



Depressed Mothers and Stunting in children with Cerebral Palsy

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Abstract

Aim: To assess the association of depression in mothers with health of children with Cerebral Palsy.

Methods: Eighty mothers (care givers) and their CP children were approached for the study. Informed consent was obtained from all the mothers. The Centre for Epidemiological Studies Depression scale (CES-D scale) a tool that has been in the public domain since 1977 was used to assess depression score among mothers. In children complete clinical examination with special emphasis on anthropometry (like Weight, Height, Mid upper arm circumference, BMI) was done as assessment of health was done in terms of anthropometric parameters in our study.

Results: The data revealed that 58 mothers (72.5%) were depressed and a higher percentage of stunting in children of depressed mothers. Although this difference does not have a statistical significance (p value = 0.05) but close to the statistical significance. These findings demand development of active, comprehensive guidelines for the management of depression in mothers.

Conclusions: Thus findings of our study emphasizes the fact that adequate attention needs to be directed towards the education and ensuring good mental health of mothers of CP children which may have a significant impact on the health status of CP children.

Received: Nov 17, 2023

Accepted: Dec 04, 2023

Published Online: Dec 11, 2023

Journal: Depression and Anxiety: Open Access

Publisher: MedDocs Publishers LLC

Online edition: <http://meddocsonline.org/>

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Keywords: Maternal depression; Cerebral palsy; Health of cp children; Anthropometry; Ces-D.

Introduction

It has been stated that non-progressive disruptions in the developing fetal or infant brain are the cause of a cluster of movement and postural problems known as Cerebral Palsy (CP). Changes in sensation, cognition, communication, perception, behaviour, and/or seizure disorder frequently coexist with the

motor abnormalities associated with cerebral palsy [1]. Conditions unique to the muscles (such as muscular dystrophies) or the peripheral nerves of the spinal cord (such as spinal muscular atrophy and myelomeningocele) that cause early motor abnormalities are not classified as cerebral palsy.



Cite this article: Bhat SM, Charoo BA, Jogi MS, Bhat IA, Gurgani S, et al. Depressed Mothers and Stunting in children with Cerebral Palsy. *Depress Anxiety Open Access*. 2023; 2(2): 1010.

We still don't fully understand the pathophysiology of cerebral palsy. Because of foetal, maternal, gestational, or postnatal circumstances, the following events are occurring during the neural development of the child:

1. Damage to the developing brain: From conception until early childhood, damage to the developing brain can happen at any time. It is a common misconception that cerebral palsy results from more than 10% of birth traumas.
2. Prematurity and postmaturity: The risk of cerebral palsy is higher in infants born slightly preterm (37–38 weeks) or post-term (42 weeks) than in children born at term (40 weeks), according to cohort studies [2].
3. Cerebral leukomalacia
4. Periventricular–intraventricular hemorrhage, hypoperfusion in the basal ganglia, middle cerebral artery, or other brain areas.
5. Inflammations or infections in the Cerebrum.

The frequency of cerebral palsy in underdeveloped nations is estimated to be 1.5–5.6 cases per 1000 live births, while exact numbers are unknown [3]. Infants born preterm or extremely preterm have a significantly higher prevalence of this illness [4,5]. The male-to-female ratio indicates a higher occurrence [3]. Brain palsy may be more likely in people with lower socioeconomic level [6]. About 31% of children with CP have mental retardation (IQ < 50), 21% have seizures, and 20% are nonambulatory. These are the approximate incidences of comorbidities [7].

The birth of a developmentally disabled child is a family stressor and requires a lot of attention and financial resources. The mother of children with different levels of disability have high level of stress and anxiety and in most cultures, mothers have more responsibility to bring up their children and are the main supporter of disabled children, so mothers are more affected by these children problems [8] and they have more responsibility than fathers. Children with chronic medical conditions cause depression [9], emotional and behavioral problems in their mothers [10].

In the study of Ones and his colleagues [11] mothers having CP children had depressive symptoms and lower quality of life, in addition Manual [12] reported 30% of mothers having CP children had the symptom of depression above cut off on Centre for Epidemiological Studies- Depression (CES-D) Scale.

