

# Depression in Mothers of Children with Cerebral Palsy and Its Relation with Current Functional Status of The Children

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## ABSTRACT

**Introduction:** Cerebral palsy is a condition caused by an abnormality in the brain causing difficulties in movement and coordination, with an onset in the developmental period of childhood. Cerebral palsy can include: cerebral malformation arising in the gestational period, a destructive process in the antenatal, prenatal or early postnatal periods, or by various processes acting together.

**Objective:** To evaluate the depression level in mothers of children with cerebral palsy and its relation with the current functional status of the children and establish To determine the correlation of functional ability of children with cerebral palsy and depression levels in their mother.

**Hypothesis:** There is inversely proportional relationship of depression of mother of children with cerebral palsy with current functional status of their children. There is directly proportional relationship of depression of mother of children with cerebral palsy with current functional status of their children.

**Design:** Pre test and post test experimental correlation study.

**Participants:** Mother of both male and female children with a documented diagnosis of Cerebral palsy in the age group of 6 months to 3 years. The children in group a received one hour of occupational therapy based on neurodevelopment therapy. Therapy was individualized for each child's condition and was dictated by the child's unique clinical needs. The goal of therapy was to improve postural and functional abilities in different developmental position.

Each activity was given for 10-15 minutes depending on child's interest, attention and interaction with the environment. Each session started from the weight bearing activity and gradually followed by performance of the movement within the developmental context.

### Main Outcome Measures:

- Beck depression inventory
- Gross motor functional measure

**Results:** Table 6 shows that there is a significant difference  $p < 0.05$  in both GMFM AND BDI scores since the p value are 0.000, which is less than the acceptable level of significance of 0.05. Table 7 shows that there is a negative relationship  $p < 0.05$  between children current functional level and mother's depression level.

**Conclusions:** From this study it is concluded that there is  $p < 0.05$  negative relationship between BDI score and GMFM score. Hence these findings should be used in caution when treating the patients with cerebral palsy.

**Keywords:** Cerebral palsy sensory, cognitive, and verbal impairment depression emotional behavioral problems mental retardation, seizure disorder, strabismus, and esotropia

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## INTRODUCTION

Cerebral palsy is a condition caused by an abnormality in the brain causing difficulties in movement and coordination, with an onset in the developmental period of childhood. Cerebral palsy can include: cerebral malformation arising in the gestational period, a destructive process in the antenatal, prenatal or early postnatal periods, or by various processes acting together (Menkes & Sarnat, 2000).

The clinical picture of this disorder occurs along a spectrum from mild impairment, characterized by mild weakness of an extremity, to severe impairment, which is characterized by spastic paralysis of all four extremities, and any clinical presentation between these two extremes (Swaiman & Ashwal, 1999).

Other disabilities are often present in conjunction with cerebral palsy. They include: mental retardation, seizure disorder, strabismus, and esotropia (Swaiman & Ashwal, 1999).

Seizures have been reported in up to 50% of the cases of cerebral palsy (Hay et al. 2003). Disorders of language, speech, vision, hearing, and sensory difficulties have been found in lesser degrees in the total cerebral palsy population (Hay, et al). Over 80% of all people with cerebral palsy developed the condition either before birth or within the first month of life (Waitzman & Romano, 1995). The life expectancy for a child with cerebral palsy is dependent upon the type and severity, the level of intelligence; children with profound mental retardation and severe quadriplegia have the shortest life expectancy (Swaiman & Ashwal).

Children with cerebral palsy have significant limitations in the activities of daily living such as feeding, dressing, bathing, and mobility. Although motor dysfunction is the defining clinical feature of cerebral palsy, sensory, cognitive, and verbal impairment in addition to learning difficulties and behavioural problems can also be seen in this condition. (Rashida begum, 2010).

