

Original Research Article

A Comparative Study between Functional Therapy and Conventional Therapy for Children with Cerebral Palsy

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Abstract: Background: Cerebral palsy describes a group of permanent disorders of the development of movement and posture, causing activity limitation, that are attributed to non- progressive disturbances that occurred in the developing foetal or infant brain. In the industrialized world, the incidence of cerebral palsy is about two per 1000 live births. The incidence is higher in males than in females. The purpose of this study was to examine the motor abilities of children with cerebral palsy who received functional Physiotherapy and the improvement compared to the motor abilities of children in a reference group whose therapy was based on the principle of normalization of the quality of movement. **Methodology:** A comparative experimental study consisting of 30 cerebral palsy children assigned into two groups. Experimental (n=15) who underwent functional therapy and control (n=15) who underwent conventional physiotherapy were assessed for their improvement in functional skills. **Result:** Gross Motor functional measures (GMFM) reflects that Group A (Treated with functional therapy) is more effective than Group B (Treated with conventional therapy). **Conclusion:** This study concluded that there is a significant difference between the efficacies of functional physical therapy and conventional therapy in the treatment of CP children.

Keywords: Cerebral palsy, Gross Motor functional measures, conventional therapy, Spastic quadriplegia.

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INTRODUCTION

Cerebral palsy (CP) is an umbrella term encompassing a group of non- progressive, motor, non-contagious conditions that cause physical disability in human development [1]. Cerebral refers to the cerebrum, which is the affected area of the brain (although the disorder most likely involves connections between the cortex and other parts of the brain such as the cerebellum), and palsy refers to disorder of movement. CP is caused by damage to the motor control centres of the developing brain and can occur during pregnancy (about 75 percent), during childbirth (about 5 percent) or after birth (about 15 percent) up to about age three.

Cerebral palsy describes a group of permanent disorders of the development of movement and posture, causing activity limitation, that are attributed to non- progressive disturbances that occurred in the developing foetal or infant brain. The motor disorders of cerebral palsy are often accompanied by disturbances of sensation, perception, cognition, communication,

behaviour, by epilepsy, and by secondary musculoskeletal problems [2-5].

Cerebral palsy is an important neurological problem; the incidence of cerebral palsy in India is quite alarming with various reports having indicated that 1.5 to 3.5 per thousand of all live births may be followed by the child developing Cerebral palsy. Cerebral palsy is a description, not a specific diagnosis that covers a number of neurological conditions resulting in abnormal development of movement and postural control [6]. Treatment of cerebral palsy focuses on how best to help the individual maximize his or her potential. Children with Cerebral palsy typically receive Physiotherapy to facilitate motor development and to enhance their independence in motor skills, self-care, play and leisure activities. Many treatment systems have been developed over the years like Neuro-developmental treatment (NDT) [7], Vojta therapy, Sensory Integrative therapy [8], and Conductive education. Each one differs in their treatment strategies, but the basic aim is to help the child with cerebral palsy to achieve greatest level of

independence. These treatment strategies focus on neurophysiological approaches.

Neurophysiological approaches emphasize facilitation of normal movement patterns, the functional approach emphasizes the role of environment and the task in the performance of functional activities [9]. The functional approach, therefore, is based on an active rather than a passive view of motor learning, people learn by actively attempting to solve problems inherent to a functional task, rather than repetitively practicing normal patterns of movement. Because each environment and task situation demands unique movements [10]. The task of the therapist is not to elicit specific responses by handling the child, but to provide an environment that enables the child to learn to perform self-initiated actions within naturally occurring restraints [11]. In this view it is more important for the child to perform a task as functionally as possible as to perform normally as possible. Functional Physiotherapy emphasizes the learning of motor abilities that are meaningful in the child's environment and perceived as problematic by either the child or the parents [12]. Children practice these motor abilities in functional situations, with the child having an active role in finding solutions for motor problems rather than having the physical therapist's handling result in a solution. Functional goals, in terms of skills, are established with parents and children based on their priorities. Functional activities are assumed to be learned by repetitive practice of goal-related tasks in functional situations. This study was to find the effect of functional activities to determine the impact in children with cerebral palsy [13-15].

The purpose of this study was to examine whether the motor abilities of children with cerebral palsy who received functional Physiotherapy improved more than the motor abilities of children in a reference group whose therapy was based on the principle of normalization of the quality of movement.