Keneilwe Motlathledi et al. [13] studied association between depression in carers and malnutrition in children aged 6 months to 5 years. The major finding of this study was that there is a statistically significant relationship between malnutrition in children aged between 6 months and 5 years and depression in their PCGs in Mahalapye.

Methodology

Methods

This was a hospital based cross sectional study carried out in the department of paediatrics and neonatology Sher-I-Kashmir Institute of medical sciences Srinagar.

Inclusion criteria

1. Diagnosed cases of CP with onset of CP at 18 months.

2. Age of child between 2-8 years.
3. Mothers of CP children who are willing to participate.

Exclusion criteria

1. Lack of informed consent.
2. Pregnant mothers.
3. Divorced mothers.
4. Mothers who were known cases of medical illnesses causing depression.
5. Mothers having addicted husbands.
6. Mothers having history of chronic psychologic disorder.

Study protocol

Eighty mothers (care givers) and their CP children were approached for the study. Informed consent was obtained from all the mothers. The Centre for Epidemiological Studies Depression scale (CES-D scale) a tool that has been in the public domain since 1977 was used to assess depression score among mothers, because of its ease of administration and because of less time consuming. It has been widely used in population surveys across the world and has a satisfactory level of reliability and validity in numerous cultures [14,15]. This is a 20 item measure that asks mothers to rate how often they had experienced over the past week, symptoms associated with depression, such as restless sleep, poor appetite and feeling lonely. Response ranges from 0 to 3 for each item. Scores range from 0-60, with high scores implying greater depressive symptoms. In the present study a universal cut off of 16 was employed, since it most effectively detects and covers "probable" depressive symptoms [16]. The clinical cut off scores of ≥ 16 helps in identifying persons at risk for depression with good sensitivity and specificity and high internal consistency. CES-D was completed by mother closely associated with the care of the affected child.

In children complete clinical examination with special emphasis on anthropometry (like Weight, Height, Mid upper arm circumference, BMI) was done as assessment of health was done in terms of anthropometric parameters in our study.

Weight

Each child's weight was measured to the nearest 0.1 kg using a bath room scale that was calibrated every morning using a known weight. Children who could not stand were weighed in the arms of the mother. The difference between the combined weight of mother and child and that of mother alone was recorded as the child's weight.

Height

The height of each child was calculated by using published validated equations from tibial length which in turn was measured by using a standard flexible steel tape. Measuring the actual height in patients with cerebral palsy has been shown to be difficult due to the presence of skeletal contractures, and inability of many of these patients to stand, hence segmental measurement are used to estimate stature in these children. The segmental measurements are Upper-arm length, tibial length, and knee height. These measurements are all reliable and valid proxies for stature in children with cerebral palsy up to 12 years of age [17].

Estimates of stature can then be calculated using published validated equations [17] and plotted on standard growth charts. For purposes of this study tibial length was used because it has the advantage of requiring only a standard flexible steel tape, which is readily available.

Knee height: This is the most reliable of the three measures, as reflected by the low technical error but it requires a caliper that most physicians would not have in their offices, measured with the knee and ankle each bent to a 90° angle using a Mediform sliding caliper (Medical Express, Beaverton, Ore), the distance between the heel to the anterior surface of the thigh over the femoral condyles.

Tibial length: It is also reliable and has the advantage of requiring only a standard flexible steel tape, which is readily available. This is measured from the superomedial edge of the tibia to the inferior edge of the medial malleolus by means of a flexible steel tape.

Results

Table 1: Frequency and percentage distribution of depression in Mothers of CP Children.

Depression	Count	58
	% of Total	72.5%
No Depression	Count	22
	% of Total	27.5%
Total	Count	80
	% of Total	100.0%

The data presented in **Table 1** reveals that 58 mothers (72.5%) were depressed.

Table 2: Frequency and percentage distribution of Children according to their Weight for height.

W/H (z score)	Frequency	Percent
>2	1	1.3
>1	6	7.5
0	37	46.3
<-1	17	21.3
<-2	18	22.5
<-3	1	1.3
Total	80	100.0

Table 2 shows the frequency and percentage distribution of children according to their weight for height. Out of 80 children 18 children (22.50%) were wasted (Z score <-2) 1 child (1.3%) was severely wasted (Z score <-3), 6 children (7.5%) had possible risk of overweight (Z score >1) and 1 child (1.3%) was overweight (Z score >1) and rest of children had z score in normal range regarding weight for height.

