

A Cross Sectional Study to Evaluate the Nutritional Status and Feeding Difficulties in Children with Cerebral Palsy

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Abstract

Introduction: Cerebral palsy is a common childhood neurodevelopmental disorder . Globally, population based studies reports incidence of Cerebral palsy ranging from 1.5 to more than 4 /1000 live birth .Regional trends have been static or shown minor increases presumably due to increase survival of very premature babies .

Objectives: The study was conducted to identify nutritional and feeding problems among children with cerebral palsy .

Methods and Material: 54 consecutive children with cerebral palsy of age group 2-12 yrs from a Pediatrics outpatient department were selected. Assessment proforma, weighing machine and measuring tape was used to assess physical measurement for identifying nutritional problems. GMFCS scale and topographical classification , IAP classification for Malnutrition were used .An interview schedule was used to assess feeding problems.

Results and Conclusions: Eighty seven percent of the cohort had malnutrition, Seventy percent had wasting and 22% had stunting. 94% of 2-5 yrs old, Seventy Six percent of 5-8 yr old and 90% of 8-12 yr old were underweight. Four percent were overweight. Hemiplegic , quadriplegic and dyskinetic children were 83% , 84.2% and 66% underweight respectively.

Feeding problems were more common in the 5-8 year age group. Ninety five percent had a slow oral intake. Seventy six percent could not self feed, Sixty percent spit food, Forty five percent rejected solids, 35% had frequent aspiration, 35% had difficulty chewing food, 35% had difficulty in spoon feeding, 25% had swallowing problem, 25% could not drink from a cup and 15% had vomiting. There was statistically significant association between feeding problems and stunting i.e. feeding problems were more in the group of cerebral palsy children who were having stunting. Children with Spastic quadriplegic Cerebral palsy had more feeding problems.

Keywords: Cerebral Palsy, Malnutrition, Underweight, Stunting, Feeding Problems.

INTRODUCTION

Cerebral palsy is defined as non progressive neuromotor disorder of cerebral origin. It is the group of permanent disorders of movements and posture, causing limitation of activity, attributable to non-progressive disturbances that occurred in the developing fetal or infant brain, often accompanied by

disturbances of sensation, perception, cognition, communication and behavior, epilepsy and secondary musculoskeletal problems.(1)

Cerebral palsy is a common childhood neurodevelopmental disorder . Globally, population based studies reports incidence of Cerebral palsy ranging from 1.5 to more than 4 /1000 live birth . Regional trends have been static or shown minor increases presumably due to increase survival of very premature babies (2).

Motor dysfunction is the main feature of cerebral palsy and play role in definition, classification and management of cerebral palsy . It prevents participants from carrying activities of daily life (including feeding) and cause oromotor dysfunction , predisposing them to under-nutrition (3) .On the other hand under-nutrition causes decrease in muscle strength, thereby worsening motor impairment in cerebral palsy.(4)

Anthropometric indices, WHO growth standard charts has got universal acceptance because it took cognizance of socioeconomic and environmental factors affecting anthropometry (5) .Nutritional assessment and appropriate intervention are critical in care of children with cerebral palsy. Unfortunately routine nutritional assessment of cerebral palsy is low, especially in developing countries like India where access to health care services are limited and the prevalence of malnutrition is high.

AIM

To assess the nutritional status among children with Cerebral palsy.

OBJECTIVES

1. To classify cerebral palsy children as per topographical classification.
2. To classify cerebral palsy children as per Gross motor functional classification.
3. To evaluate and correlate feeding difficulties and nutritional status in children with cerebral palsy .

METHODOLOGY

STUDY DESIGN: Cross sectional observational study

STUDY DURATION: April 2023 to October 2024

STUDY PLACE: This study will be performed in the department of Pediatrics at Amaltas Institute of Medical Science, Dewas.

SAMPLE SIZE

Consecutive sampling technique

Inclusion criteria

1. Cerebral palsy patients visiting pediatrics department .
1. Children of age 2-12 years with diagnosis of cerebral palsy .
2. Willingness to participate .

Exclusion criteria

1. Progressive neurological disorder
2. Severe concurrent illness or disease not typically associated with cerebral palsy
3. Lack of consent .

METHOD

Patient fulfilling the inclusion criteria and visiting the department of pediatrics were explained about the study. If willing to participate a written informed Pediatric consent was taken from caregiver.