MATERIALS & METHODOLOGY

30 cerebral palsy children were assigned into two groups of 15 each according to inclusion criteria. The method of collection of data was by purposive sampling method. It was done on the basis of inclusion and exclusion criteria. A comparative experimental study consisting of 30 cerebral palsy children assigned into two groups. Experimental (n=15) who underwent functional therapy and control (n=15) who underwent conventional physiotherapy were assessed for their improvement in functional skills.

Inclusion Criteria

Subject with diagnostic of spastic cerebral palsy. Male and female subjects. Age between 3 years to 7 years. Diplegia, Hemiplegic and Quadriplegic cerebral palsy were included.

The materials used are:

1. Mat
2. Pillow

Ball With different colors, Board with three shapes in a line with three fitting pieces Board with six pegs, round box, Cubes, Doll which can be seated, Doll squeezing type, small animal toy, plate, ring with string, spoons, toy car, toy chair, white napkin/handkerchief, Lace shoes, Straw in milk cartoon [16], Stationeries like Pen and Pencil, Sound proof room used for assessment.

- Gross Motor Functional measure (GMFM)
- Functional Independence measure (WeeFIM)

METHOD

Thirty children with cerebral palsy were selected on the basis of inclusion and exclusion criteria. The parents of the included subjects signed a parental consent statement for participation in the study Children were assigned into 2 groups i.e group A and group B Group A ie (Experimental group) received functional physiotherapy treatment while Group B ie (conventional) was treated by conventional therapy.

Measurement Tools

Gross Motor functional measures (GMFM):

The GMFM is a validated evaluative instrument designed to detect change in gross motor function of children with cerebral palsy. Intra-class correlation coefficients (ICCs), calculated to study inter-observer and intra-observer reliability, were high. In our study, we used a Dutch translation of the GMFM. Inter-observer reliability and test-retest reliability of the Dutch version of the GMFM were assessed in a sample of children with mild, moderate, or severe cerebral palsy. The ICC for inter-observer reliability for the first dimension (lying and rolling) was 75; ICCs for the other dimensions ranged from 96 to 1.00. The ICCs for test-retest reliability ranged from 96 to 99 for the 5 dimensions [17]. The evaluative quality of the GMFM has been confirmed in a study in which the Dutch version was used. The GMFM is a standardized observational instrument and validated to measure change in gross motor function over time in children with cerebral palsy. The scoring key is meant to be a general guideline. However, most of the items have specific descriptors for each score. It is imperative that the guidelines contained in the manual be used for scoring each item.

Functional Independent Measure (WeeFIM):

Functional independence measure useful in assessing functional independence in children aged 6 months to 7 years. It can be used for children with developmental disabilities aged 6 months to 21 years. Normative The Functional Independence Measure (WeeFIM) for children is a simple-to-administer scale for assessing independence across 3 domains WeeFIM was based on a conceptual framework by the World Health Organization (1980) of pathology, impairment,

disability and handicap, and the "burden of care." WeeFIM is useful in assessing functional independence in children aged WeeFIM data had been validated for American children. With a normative database, the progression of independence at home and in the community can be evaluated [18-21].

WeeFIM is an 18-item, 7-level ordinal scale instrument that measures a child's consistent performance in essential daily functional skills. Three main domains (self-care, mobility, and cognition) are assessed by interviewing or by observing a child's performance of a task to criterion standards. WeeFIM is categorized into 2 main functional streams: "Dependent" (i.e., requires helper: scores 1-5) and "Independent" (i.e., requires no helper: scores 6-7). Scores 1 (total assistance) and 2 (maximal assistance) belonged to the "Complete Dependence" category. Scores 3 (moderate assistance), 4 (minimal contact assistance), and 5 (supervision or set-up) belonged to the "Modified Dependence" category. Scores 6 (modified independence) and 7 (complete independence) belonged to the "Independent" category. The WeeFIM is a 7-level criterion-specific ordinal scale. Level 7 requires no assistance for the child and the child completes the task independently without requiring a device. During the task, there is no concern about safety or taking an inordinate amount of time. Level 6 reflects modified independence and includes use of an assistive device or not completing the task in a timely or safe manner [22-25].