Table 3 shows frequency and percentage distribution of children according to their height for age. Out of 80 children 26 children (32.50%) were stunted (W/H z score <-2), 2 children (2.5%) were severely stunted (Z score <-3) and rest of the children had z score in normal range regarding height for age.

Table 3: Frequency and percentage distribution of Children according to their Height for Age.

H/A (z score)	Frequency	Percent
>2	1	1.3
>1	8	10.0
0	26	32.5
<-1	17	21.3
<-2	26	32.5
<-3	2	2.5
Total	80	100.0

Table 4: Frequency and percentage distribution of Children according to their Weight for Age.

W/A(z score)	Frequency	Percent
>2	1	1.3
>1	7	8.8
0	24	30.0
<-1	8	10.0
<-2	32	40.0
<-3	8	10.0
Total	80	100.0

Table 4 shows frequency and percentage distribution of children according to their weight for age. Out of 80 children, 32 children (40.0%) were underweight (Z score <-2) and 8 children (10%) were severely stunted (Z score <-3) and rest of children had z score between 0 to 2.

Table 5: Frequency and percentage distribution of Children according to their Mid Arm circumference.

MUAC (cm)	Frequency	Percent
<12.5	27	33.8
12.5-13.5	21	26.3
>13.5	32	40.0
Total	80	100.0

Table 5 shows frequency and percentage distribution of children according to their Mid Arm circumference. Out of 80 children, 27 children (33.8%) were wasted (MUAC<12.5 cm), 21 children (26.3%) were borderline and 32 (40%) children were normal.

Table 6: Frequency and percentage distribution of Children according to their BMI.

BMI (z score)	Frequency	Percent
>2	2	2.5
>1	7	8.8
0	40	50.0
<-1	22	27.5
<-2	8	10.0
<-3	1	1.3
Total	80	100.0

Table 6 shows frequency and percentage distribution of children according to their BMI. Out of 80 children 8 children (10%) were wasted (Z score <-2), 1 child (1.3%) was severely wasted (Z score < -3), 7 children (8.8%) were having possible risk for overweight (Z score >1) and 2 children (2.5%) were overweight (Z score > 2) and rest of the children had z score in the normal range for BMI.

Table 7 shows frequency and percentage distribution of weight for Height of Children in Mothers of depression and no depression. out of 58 children of depressed mothers, 15 children (25.9%) were wasted (z score <-2), 3 (5.2%) children had possible risk of overweight and 1 (1.7%) was overweight, rest of the children had z score in the normal range. out of 22 children of non depressed mothers 3 (13.6%) children were wasted and 1 (4.5%) was severely wasted, 3 (13.6%) children had possible risk of overweight, none was overweight and rest of the children had z score in the normal range. These parameters had no statistical significance. P value 0.324.

Table 7: Frequency and percentage distribution of weight for Height of Children in Mothers of depression and no depression.

		Weight/Height						P Value
		>2	>1	0	<-1	<-2	<-3	
No Depression	Count	0	3	11	4	3	1	0.324
	%	0.00%	13.60%	50.00%	18.20%	13.60%	4.50%	
	% of Total	0%	3.80%	13.80%	5.00%	3.80%	1.20%	
Depression	Count	1	3	26	13	15	0	
	%	1.70%	5.20%	44.80%	22.40%	25.90%	0.00%	
	% of Total	1.20%	3.80%	32.50%	16.20%	18.80%	0%	
Total	Count	1	6	37	17	18	1	
	% of Total	1.20%	7.50%	46.20%	21.20%	22.50%	1.20%	

Table 8: Frequency and percentage distribution of height for age of Children in Mothers of depression and no depression.