Cerebral palsy was diagnosed by Levine POSTER criteria and clinically by taking history and physical examination.(6)

Levine POSTER criteria [Abnormalities in 4 of these 6 categories if present strongly point to diagnosis of cerebral palsy]

1. Posturing,
2. Oropharyngeal problems
3. Strabismus
4. Tone
5. Evolution maldevelopment
6. Reflexes (increased deep tendon reflexes /persistent babinski reflex)

Classification of children with cerebral palsy -

Cerebral palsy children was categorized according to neurological sub-type and severity. Sub type stratification was based on the topographic pattern of the affected limbs, and the predominant quality of motor impairment in those limbs.(7)

1. Spastic Cerebral palsy (quadriplegia /diplegia /hemiplegic)
2. Hypotonic (Atonic) Cerebral palsy
3. Extrapyramidal Cerebral palsy (choreoathetotic / Dyskinetic)
4. Ataxic Cerebral palsy (Cerebellar involvement)
5. Mixed type Cerebral palsy

Then patient were classified as per gross motor functional classification system. The Gross motor functional classification is used to describe functional and motor severity, using scores ranging from most able to perform movements such as sitting, walking without limitation (Level I) to restricted movements, needs to be transported in a manual wheelchair (GMFCS V)(8)

To assess the nutritional status among children with Cerebral palsy.

Anthropometric assesment-

Anthropometry (weight and height) was measured in accordance with the standard procedure. (9) Weight was measured using a digital weighing scale with taring capability. Tare weighing was used for subjects who could not stand, where accompanying parent or caregiver was weighed first. Then, the scale was tared to zero and the parent / caregiver carrying the children were weighed to get the child's weight. Observed weight for age was compared with the expected weight for age of child. Height was measured using a stadiometer (UNICEF). Recumbent length was measured in children who were unable to stand using the length board. Anthropometric measurements obtained was converted into indices using the WHO Standard Growth Charts for Z-scores based on subjects' age and gender.

Statistical analysis- Appropriate Statistical tests and data analysis tools MS Exel, SPSS software used.

Sponsorship- No

Conflict of interest - None

RESULTS

Majority of children in the study group were in the age group of two to eight yrs.percent of the Fifty

Eight percete were males. Among the 114 children, majority 2% (3) had Hypotonic Cerebral Palsy, 66.6% (76) had quadriplegic , %50.8 (58) Diplegic Cerebral Palsy, 66.6% (76) had Hemiplegic Cerebral Palsy and %35.9(41) were Dyskinetic , 0% (0) mixed type, Ataxic 0% (0).

Regarding nutritional problems identified in the group 87.03% had malnutrition, 70.3 % (38) had wasting and 22.2% (12) had stunting. Out of children of age two to five years 26% (14) of age , 22% (12) five to eight yrs and 12 (22%) in the age eight to twelve yrs were underweight. Stunting was marked in the Five to twelve year group and in those with Spastic Cerebral Palsy. Four Percent were overweight . Among children with 42.59% (23) of spastic were underweight of which 48% (11) quadriplegic, 22% (5) Hemiplegic, (30% (7) Diplegic , 28% (13) Hypotonic , 6% (3) Ataxic, 4% (2) Dyskinetic ,13% (6) Mixed.

Table 1: Age and Gender distribution

S.No.	Age(yrs)	Male	Female	Total
1	2-4	26	8	34
2	4-6	16	6	22
3	6-8	10	22	33
4	8-10	8	7	15
5	10-12	7	3	10
	Total	67	46	114

Table 1 shows Age group wise Gender distribution of children with cerebral palsy total 114 children with cerebral palsy out of which 58.7% (67) were male and 41.3% (46) were female.

Maximum children of age group 2-4yrs and most of them were Male.

Fig.1 Chart showing age group wise Stunting and Wasting in children with cerebral palsy