Procedure

The children were assigned to 1 of 2 groups: Group A functional therapy group, group B received conventional therapy, whose Physiotherapy was based on the principle of normalization of the quality of movement. Age and type of cerebral palsy important variables that should be considered equally so pre-stratified randomization procedure was applied to ensure an equal distribution of subjects.

After random assignment to groups, all children were pretested, parents were interviewed, both basic gross motor abilities in standardized environment and motor abilities daily situations were studied using the Gross Motor Functional Measure (GMFM) and Functional independence measure (WeeFIM) respectively.

Group A-Functional therapy

Individual intervention plans were designed for the functional therapy group children. Functional Physiotherapy directed at promoting functional skills and the physical and social environments of children are never the same. The therapy model consists of stages that lead to a task specific individual therapy plan to master functional skills that are important to the child and the parents. After collection of general information about the physical and social environments of the child and collection of specific informations about the child's

problems in performance of functional motor activities, priorities are established with parents and child. A maximum of 3 problematic activities are selected. In the next stage, the selected problems are analysed separately [26].

The constraints and possible support from the environment (both physical and social) in which the skill is problematic are determined, as well as individual factors such as specific impairments, functional limitations, and motivational aspects that are related to the functional skill. When the constraints are analysed, long-term goals (directly related to the selected problematic activities) are divided into short-term goals, which are related to the long-term goals, but are less complex. For example, a child falls very often when walking on uneven surfaces. His poor ability to stand on one leg and the uneven surfaces in and around them are the main factors related to his falling. The long-term goal is formulated as follows: the child walks in and around the tables without falling. Short-term goals are related to this goal; for example:

1. The child steps over a doorstep without holding on to the doorpost, and
2. When standing on a mat, the child kicks a ball without falling.

An evaluation date is established for each goal. In the implementation stage, the short-term goals are practiced in various natural settings. Repetitive practicing takes place in situations that resemble as much as possible the situation in which the activities are problematic. This means that practice takes place in natural situations (mostly at home or outdoors, and maybe in the therapy room when the desired situation can be stimulated). The therapist and parents discuss how, when, and where to practice. They also discuss the amount of assistance, the reduction of assistance, the time of day that is most practical for practicing the specific skill (fit into the daily routines), and the setting in which the child practices the skill. The parents, child, and therapist together evaluate the goals at the established dates. The main features of the functional approach are the establishment of functional goals, repetitive practice of the problematic motor abilities in functional situations (in a meaningful environment), an active role for the child (the child must find solutions for motor problems), and active involvement of parents in all stages of the program (e.g., goal setting, decision making, implementation in daily life, evaluation of goals) [27-29].

Functional Activities that incorporate Developmental Skills

1. Walking on bleachers, walking between rows of chairs- For balance training. 2. Cup, spoon, book, coin, Pencil and ball holding-For improve holding objects.

2. Glasses, bowls, dishes, trays, records and cassette tapes-Perceptual-motor co-ordination of stacking.
3. Straw in milk cartoon, sock in shoe, toast to toaster, key in lock, pencil in sharpener-Eye hand co-ordination of placing an object in another object.
4. Food, table game pieces, coins, pages of book- Uses pincer grasp to pick up items.
5. Being fed, bathed, tickled, greeted and being put to bed -Anticipates routine event.

Group B-Conventional therapy

15 children were treated with according to conventional Physiotherapy method.

Before starting the treatment therapy methods and intervention goals of all children were examined the focus of intervention was based on the principal of normalization of children of motor performance and quality of movement.

Treatment time was mean duration of 45 minutes per session. After every 3 months, assessment was taken to know the motor abilities of children by using GMFM and WeeFIM. There were 2 follow up assessments: 3 and 6 months after pretest. Exercise Protocol for conventional Group72.

1. To provide midline orientation of the body-Child side lying, head supported on a small pillow or towel; therapist's hands on child's abdominal muscles; lower extremities dissociated or symmetrically flexed; toy placed in front of child at chest level.
2. To increase movement of upper extremities - child from side lying backward shift into supine with buttocks maintained elevated off the support with hips and knees flexed; lower

extremities just outside lateral dimensions of trunk.