Limitations can result in requirements for long-term care that far exceed the usual needs of children as they develop. Care giving is a normal part of being the parent of a young child whereas this role takes on an entirely different significance when child experiences functional limitations and possible long term dependence. (Ozlem altinda, 2006)

The birth of a child with cerebral palsy places the family in dilemma. Society views parenthood positively, but it views the birth of a disabled child negatively. Awareness of society's ambivalence, adds to the stress the family feels within themselves. (Vijesh & Sukumaran, 2007)

The birth of a developmentally disabled child is a family stressor and mothers often feel guilty and sense of responsibility because of their character qualities more than the other family members; hence, they involve in compensation strategies to overcome their children's disability. Mothers of children with different levels of disability tolerate high level of stress. Children with chronic medical conditions cause depression emotional and behavioural problems in their mothers. (Vijesh & Sukumaran, 2007).

The stress factors accompanying the birth of normal child are intensified when the child is disabled. The marital

relationship may suffer unduly from the added stresses of blame, guilt and anxiety. A child's disability attacks the fabric of marriage in different ways. It excites powerful emotions in both parents. It reshapes the organisation of the family. It creates a fertile ground for conflict. (Vijesh & Sukumaran, 2007).

The economic stress may be multiplied by additional hospital and medical cost. The parents' social life may become non-existent. They may be fearful of rejection by their friends and relatives. Additional stress is likely to occur in families of disabled infants, presence of other chronic illness, disabilities and so on. However, the psychological impacts experienced by these families are common-shock, denial and grief. (Vijesh & Sukumaran, 2007)

Maternal adjustment to the strain of caring for a child with a disability seems to span a wide range from psychological distress to successful adaptation. Same studies found that mothers of children with disability report significantly more physical health complaints as well increased level of depression, and overall emotional distress than the mother of normal children. (Rashida begum , 2010)

No studies have analyzed the depression in mothers of children with cerebral palsy and its relation to the current functional status of the child. Therefore, attempt has made to determine the level of depression of mother and its relation with current functional status of children with cerebral palsy.

## AIM & OBJECTIVE

**Aim:** To evaluate the depression level in mothers of children with cerebral palsy and its relation with the current functional status of the children

**Objective:** To determine the correlation of functional ability of children with cerebral palsy and depression levels in their mothers.

## HYPOTHESIS

**Experimental Hypothesis:** There is inversely proportional relationship of depression of mother of children with cerebral palsy with current functional status of their children.

**Null hypothesis:** There is directly proportional relationship of depression of mother of children with cerebral palsy with current functional status of their children.

## METHODOLOGY

**STUDY DESIGNS** Pre test and post test experimental correlation study.

**SUBJECTS AND SETTING** total number of 50 children with cerebral palsy and their mothers participated in this study. All the subjects were recruited from pediatric section, department of occupational therapy, SVNIRTAR, Cuttack for 6 months. All subjects were tested routinely during their initial assessment.

**INCLUSION CRITERIA** Mother of both male and female children with a documented diagnosis of Cerebral palsy in the age group of 6 months to 3 years.

- Mother who are the primary caregiver of the child.
- Mother who will give a written consent to participate in the study.
- Mother who is from diverse socio-economic status.
- GMFCS level- II

**EXCLUSION CRITERIA**

- Mother having past or current psychiatric illness.
- Mother having history of chronic illness like diabetes, cardiovascular disorders, Pulmonary disorders or renal disorders and cancer.
- Mothers with children with a diagnosis of PDD, Autism, MR, epilepsy, Orthopedics, ADHD & ADD, LD.
- Mother, who is single, widowed.

**INSTRUMENTATION**

1. Beck Depression Inventory (BDI)
2. Gross Motor Function Classification System (GMFCS)
3. Gross Motor Functional Measure (GMFM-88)

**THE BECK DEPRESSION INVENTORY (BDI)**

Second Edition (BDI-II) is a 21-item self report

Instrument designed to assess the severity of depression in adults and adolescents aged 13years and older. The BDI-II was designed to act as an indicator of depressive symptoms based on diagnostic criteria in the DSM-IV. According to the authors, the 21 items in the BDI-II are representative of the DSM-IV criteria for depression.