		Height/Age						P Value
		>2	>1	0	<-1	<-2	<-3	
No Depression	Count	1	4	9	5	2	1	0.052
	%	4.50%	18.20%	40.90%	22.70%	9.10%	4.50%	
	% of Total	1.20%	5.00%	11.20%	6.20%	2.50%	1.20%	
Depression	Count	0	4	17	12	24	1	
	%	0.00%	6.90%	29.30%	20.70%	41.40%	1.70%	
	% of Total	0.00%	5.00%	21.20%	15.00%	30.00%	1.20%	
Total	Count	1	8	26	17	26	2	
	% of Total	1.20%	10.00%	32.50%	21.20%	32.50%	2.50%	

Table 8 shows frequency and percentage distribution of height for age of Children in Mothers of depression and no depression. out of 58 children of depressed mothers, 24 children (41.4%) were stunted (z score <-2), 1 child (1.7%) was severely stunted and rest of the children had z score in the normal range. out of 22 children of non depressed mothers 2 (9.1%) children were stunted and 1 (4.5%) was severely stunted, 3 (13.6%) and rest of the children had z score in the normal range. Although this parameter had no statistical significance but very close to the statistical significance (p value 0.052).

Table 9 shows frequency and percentage distribution of weight for age of Children in Mothers of depression and no depression. out of 58 children of depressed mothers, 26 children (44.8%) were underweight (z score <-2), 7 children (12.1%) were severely underweight and rest of the children had z score in the normal range. out of 22 children of non depressed mothers 6 (27.3%) children were underweight and 1 (4.5%) child was severely underweight and rest of the children had z score in the normal range. this parameter had no statistical significance, P value 0.269.

Table 9: Frequency and percentage distribution of weight for age of Children in Mothers of depression and no depression.

		weight/age						P Value
		>2	>1	0	<-1	<-2	<-3	
No Depression	Count	0	4	8	3	6	1	0.269
	%	0.00%	18.20%	36.40%	13.60%	27.30%	4.50%	
	% of Total	0.00%	5.00%	10.00%	3.80%	7.50%	1.20%	
Depression	Count	1	3	16	5	26	7	
	%	1.70%	5.20%	27.60%	8.60%	44.80%	12.10%	
	% of Total	1.20%	3.80%	20.00%	6.20%	32.50%	8.80%	
Total	Count	1	7	24	8	32	8	
	% of Total	1.20%	8.80%	30.00%	10.00%	40.00%	10.00%	

Table 10: Frequency and percentage distribution of MUAC of Children in Mothers of depression and no depression.

		MUAC (cm)			P Value
		<12.5	12.5-13.5	>13.5	
No Depression	Count	6	4	12	0.255
	%	27.3%	18.2%	54.5%	
	% of Total	7.5%	5.0%	15.0%	
Depression	Count	21	17	20	
	%	36.2%	29.3%	34.5%	
	% of Total	26.2%	21.2%	25.0%	
Total	Count	27	21	32	
	% of Total	33.8%	26.2%	40.0%	

Table 10 shows frequency and percentage distribution of MUAC of Children in Mothers of depression and no depression. Out of 58 children of depressed mothers, 21 (36.2%) were wasted, 17 (29.3%) were border line and 20 (34.54%) were normal where as in 22 children of non-depressed mothers 6 (27.3%) were wasted, 4 (18.2%) were border line and 12 (54.5%) were normal. This data had no statistical significance. P value 0.255.

Table 11 shows frequency and percentage distribution of BMI of Children in Mothers of depression and no depression. Out of 58 children of depressed mothers 6 children (10.3%) were wasted, 5 children (8.0%) had possible risk of overweight and 1 child (1.7%) was overweight. whereas out of 22 children of non depressed mothers 2 children (9.1) were wasted, one child (4.5%) was severely wasted, 2 child (9.1%) had possible risk of overweight and 1 child (4.5%) was overweight. The data had no statistical significance, P value 0.153.

Table 11: Frequency and percentage distribution of BMI of Children in Mothers of depression and no depression.

		BMI						P Value
		>2	>1	0	<-1	<-2	<-3	
No Depression	Count	1	2	12	4	2	1	0.153
	%	4.5%	9.1%	54.5%	18.2%	9.1%	4.5%	
	% of Total	1.2%	2.5%	15.0%	5.0%	2.5%	1.2%	
Depression	Count	1	5	28	18	6	0	
	%	1.7%	8.0%	48.3%	31.0%	10.3%	0.0%	
	% of Total	1.2%	6.2%	35.0%	22.5%	7.5%	0.0%	
Total	Count	2	7	40	22	8	1	
	% of Total	2.5%	8.8%	50.0%	27.5%	10.0%	1.2%	

Discussion

The effect of maternal depression on CP children was assessed in terms of anthropometry parameters. In our study children with higher maternal CES-D score were more frequently stunted however statistical significance was not seen. Karen A. Ertel et al [18]. A US prospective cohort study found no corre-

lation between early children’s lower height and maternal depressed symptoms, which is consistent with our study with non disabled healthy children in their study compared to our study which can act as a significant confounding variable.

