prior to the execution. For each of the detailed areas, the increased was the lowest for the areas of walking, running and jumping with 0.58% while that for the areas of crawling on all limbs and standing on knees was 1.68% with greater increase in the experimental group in comparison to the control group. In addition, in terms of the motility of Wee-FIM, although the control group illustrated improvement by I stages in only one subject, the experimental group illustrated improvement by 1 stage in two subjects and by II stages in 1 subject. In this study, the changes in the functional independence measure between prior to training and after 6 weeks of training was 1.42±1.68 and that between after 6 and 12 weeks of training was 1.62±0.50 for the control group, while that between prior to training and after 6 weeks of training was 2.15±1.21 and that between after 6 and 12 weeks of training was 4.15±3.36 for the experimental group, thereby illustrating significant increases in both groups. However, in the case of the extent of changes, there was significant improvement from that after 6 weeks of training to that after 12 weeks of training in the experimental group. Although it is difficult to make direct comparison since the preceding research analyzed only the presence of increase in rate of change without verifying the statistical significance between the two groups, this study also illustrated that there was greater improvement in the functional independence measure in the experimental group for which family-centered training was applied in comparison to the control group. Therefore, it is deemed that family-centered training is an intervention method that can be helpful in improvement of the quality of life of individuals by enabling children with cerebral palsy to live more independently. In addition, the preceding study, unlike this study in which samples achieved normal distribution, applied home therapy program composed of 2~3 movements on 6 subjects and parents made subjective evaluation of the motility of children's activities of daily living. As such, it can be deemed that the preceding study has limitation in generalizing the study results.

Tang et al. [31] compared comprehensive developmental inventory of children, toddlers test and pediatric evaluation of disability inventory after having randomly allocated 70 children diagnosed with delay in motor or overall development to experimental and control groups as subjects. All of comprehensive developmental inventory of children, toddlers test and pediatric evaluation of disability inventory displayed significant increase in the group for which systematic home-activity program was applied in addition to the institutional therapy. In this study, as the results of comparison of the changes in the Wee-FIM between the control and the experimental groups, although there was no significant difference from that prior to training to that after 6 weeks of training, there was significant difference from that after 6 weeks of training to that after 12 weeks of training between the two groups. Although both this study and preceding study are the same in that the intervention program was applied for 12 weeks, the preceding study implemented 45 minutes of institutional therapy once for the control group, and 30 minutes of institutional therapy and 15 minutes of home-activity program for the experimental group. Meanwhile, in

this study, 40 minutes of neurodevelopmental treatment was applied both the experimental and the control groups with only the experimental group subjected to additional family-centered training at the rate of 3 times per week. In addition, it is thought that the preceding study was able to obtain further improved results in daily living activities in comparison to this study, which applied family-centered training to children with cerebral palsy, since it selected children with delay in the development of gross motor and minor motor skills at the baseline that has performances appropriate for the age in the development domain by excluding children diagnosed with disorders in neuromuscular skeletal system. Accordingly, it is deemed that application of family-centered training program planned by focusing on functional ability, that is task-oriented, or activities irrespective of the diseases of disabled children would have overall affirmative effects on daily life processes. These are the results in concordance with the results of the study by Novak et al. [32] that compared the level of satisfaction of the parents on the function over periods of 4 and 8 weeks after having randomly allocated 36 children in the age range of 4~12 years with cerebral palsy into control group and experimental group for which home program for task therapy was conducted.

Pediatric therapist stated that it was possible to advise the family of the subjects that therapeutic application by family at home is clinically effective and can progress into cooperative evidence-based approach if the family-centered program can be performed for 16.5 minutes for each session with average of a total duration of 17.5 hours per month [32]. In addition, Janet et al. [33] asserted that family-centered therapy program can not only reduce the cost of medical rehabilitation services since it can be implemented continuously for prolonged period of time, but also supplement the shortcomings of therapeutic specialists from various perspectives since it is the family members who know about the disabled children better than anyone else and spend more time with such children. There are diversified opinions on the range and characteristics of the participation of family members including the parents when applying family-centered training program to children with cerebral palsy. Some therapists assertively recommend a broad range of family-centered therapies in order to provide the best treatments to the children. However, there also are therapists who present the opinion that they do not particularly recommend parents actively treating children at home although they could recommend activities to the extent of being integrated into the general roles of parents that could be helpful in the daily lives of the children. Barlett & Palisano [34] presented multivariate model for the determining factors of motor changes in children with cerebral palsy. They emphasized that although extent of the secondary damages according to the personality and characteristics of the children with cerebral palsy in addition to their congenital damages impart the most significant effect on the changes in their motor ability, ecological environment of the family is also very important in rehabilitation of disabled children.

In this study, it was also found that functional balance and activities of daily living are improved when family-centered training is applied for 12 weeks on children with cerebral palsy by acknowledging the family members of the disabled children as experts and maintaining mutually cooperative relationship in all the processes of rehabilitation. Across the world, community and state organizations in mental health, social services, health care, and education are developing new frameworks to put families at the center of collaborative, strength-based, culturally responsive services. Family-centered training ensures the health and well-being of children with cerebral palsy and their families through a partnership approach to health care decision-making between the family and health care provider. It honors the strengths, cultures, traditions, and expertise that everyone brings to this relationship. It is deemed necessary to develop family-centered training program that is more effective and systematic in enabling disable children to lead independent daily life with large scale specimen in accordance with causes of disability other than cerebral palsy and more diversified clinical appearances as subjects of study in the future. Therefore, family-centered training on children with cerebral palsy can be provided as an efficient and reliable clinical intervention program in development of functional movements and physical activities.

CONCLUSION

This study was executed to examine the effects of 12 weeks of family-centered training on functional balance and activities of daily living applied to children with cerebral palsy and to provide basic data in provision of family-centered training on children with cerebral palsy as efficient and reliable clinical intervention program for development of functional movements and physical activities of said children in

the future. As the results of family-centered training program on children with cerebral palsy was performed 3 times a week over a period of 12 weeks for the total of 36 sessions, there was no significant difference between the outcomes prior to training and after 6 weeks of training, functional balance and activities of daily living increased significantly from those measures after 6 weeks to those after 12 weeks of training. Based on these study results, it is deemed that family-centered training program can be an efficient alternative, both temporally and economically, if it were to be used as complementary intervention in clinical settings through associated activities with pediatric physiotherapist since it can provide affirmative assistance in improving the functional movements and physical activities of children with cerebral palsy.

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