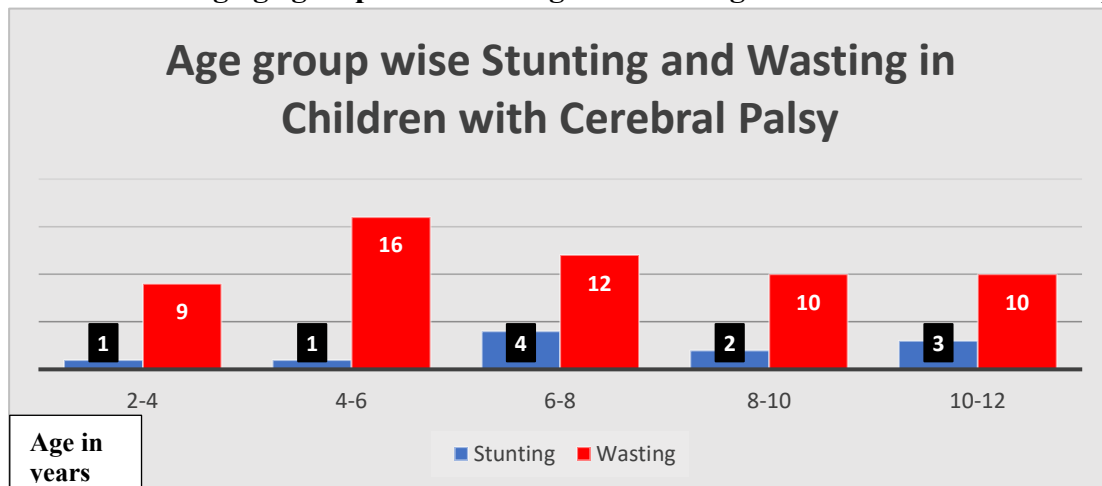


Table 2 : Association between GMFCS Classification and type of Cerebral Palsy

MALNUTRITION	Spastic Quadriplegic	Spastic Hemiplegic	Spastic Diplegic	Dyskietic	Ataxic	Hypotonic	Mixed	Total
I	21	20	14	4	0	3	0	8
II	30	22	12	8	0	12	0	22
III	13	16	18	9	0	12	0	11
IV	12	18	14	20	0	10	0	6
Total Malnourished	76	76	58	41	0	37	0	47

Table 3: Type-wise distribution of children according to IAP classification of Malnutrition

S.No.	Feeding problems	1-4yr.	5-8yr.	9-14yr.	Chi square	P value
1	Difficulty in chewing	18%	35%	13%	3.2	0.19
2	Difficulty in swallowing	30%	25%	38%	0.65	0.72
3	Cough during meals	31%	20%	13%	2.3	0.31
4	Vomiting	13%	15%	7%	0.69	0.70
5	Aspiration	31%	35%	13%	2.54	0.28
6	Spillage during eating	39%	60%	63%	3.8	0.14
7	Rejection of solid foods	31%	45%	13%	4.4	0.11
8	Slowness in oral intake	72%	95%	63%	5.9	0.05
9	Difficulty in self feeding	84%	77%	47%	6.96	0.03
10	Difficulty in spoon feeding	21%	35%	13%	2.78	0.249

11	Difficulty in cup drinking	26%	25%	19%	0.31	0.85
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Table 3: shows association between type of cerebral palsy and nutritional problems., 66.66% (76) were Malnourished.Out of which 66.6% (76) quadriplegic, 66.6% (76) Hemiplegic, 50.8%(58) Diplegic , 32.4% (37) Hypotonic ,0Ataxic, 4% (2) Dyskinetic, 35.9% (41) Mixed. However there was no statistically significant association between the type of cerebral palsy and Malnutrition (p=0.0189) Total malnourished (87.03%) of cerebral palsy children were malnourished.

Table 4:Association between feeding problems and Age of children

Table-4 shows that there was significant association between feeding problems and the Age of children..More feeding problems were in the age group of five to eight years. The major identified feeding problem in this age group was slowness in oral intake (77%). Other problems noted were difficulty in self feeding (69.3%), spillage during eating (32.3%), rejection of solid foods (30%), aspiration (26.3%), difficulty in chewing (22%), difficulty in spoon feeding (23%), difficulty in swallowing (31%), difficulty in cup drinking (23.3%), cough during meals (21.3%), and vomiting (11.6%)

Children with Spastic quadriplegic Cerebral Palsy had more feeding problems than children with other types of Cerebral Palsy. The relation of feeding problems and nutritional consequence was statistically analyzed. There was significant association between feeding problems and Malnourished cerebral palsy children (p=0.041).

DISCUSSION

Cerebral palsy children were more prone to under-nutrition because of the feeding difficulties, oromuscular dysfunction and dietary deficiencies .Children and caregiver were not aware about consequences of huge gap in nutritive requirements of child and amount of feed received by them.

A study by Saroj sanjeev Gupta et al.in 2020 , an observational study included 100 children diagnosed with cerebral palsy, All the children were upto the age of 12 years .Maximum patients were of spastic quadriplegia. As per the analysis majority of the children were malnourished. A total of ninety percent were malnourished. Of the total 90 % children who were malnourished, About 56 % children belong to grade I, in grade II and grade III malnutrition is 30% and 4% respectively. (10) In our study 14% children belong to grade I, in grade II , grade III and grade IV malnutrition is 41% , 20% and 11% respectively.