Total raw scores can range from 0 to 63, and are then converted into descriptive classifications based on cut scores. Total score of 0-13 is considered minimal range, 14-19 is mild, 20-28 is moderate, and 29-63 is severe.

Reliability: the internal consistency of BDI- II responses was excellent, with an alpha coefficient of .94.

**GROSS MOTOR FUNCTIONAL CLASSIFICATION SYSTEM (GMFCS)**

is a reliable and valid five level patterns recognition classification system that discriminates between children with CP in each level within several age groups before their second birthday, between age 2years and the fourth birthday, between age 4<sup>th</sup> year and sixth birthday.

**GMFM:**

The GMFM is a clinical measure designed to evaluate change in gross motor function in children with cerebral palsy.

1. The original 88-item measure (GMFM-88 )

**ITEM SCORING:** Scoring of each GMFM item is done using a consistent generic four-point ordinal scale.

Values of 0 to 3 are assigned to the four categories:  
 0 = does not initiate (the task being tested)  
 1 = initiates (<10% of the task)  
 2 = partially completes (10% to > 100% of the task)  
 3 = completes (the task as outline in the criterion descriptions).

General administration guidelines

**INTERVENTION MATERIAL:** Intervention material is used in this study is based on Neurodevelopment Therapy. A variety of inhibition technique based on Bobath was used to reduce muscle tone. Most technique focuses on improving the Childs range of motion and flexibility at the

spine with the expected result of improved postural alignment and increased postural flexibility.

Therapeutics technique to increase the functional abilities and muscle elongation was also used to help the child achieve extension of the extremities.

Intervention materials used in this study are as below –

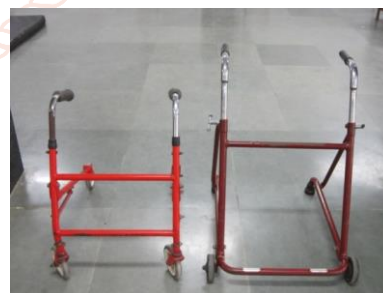
- Bolster
- Therapy ball
- Equilibrium board
- Medicine ball
- Standing unit
- Walking on parallel walking frame
- Walker

**THERAPY BALL**



EQUILIBRIUM BOARD

STANDING UNIT



**Variables:**

**Independent Variables:**

- Occupational therapy based Neurodevelopmental Therapy.

**Dependent variables:**

- Beck depression inventory
- Gross motor functional measure

**Outcome measures:**

- Beck depression inventory
- Gross motor functional measure

**PROCEDURE:**

The subjects were selected through convenient sampling who fulfilled the inclusion and exclusion criteria. The

purposes of the study were explained to the parents. They were asked to sign the consent form. Then general occupational therapy evaluation was done for the children. BDI scale was administered to the parents to assess the depression level and GMFM-88 to assess the functional level of the child. Then therapy was started to the children based on Neurodevelopmental Therapy.

### INTERVENTION STRATEGIES

The children in group a received one hour of occupational therapy based on neurodevelopment therapy. Therapy was individualized for each child's condition and was dictated by the child's unique clinical needs. The goal of therapy was to improve postural and functional abilities in different developmental position.

Each activity was given for 10-15 minutes depending on child's interest, attention and interaction with the environment. Each session started from the weight bearing activity and gradually followed by performance of the movement within the developmental context. For example a child who did not achieve independent sitting, the therapy in following order was provided.

