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A Prospective Study on Role of Nutrition in the Rehabilition of Cerebral Palsy Children in Eastern India

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Abstract: ***Cerebral palsy is a disorder of movement and posture resulting from an insult to the immature brain. Cerebral palsy affects muscle tone, muscle co-ordination, reflex and balance. It can also impact fine motor skills, gross motor skills and oral motor functioning Cerebral palsy children are found to be poorly nourished and also have decreased basal metabolic rate.Energy requirements of children with severe CP who utilize a wheelchair for mobility have been reported to be between 60% to 70% of those of healthy typically developing children. There is currently no commonly accepted method for estimating the energy needs of children and adolescent with CP. Adequate amount of carbohydrates, proteins and fats are needed to meet the energy requirement of the body. Standard recommendations for dietary intake of vitamins, minerals and trace elements should be utilizedParticipation in the rehabilitation program may increase the energy requirements of children with CP and needs to be considered when estimating energy needs.***

1. Introduction

Cerebral palsy is a disorder of movement and posture resulting from an insult to the immature brain. Cerebral palsy affects muscle tone, muscle co-ordination, reflex and balance. It can also impact fine motor skills, gross motor skills and oral motor functioning Cerebral palsy children are found to be poorly nourished and also have decreased basal metabolic rate. Energy requirements of children with severe CP who utilize a wheelchair for mobility have been reported to be between 60% to 70% of those of healthy typically developing children.

Objective

To evaluate the effectiveness of nutrional intervention in Cerebral Palsy children

2. Materials

Prospective Hospital Based Interventional Study in IPD and OPD of Svnirtar, Olatpur, Cuttack, Odisha.

50 Cases- 11 girls and 39 boys:

Age (Years)	*No.*	*Girls*	*Boys*
2-4	28	6	22
4-6	14	2	12
6-8	6	2	4
8-10	-	-	-
10- 12	2	1	1

According to GMFCS

GMFCS	Boys	Girls
I	3	0
II	18	8
III	14	3
IV	2	0
V	2	0

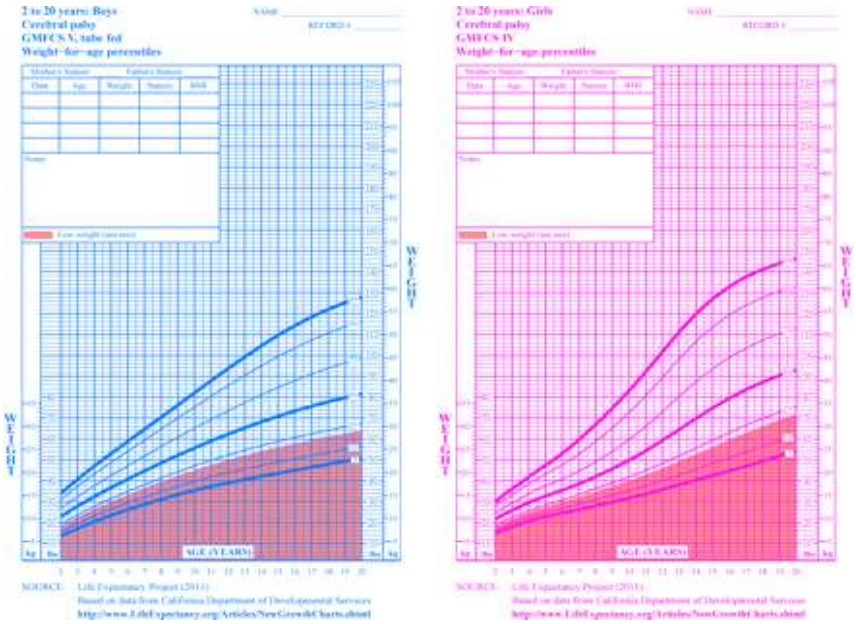
3. Methods

Parents were interviewed about the feeding habits of their children and the feeding difficulties faced by them

questions	Red flags
How long does it take to feed the child	More than 30 mins, on any regular basis
Are meal times stressful to child or parent	Yes , if one or other or both
Is your child gaining weight adequately	Lack of weight gain over 2-3 months in young child, not just weight loss
Are there signs of respiratory problems	Increased congestion at meal times,'gurgly' voice, respiratory illness

Assessment of Growth

- Each cerebral palsy child was assessed by measuring
- Height
- Weight
- Midarm circumference in children below 5 years
- Biochemical values
- Calorie intake
- These parameters were repeated at 3 and 6 months interval
- Evaluated according to BROOKS growth chart for CP children.