Veit Grote, et al. [19] & the European Childhood Obesity Trial Study Group in a European cohort study investigating the

relationship between infant growth and maternal postnatal depression. The measurements of weight, length, triceps, and subscapular skinfold thicknesses were taken, and the BMI was computed. After multivariate adjustment, none of the anthropometric parameters changed between the groups. The study's conclusion—which is in line with our findings on the differences in having CP children in our study—was that high maternal postnatal depression scores do not have any significant effects on offspring growth in high-income countries.

Keneilwe Motlathledi et al. [13] studied association between depression in carers and malnutrition in children aged 6 months to 5 years. The major finding of this study was that there is a statistically significant relationship between malnutrition in children aged between 6 months and 5 years and depression in their PCGs in Mahalapye (OR 4.33; 95% CI: 1.90, 9.90, $p = 0.001$). Similar findings were reported in South Africa where depressed maternal mood was reported in 63 out of 179 care givers of children with failure to thrive which is closely consistent with our study.

Puong H Nguyen et al. [20] investigated In Bangladesh, Vietnam, and Ethiopia, there is a correlation between maternal mental health and undernourishment and disease in children. Maternal CMD was very common; prevalence ranged from 31% in Vietnam to 49% in Bangladesh. Bangladesh and Ethiopia had higher rates of child under nutrition than Vietnam. Maternal CMD was linked in multivariate analysis to underweight children in Vietnam (OR = 1.27; 95% CI 1.01, 1.61) and stunting children in Bangladesh (OR = 1.21; 95% CI 1.03, 1.41); no correlation was observed with wasting. The results pertaining to waste align with our investigation, which yielded no statistically significant results. In Vietnam, one-third of women and nearly half of Bangladeshi women suffered from CMD, which was a significant contributing factor to underweight and stunting in children. Ethiopia had no such association, despite 39% of the population having CMD. Thus it can be concluded from this study that maternal depression has a significant effect on chronic malnutrition (stunting) which has been analysed in a number of studies and is in accordance with the results of our study.

A CP child when aged 2 to 3 years develops various behaviour problems which increases mental stress among mother. This increased mental stress can be the precipitating factor for the development of depression among mothers of CP children. It has been suggested that appropriate interventions programs, for care giver mothers, to improve skills in everyday living for example feeding, bathing, toilet along with behaviour management programs are vital to minimise psycho social stress among parents [21]. Similarly it had been reported that a CP child have more sleep problems than normally developing child, which indirectly adversely affect sleep quality of mothers. This poor sleep of mothers may be considerably interrelated with maternal depression [22]. As mothers are the principal caregiver in almost all cases, by optimising mothers' physical and mental health the target therapy for CP child can conveniently be accomplished. It is therefore highly desirable to develop active health strategies (health program/policy) to support mothers of the disables children. This must include support for the caregiver, training to cope with stress, time management and appropriate treatment of mental health problems [23-24].

In our study 41.4% children (24 out of 58) of mothers with CES-D score above clinical cut off were found to be stunted and 9.1% children (2 out of 22) children were stunted in mothers with CES-D score below cut off (p value 0.05). We found a high

percentage of stunting in children of depressed mothers. Although this difference does not have statistical significance (p value = 0.05) but close to the statistical significance. In our study we also found, out of 80 CP children, 43 (53.8%) were male and 37 (46.2%) were female children which is consistent with the study conducted by Stanley et al.³ who found incidence of CP was higher in males than in females (Ratio 1.33:1).

Summary & Conclusion

We found a higher percentage of stunting in children of depressed mothers. Although this difference does not have a statistical significance (p value = 0.05) but close to the statistical significance. These findings demand development of active, comprehensive guidelines for the management of depression in mothers as without them it is not possible to achieve our goal of ideal management of a CP child.

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