- Weight bearing activity in different developmental positions for 10 to 15 minutes. Weight bearing on different textured surface.
- Supine position inverted over the therapy ball and rotates trunk to pick up a ball on a bench. Target was set up on the other side the child. While supine, the child should rotate the trunk to shoot at the target with the arm that is farthest from the target. The purpose of this activity was to increase vestibular, tactile, and proprioceptive input from the activity and feedback from the movement experience and use active trunk rotation with flexion and activation of abdominal muscles. When the child completed this activity then the child was shifted to next activity that is rolling in kidlite barrel.
- For example, a child who did not achieve independent sitting, the therapy in the following order was provided.
- Weight bearing activity in different developmental position for 10-15 minutes
- Facilitate equilibrium reactions in sitting on plane surface (10-15 minutes)
- Reaching while the child is in weight bearing position (10-15 minutes).
- Rolling activity (10 -15 minutes).
- Trunk rotation activity in supine and supported sitting position (10-15 minutes).
- Rolling and Belly Crawling
- Reaching activity, when the child in different developmental position.
- Crawling



**FIG.1- ON THERAPY BALL**



**FIG.2- WALKING**



**FIG.3-PRONE ON ELBOW & HEAD CONTROL**



**FIG.4- THERAPY ON BOLSTER IN HALF KNEELING**

**Standing Unit:** Child was placed in vertical standing unit. The child asked to keep the knee straight, hip and trunk to maintain the normal anatomical position as much as possible. Child was encouraged to use the hands for handling of manipulating the object placed on the cut out table. Holding this position on was motivated to maintain for 10 minutes.

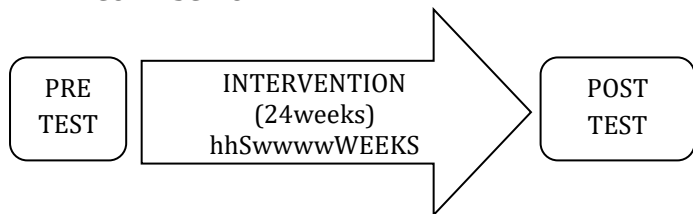
**Therapy ball:** The child was picked up in the desired position of placed on the ball by placing on arm under the child's thigh and one was under the extended arms. When child was in prone position then child was slowly rocked over the ball. Then put the child in supine position over the ball. Gradually the child was rocked over the ball forward and backward for 10 minutes.

**Bolster:** 1<sup>st</sup> step: the child was placed across the bolster in supine position to elongate the hip and trunk. Head was supported over the mat. Then the child was slowly rocked over the bolster. 2<sup>nd</sup> step: - the child was turned in prone position over the bolster. Bolster was placed under the thigh to extend the trunk. Child was allowed to bear weight on straight arm. 3<sup>rd</sup> step: - child was seated on the

bolster in astride position with bearing weight on foot. Therapy over bolster was performing for 10 minutes each session.

The activities for the therapy for cerebral palsy children's: Children were given for 5 day in a week for 24 weeks. Functional abilities were recorded using GMFS-88 at the end of 24 weeks.

**DATA COLLECSTION**



**Data collection:**

Subjects were tested on all the dependent variables according to the above time line. The time line depicts the measurement and treatment schedules. Data collected were transcribed onto a data sheet for each subject separately.

**DATA ANALYSIS**

Test parameters were computed before and after therapy. Statistical calculations were performed with SPSS version 16.0 package. Statistical test were carried with the level of significance set at P=0.05. As it is a parametric study paired 't' test were used to analysis the data and Pearson correlation test was used to find the relationship between function level of child and depression level in the mothers.

**RESULTS**

The sample included a mixture of all the different types of cerebral palsy. The children's diagnoses and mean ages are presented in table 1 below:

**TABLE 1: CHILDREN'S CHARACTERISTICS**

DIAGNOSIS	NUMBER OF CHILDREN	MEAN AGE
Quadriplegic	10	1 year 5 months
Diplegic	18	1 year 7 months
Hemiplegic	6	1 year 9 months
Dystonic/Athetoid/Ataxic	11	1 year 3 months
Mixed	5	1 year 5 months

Table 1: shows the characteristic statistics of different types of cerebral palsy children with mean age from 12month to 21 month.