Brooks et al Growth Curve

- Weight/age, height/age and BMI was used in the growth curve
- "nutritional deficit"(malnourished)-data below 10th percentile
- Normal weight-data between 10th and 50th percentile
- At risk of overweight-data between 50th and 90th percentile
- Overweight-data above 90th percentile

Nutrition Support

- The nutritional intervention in each CP child depended on their nutritional status and on the feeding difficulties faced by their caretakers
- Tube feeding was not encouraged in view of risk of infection in the low socioeconomic status group

Treatment

- 1ST LINE TREATMENT
  Correct positioning and adequate physical support during mealtimes
- 2ND LINE TREATMENT
  The texture of food was modified
  (To ensure airway safety, maximizing eating efficiency and reducing fatigue during mealtimes)
- Smaller more frequent meals was encouraged
- Fats and oils addition to food was advised
- Iron, minerals and vitamins supplementation was given by prescribing tonics
- Constipation was treated by increasing the dietary intake of fibres and fluids. Medications was prescribed if required
- The children participated in speech therapy and OT program to improve feeding skills

Positioning

Changing Consistency of Food

Supplements

Therapy



According to mid arm circumference

- 42 Children were under 5 years

	At 0 Month	After 6 Months
Severe Acute Malnutrition	1	1
Moderate Acute Malnutrition	7	2
At Risk	12	3
Well Nourished	22	36

Calorie Intake

Age Group	No.	Calorie Requirement	AVG Calculated Value	Deficiency
1-3 YRS	28	1058	900	158
4- 6 YRS	16	1358	992	366
7- 9 YRS	4	1682	1400	282
BOYS				
10- 12 YRS	1	2195	1850	345
13- 15 YRS	-	2761		
GIRLS				
10- 12 YRS	1	1995	1680	315
13- 15 YRS	-	2330	-	-

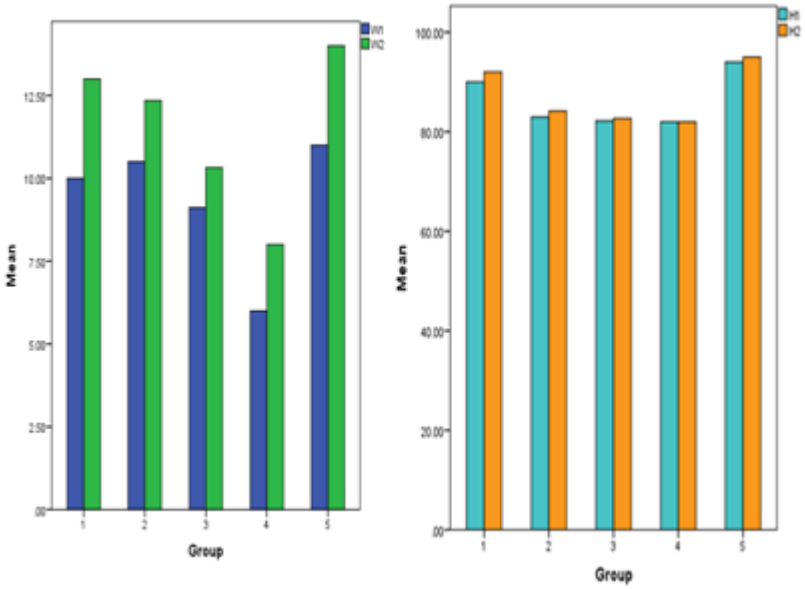
According to brook's growth chart

	At 0 Month	After 6 Months
Malnourished	28	8
Normal	13	26
At Risk of Overweight	8	14
Overweight	1	2