According to Cross sectional study by Smita mundada et al. , 2020 among 78 enrolled children of age group 1-12year with cerebral palsy , Most common type of cerebral palsy was spastic 87.1% followed by dyskinetic 10.2%. Most of the participants were at GMFCS level IV and V (23.1% and 47.4% respectively). 78.2% subjects were having feeding problems . Majority of subjects had malnutrition (74.3%).(11) In our study most of the participants were at GMFCS level II,III and IV .

Similar Study by Ali Almajwal et al. at king saud university , Riyadh ,KSA ,Saudi arabia in 2018 focuses on GMFCS classification, Anthropometry, history and physical examination , biochemical and clinical evaluation of micronutrient deficiencies and feeding problems of CP children . Study concluded that malnutrition is a frequent problem that primarily affects those who have problems with their motor

functions and cannot achieve the growth expected for their age and gender compared with normal children.(12)

Most of the studies on children with cerebral palsy had documented that majority of children with cerebral palsy were malnourished .In a study from Taiwan, 41.3% of the recruited Cerebral palsy children had under-nutrition (13). This is in contrast to 87.03% of our cohort who had malnutrition .In a recent study among the general pediatric patients (which excluded cerebral palsy, diarrhea and other-serious illnesses) admitted to the hospital in which the present study was conducted, the prevalence of Protein Energy Malnutrition was 87.03 % .In the present study, cerebral palsy children had clearly worse nutritional status compared to the general pediatric population in the same hospital; The fact that 22.2% of our sample was stunted shows the prevalence of chronic under nutrition .

Spastic quadriplegic cerebral palsy and hypotonic patients had significantly poor feeding skill score in an Indian study on 100 children with cerebral palsy and was akin to our study group where spastic quadriplegic cerebral palsy showed statistically significant association with feeding difficulty.(14)

Since feeding problems were found to be significantly associated with stunting, it is important to screen children with cerebral palsy for dysphagia, chewing problems, spilling during feeding, aspiration, coughing and vomiting during meals and difficulties specific to self feeding, cup or spoon feeding so that timely remedial measures can be implemented.None of our children had a gastrostomy in spite of the feeding problems; as our patients do not seem to accept gastrostomy as a remedy when offered to them.

Clinical signs of nutritional deficiencies were evident in the study group though the number who showed these signs was less than expected compared to their overall nutritional status.This could probably have been due to the fact that the 20 % were on vitamin supplements.

CONCLUSION

The prevalence of acute and chronic malnutrition among children with cerebral palsy is still substantial in our country despite the better nutritional status of similar children in other countries and is a reflection of uneven resources in the care of children with cerebral palsy. There is scarcity of data about children with cerebral palsy who are at risk of developing malnutrition. The result of the present study shows that majority of the children with cerebral palsy were suffering from Malnutrition. Almost all children had various feeding problems. The type of cerebral palsy had influence on the feeding problems. There was statistically significant association between feeding problem and Malnutrition.

IMPLICATIONS

Nutritive calorie rich diet was advised to malnourished children and Micro-nutrient supplements were added as per requirement. Dietary Counselling of parents was done regarding other options for feeding like Ryle's tube feeding , feeding Gastrostomy for the improvement in health and well being of neglected children of Cerebral palsy. Strategies include oral sensorimotor management, positioning, oral appliances, food thickeners, specialized formulas, and neuromuscular stimulation. Positioning techniques address poor postural alignment and control that exacerbates swallowing difficulties, and include stabilizing the neck and trunk. Parents were told about oral appliances available used to stabilize the jaw, improve sucking, tongue coordination, lip control, and chewing.

Study aim to create awareness among society for including Cerebral palsy children as there part and try to help the Caregiver of Cerebral Palsy.To create awareness among Parents of Cerebral palsy regarding

choices available for feeding their child, micro-nutrient supplement and nutritive rich diet required for their child to improve their nutritional status.

Rehabilitation clinics should be set up for Cerebral palsy patients at every government medical college so that parents can be made aware of the disease, associated disabilities, prognosis, and management.

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RECOMMENDATION OF HOD

AX-05/SOP-04/v02: Recommendation of the H.O.D

The dissertation / study titled * CEREBRAL PALSY CLINICAL SPECTRUM, FEEDING DIFFICULTIES, COMORBIDITIES AND HEALTH RELATED QUALITY OF LIFE IN A TERTIARY CARE HOSPITAL OF CENTRAL INDIA. by Dr. ADITI AWASTHI in the department of PEDIATRICS at Amaltas Institute of Medical Science, Dewas, will be done according to the regulations of the Institutional Ethics Committee and I recommend it for acceptance.

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