**TABLE 2: SHOWING DISTRIBUTION OF SUBJECTS ACCORDING TO BDI IN PRE GROUP.**

DISTRIBUTION OF SUBJECTS ACCORDING TO BDI IN GROUP (PRE TEST)		
DEPRESSION LEVEL	NO. OF SUBJECTS	PERCENTAGE
Normal depression level	0	0%
Mild depression level	0	0%
Moderate depression level	4	8%
Severe depression level	46	92%
Total	50	100%

Table 2 shows distribution of various levels of depression of the pre-test group of mothers of cerebral palsy children.

**TABLE 3: SHOWING DISTRIBUTION OF SUBJECTS ACCORDING TO BDI IN POST GROUP**

DISTRIBUTION OF SUBJECTS ACCORDING TO BDI IN GROUP (POST TEST)		
DEPRESSION LEVEL	NO. OF SUBJECTS	PERCENTAGE
Normal depression level	0	0%
Mild depression level	2	4%
Moderate depression level	23	46%
Severe depression level	25	50%
Total	50	100%

Table 3 shows distribution of various levels of depression of the post-test group of mothers of cerebral palsy children.

**Table 4: MEAN VALUE FOR GMFM PRE & POST TEST**

Scores	Mean	Standard deviation	Std .error mean
Pre test	1.0058E2	12.87632	1.82099
Post test	1.6932E2	17.69289	2.50215

Table 4 shows mean value of GMFM scores between pre and post test, which depicts that there is significant improvement in the functional level.

**Table 5: MEAN VALUE FOR BDI PRE & POST TEST**

Scores	Mean	Standard deviation	Std .error mean
Pre test	37.5200	5.99060	.84720
Post test	29.30	7.99809	1.13110

Table 5 shows mean value of BDI scores between pre and post test, which depicts that there is significant decrease in the depression level.

**Table 6: PAIRED T-TEST FOR THE GROUP FOR BDI & GMFM**

OUTCOME	t-value	Level of significance
GMFM	-44.57	.000*
BDI	8.315	.000*

\*Significant  $p < 0.05$

Table 6 shows that there is a significant difference in both GMFM AND BDI scores since the p value is 0.000, which is less than the acceptable level of significance of 0.05.

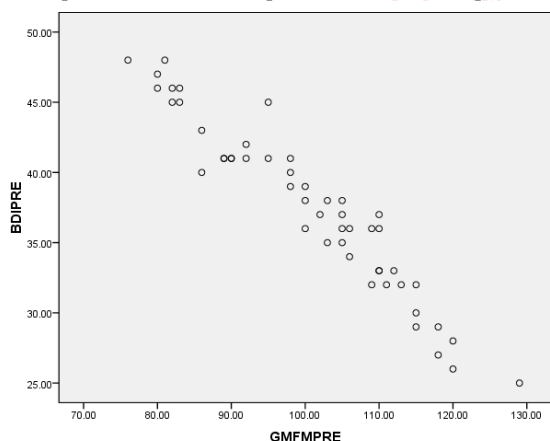
**Table 7: shows the relationship between children current functional level and mother’s depression level.**

Test	Pearson (R)	Level of significance (p value)
Pre test	-0.960	0.01
Post test	-0.755	0.01

\*Significant  $p < 0.05$

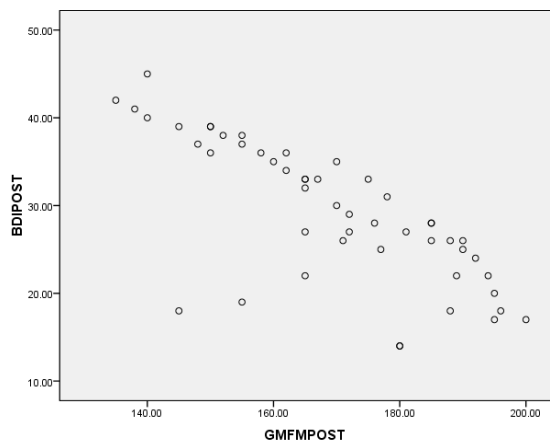
Table 7 shows that there is a negative relationship between children current functional level and mother’s depression level.