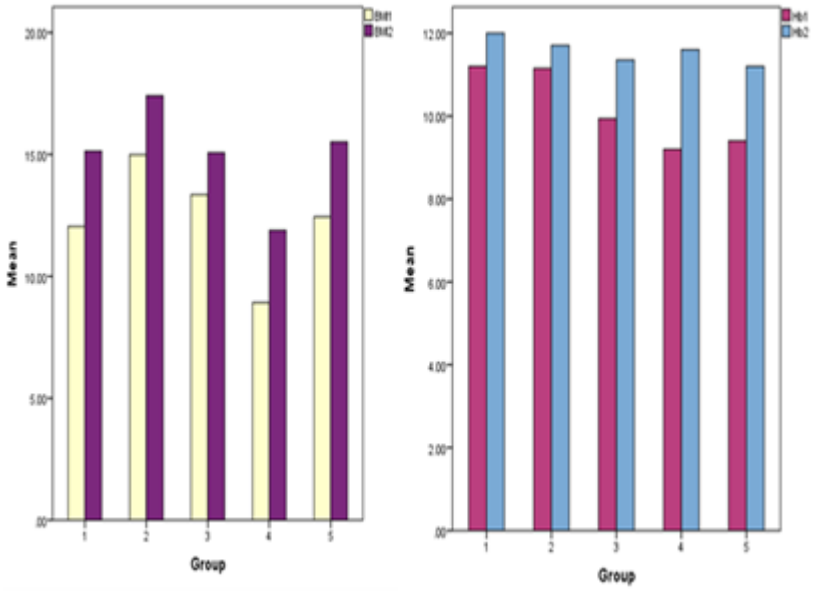
Anaemia

Hb%	At 0 Month	After 6 Months
Normal	19	46
Mild	13	3
Moderate	14	1
Severe	4	0

Graphs

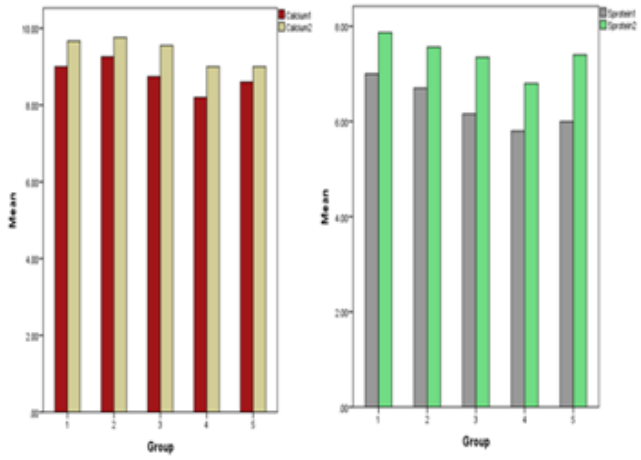


Graphs



Data

Calcium	At 0 Month	At 6 Months
Normal (8.8- 10.4 mg/dl)	36	50
Hypocalcemia (< 8.8mg/dl)	14	0



Graph

Data

Sodium

	At 0 Month	At 6 Months
Normal	50	50
Hyponatremia	0	0

Potassium

	At 0 Month	At 6 Months
Normal	50	50
Hypokalemia	0	0

Data

SR.Protein	At 0 Month	At 6 Months
Normal (6- 8.5 gm./dl)	43	50
Hypoproteinemia (< 6.0 gm./dl)	7	0

Statistics

Descriptive statistics for 50 subjects

Case Summaries						
	N	Mean	Std. Deviation	Median	Minimum	Maximum
W1	50	9.8400	3.67762	9.5000	5.00	25.00
W2	50	11.5900	3.69320	11.0000	6.00	27.00
H1	50	83.5200	10.59311	81.0000	65.00	112.00
H2	50	84.4600	10.71754	82.0000	66.00	113.00
BMI1	50	13.9078	4.00758	12.9450	7.81	24.65
BMI2	50	16.1792	3.87027	15.2150	9.90	25.78
Hb1	50	10.5948	1.06381	10.8000	8.40	12.60
Hb2	50	11.5788	.54756	11.6000	10.40	12.80
Cal1	50	8.9976	.54531	9.0000	8.20	10.00
Cal2	50	9.6240	.39515	9.6000	9.00	10.40
S prot1	50	6.4712	.81528	6.8000	4.52	7.50
S prot2	50	7.4700	.53956	7.6000	6.40	8.20

Statistics

- Normality test was done using Shapiro-Wilk's test for normality.
- Coloured ones are significant that is not normally distributed ($p<0.05$)

Tests of Normality			
	Shapiro-Wilk		
	Statistic	Df	P
W1	.876	50	.000
W2	.884	50	.000
H1	.958	50	.072
H2	.963	50	.117
BMI1	.945	50	.022
BMI2	.928	50	.005
Hb1	.972	50	.273
Hb2	.968	50	.185
Cal1	.932	50	.007
Cal2	.937	50	.010
S prot1	.875	50	.000
S prot2	.903	50	.001

Statistics

Since height and HB are normally distributed comparison between first and second conditions are done using parametric test namely paired-samples t-test

Results of Paired-Samples t-Test Results show significant improvement in both height and Hb from first to second condition ($p<0.001$)

Test Statistic				
	Weight	BMI	Calcium	S protein
Mod (Z)	6.202	6.155	6.186	6.166
P	.000	.000	.000	.000

4. Result

The overall well- being of cerebral palsy children improved with the nutritional intervention.

Results show significant improvement in both height and HB from

First to second condition ($P<0.001$)

Results show significant improvement in Weight, Bmi, Calcium Level and S Protein from first to second condition ($P <0.001$)

- The mean feeding time of the cerebral palsy children was 20 mins (range 15-90 mins).
- Oral motor dysfunction was found in gmfcs iii - v.
- Spastic quadriplegic cerebral palsy patients had significantly poor feeding skill score ($p<0.001$)

5. Conclusion

Creating parental awareness about correct feeding practices and timely nutritional intervention with an individualized approach. In cerebral palsy children has a definitive role in their rehabilitation.

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