3. To improve bilateral symmetrical activation of trunk musculature, Hand knees and hands-feet play in supine with buttocks elevated.
4. To achieve trunk extension with active holding by abdominal muscles; shoulder flexion with elbow extension; slight lateral pelvic tilt; unilateral hip extension; full hip and knee flexion with ankle plantar flexion contra lateral side-Prone on extended arms over a ball; lower extremities in line with trunk with the opposite leg in extension.
5. Lateral weight shift through pelvis; increased lateral pelvic tilt; lateral flexion of trunk and neck-Lateral displacement of ball towards extended lower extremity [30-35].

RESULT

Data Analysis

Statistical Analysis was done by using the statistical software namely, SPSS 10.0 Version. Microsoft word and Excel have been used to generate graphs, tables etc.

A total number of 30 (n = 30) were taken for the study. Improvements in Gross Motor Function using GMFM and Functional independent measure using WeeFIM from baseline to the last follow up were measure by computing change scores for each group and taking the group mean as well as computing change in each outcome variable between groups. Repeated measures of ANOVA one-way classification using multivariate test were used to assess the statistical significance of the change score.

**Gross Motor Functional Measures
General Linear Model**

Table 1: Descriptive Statistics

Measurements		Mean	Standard deviation
Pre	Group A	50.21	10.87
Post	Group A	57.22	10.2
Follow-UP	Group A	59.24	11.24
Pre	Group B	37.95	5.17
Post	Group B	36.58	7.09
Follow-Up	Group B	42.46	6.01

Mean and standard deviation of Pre, Post and follow- Up measurements for all the 15 samples of both groups are shown in descriptive statistics.

Table-2: Multivariate Tests

	Effects	F	P-Value
Visits	Pillai,s Trace	b 523.60	.000
Group Vs Visit	Pillai,s Trace	b 8.62	.020

A highly significant difference ($P < 0.05$) at 95% confidence interval by using multivariate test in Pillai's Trace.

Table 3: Test of between –Subjects Effects

Source	Type III Sum of Squares	Degrees Of Freedom	Mean Square	F	P Value
Intercept	15371.51	1	15371.51	1734	.000
Error	1123.05	14	102.34		

From the above table we Have arrived a highly significant difference ($P < 0.05$) by using repeated measure of ANOVA with one way classification. Group

A has increase in motor abilities when compared to Group B. So Group A is effective.

Test of functional independent Measure for Children General Liner Model

Table 4: Descriptive Statistics

Measurements		Mean	Standard deviation
Pre	Group A	39.87	5.27
Post	Group A	45.13	4.58
Follow-Up	Group A	49.47	4.58
Pre	Group B	37.60	5.87
Post	Group B	40.47	5.91
Follow-Up	Group B	42.67	6.00

Mean and standard deviation of Pre, Post and follow up measurement for the entire 15 sample of both the Groups are shown in descriptive statistics.

Table 5: Multivariate Tests

	Effects	F	P-Value
Session	Pillai,s Trace	b 473.498	.000
Group Vs session	Pillai,s Trace	b 6.930	.020

A highly significant difference ($P < 0.05$) at 95% confidence interval by using multivariate test in Pillai's Trace.

Table 6: Test of Between –Subjects Effects

Source	Type III Sum of Squares	Degrees Of Freedom	Mean Square	F	P Value
Intercept	162817.600	1	162817.600	1624.617	0.000
Error	1123.05	14	100.219		

From the above table we have arrived a highly significant difference ($P < 0.05$) by using repeated measure of ANOVA with one-way classification. Since

Group A have high scores in functional activities Group-A is more effective.

Table 7: Demographic detail showing male and female ratio

Sex	Number	%
Male	22	73.3
Female	8	26.67
Total	30	100

Table: 8 Demographic detail showing CP Children in age wise

Age of Children	No. of Children	%
3years	12	40
4Years	12	40
5 Years	5	16.66
6 Years	1	33.33
7 Years	0	0
Total	30	100

Table 9: GMFM scores for evaluation of gross motor function

	Pre	Post	Follow
Group A	50.21	57.22	59.24
Group B	37.95	36.58	42.46

Table:10 Wee FIM scores for evaluation of functional independence

	Pre	Post	Follow
Group A	39.87	45.13	49.47
Group B	37.6	40.47	42.67

RESULTS

The study was conducted on 30 Cerebral Palsy patients who were given Physiotherapy treatment for 6 months. The effects of the treatment on each subjects were evaluated using both GMFM and WeeFIM. Three evaluation were performed

- ✓ Before treatment
- ✓ After 3 months of the treatment
- ✓ After 6 months of the treatment

Data analysis revealed that the before treatment mean score of GMFM for Group A (50.21+10.87) was increase to (57.22+10.20) after 3 months of treatment and which further increased to (59.24+11.24) after 6 months of treatment when compared to Group B as their baseline mean score of GMFM (37.95+5.17) was (36.58+7.99) after 3 months of treatment and it increased after 6months of treatment to (42.46+ 6.01). Thus statistically highly significant difference between both the groups and thus results of GMFM reflects that Group A (Treated with functional therapy) is more effective than Group B (Treated with conventional therapy).