**Graph 1:** scatter diagram Pearson correlation test for the relationship between GMFM pre score and BDI pre score.



Above **Graph 2** shows scatter diagram of Pearson correlation test for the relationship between GMFM pre score and BDI pre score.

**Graph 3:** scatter diagram Pearson correlation test for the relationship between GMFM post score and BDI post score.



Above **Graph 4** shows scatter diagram of Pearson correlation test for the relationship between GMFM post score and BDI post score.

**DISCUSSION**

The purpose of the study was to determine the severity of depression in mothers of children with cerebral palsy.

The findings of this study suggested that there is a negative relationship between children current functional level and level of depression in mothers.

Table 2 shows distribution of various levels of depression of the pre-test group of mothers of cerebral palsy children.

Table 3 shows distribution of various levels of depression of the post-test group of mothers of cerebral palsy children.

Table 2 and 3 comparatively shows that there is a significant decrease in the level of depression of mothers of cerebral palsy children after there had been some improvement seen in functional status of children after therapy.

Table 4 shows mean value of GMFM scores for pre test is 1.0058E2 and post test is 1.693E2, which depicts that there is significant improvement in the functional level.

Table 5 shows mean value of BDI scores for pre test is 37.5200 and post test is 29.30 which depicts that there is significant decrease in the depression level.

Table 6 shows that there is a significant difference in both GMFM AND BDI scores since the p value is 0.000, which is less than the acceptable level of significance of 0.05.

Above graph 1: shows the comparison between pre and post treatment score of GMFM, where the post test score is much higher than the pre test score which means there is a significant improvement in the functional status of the CP children.

Above graph 2: shows the comparison between pre and post treatment score of BDI, where the post test score is much lesser than the pre test score which means that there is a significant decrease in the depression level of others of CP children.

Table 7 shows that there is a negative relationship between children current functional level and mother’s depression level with Pearson correlation of value 0.960 for pre test and 0.755 for post test. The level of significance is 0.01 for both.

Above **Graph 3** shows scatter diagram of Pearson correlation test for the relationship between GMFM pre score and BDI pre score.

Above **Graph 4** shows scatter diagram of Pearson correlation test for the relationship between GMFM post score and BDI post score. Thus the study findings as discussed above are the reviews of current research.

Our first hypothesis was there is significant difference between child functional level and mother’s depression level (There is inversely proportional relationship of depression of mother of children with cerebral palsy with current functional status of their children). This hypothesis is accepted.

This study is supported by Ozlem et al (2007) which

showed that BDI scores of patient group were statistically higher than score of control group. They found increase level of depression and anxiety in the mothers of children with disability.

Sibel unsel et al in 2009 found that depression in mothers of children with cerebral palsy and related factors in turkey. Mothers of CP children more depressed than mothers of the healthy children. (International of rehabilitation of research).

The result of this study indicate that there was a significant improvement in postural control, reduction in muscle tone which has lead to the improvement in their upper extremity function as well as in ADL and lower extremity for mobility. Increase functional ability status of children after intervention program.

In BDI patient group also show improvement it due to the treatment provided for their child in the department. In department care givers share their experience to other care givers and with the therapist. From therapist the get information and support which can reduce their depression and anxiety level.

The entire subject underwent a therapy program for increase their functional abilities using the following instrument:

- Standing unit
- Therapy
- Bolster
- Walking frame
- Walker

Because these instrument found to be effective in reduction of muscle tone and improve in functional abilities, which has been supported by Sophite Levit (2004).

Hence, the psychological status of mothers should be considered by the health professionals and treatment or prevention of depression of mothers is recommended for improving the rehabilitation process and achieve better result in these children.

Therefore long term follow up studies are required to evaluate the change in the characteristics of mothers of children with disability.

## CONCLUSION

From this study it is concluded that there is negative relationship between BDI score and GMFM score. Hence these findings should be used in caution when treating the patients with cerebral palsy.

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