The increase in mean measurements of WeeFIM test of Group A from (39.87+5.24) to (49.47+4.58) at follow up when compared with Group B baseline Measurement (37.60+5.87) which increased to (42.67+6) showed statistically significant difference between group and proves Group A which was treated with functional therapy is more effective than Group B which was treated with conventional therapy.

DISCUSSION

The purpose of this study was to examine whether children with cerebral palsy receiving functional Physiotherapy had greater improvements in motor abilities compared with a reference group of children who received therapy based on the principle of normalization of the quality of movement. Both basic gross motor abilities in a standardized environment (measured with the GMFM) and motor abilities in daily situations (measured with the (WeeFIM) were studied.

Children with cerebral palsy typically receive Physiotherapy to facilitate motor development and to enhance their independence in motor skills, self-care, play, and leisure activities. This study the focus on functional activities versus the focus on quality of movement; the practice of functional skills versus the

facilitation and normalization of movements; concrete versus abstract goals; and the collaboration with parents, who were more involved in decision making about problem definition and goal setting and in the evaluation of goals.

Functional Physiotherapy emphasizes the learning of motor abilities that are meaningful in the child's environment and perceived as problematic by either the child or the parents. Children practice these motor abilities in functional situations, with the child having an active role in finding solutions for motor problems rather than having the physical therapist's handling result in a solution. Functional goals, in terms of skills, are established with parents and children based on their priorities. Functional activities are assumed to be learned by repetitive practice of goal-related tasks in functional situations. Conventional therapy was based on the principle of normalization of the quality of movement.

It focus on eliciting and establishing normal patterns of movement through controlled sensorimotor experiences. These sensorimotor experiences are intended to inhibit abnormal movements and to facilitate adjustments to promote functional movements.

This study attributes the result that suggests functional therapy is best suited physical therapy to enhance and improve the functional skills in daily situations of children with CP. Clinically both Functional therapy group and conventional therapy group improved in motor abilities. Mean of GMFM for Group A (treated with functional therapy) was (59.24+11.24) at follow Up when compared Group B (treated with conventional therapy) was (42.46+6.01) at follow up shows significant difference between both the groups with Group A recording marked increase in gross motor functions, mean functional skills in daily situations with WeeFIM 49.47+4.58 when compared to group B with mean 42.67+6.00. Group A showed a marked improvement in performance of daily functional motor skills which reflected on WeeFIM scores. It shows that the application of a functional Physiotherapy program has positive effects on both the child's capability as well as the performance (independence) of daily functional motor skills.

The following advantages of the functional approach were identified: it was more purposeful and

more functional; it had more structure; it was clearer for parents, children, and therapists; it promoted better participation of parents and higher motivation of parents and children; it was more enjoyable for the children; it led to better collaboration with parents and children because they were expected to indicate which skills they wanted to improve; it provided better insight into problematic skills of the children; improvements were more apparent; frequency of therapy could be reduced; and reporting to other professionals was easier because therapy goals were clearer.

CONCLUSION

This study was planned to find out whether the motor abilities of children with spastic cerebral palsy who were receiving functional Physiotherapy (Physiotherapy with an emphasis on practicing functional activities) improved more than the motor abilities of children in a reference group who's Physiotherapy was based on the principle of normalization of the quality of movement.

Result derives a highly significant difference between two groups with ($P < 0.05$) by using repeated measure of ANOVA with one way classification Children with Cerebral palsy are benefited from functional Physiotherapy, both the child's capability as well as the performance (independence) of daily functional motor skills improved. It emphasizes on further evaluation of long term benefits. Therefore, this study accepts the hypothesis which says that there is a significant difference between the efficacies of functional physical therapy and conventional therapy in the treatment of CP children.

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