



ORIGINAL ARTICLE

Nutritional Status among Children with Cerebral Palsy attended at Medical University Hospital of Bangladesh

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Abstract

Background: Feeding difficulty among children presented with cerebral palsy (CP) is a common problem which ultimately leads to malnutrition. **Objective:** The purpose of the present study was to assess the nutritional aspect in children with cerebral palsy. **Methodology:** This cross-sectional study was done in the Pediatric Neurology Unit of Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh. The children of cerebral palsy aged 1 to 10 years was enrolled in this study. Perinatal, developmental and feeding history was taken meticulously. Nutritional status was assessed by Welcome, Waterlow and WHO classification and on the basis of MUAC and BMI. Neurological assessment was done thoroughly and severity grading was done according to WHO manual 1987. **Results:** Majority (70.0%) of children were in the age group of 1 to 5 years. Most of the children were male (58.0%), born at term (90.0%) and had history of perinatal asphyxia (82.0%). Among enrolled children, 60.0% took adequate calorie. About 32.0% cases and 26.0% patient had difficulty in chewing and swallowing respectively whereas 54.0% faced drooling. Spastic quadriplegia (48.0%) was the most frequent type of Cerebral Palsy followed by mixed type (22.0%). According to Welcome classification, 32.0% cases had undernutrition and 6.0% cases had marasmus. Among children with marasmus, 66.7% cases had quadriplegia. Undernutrition was most frequent in quadriplegic and mixed type of cerebral palsy. **Conclusion:** Malnutrition is a common problem among patients with cerebral palsy. However severe malnutrition is less. [*Journal of Current and Advance Medical Research, January 2022;9(1):42-47*]

Keywords: Cerebral palsy; nutritional status; malnutrition; prinaltal asphyxia; feeding difficulty; anthropometric measurement; oromandibular dysfunction

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Introduction

Cerebral Palsy (CP) is the most common cause of disability among children, with a prevalence of approximately 2 per 1000 live births. Globally, there are an estimated 17 million people living with CP¹. The burden of CP is high in Bangladesh compared with other high-income countries (HICs) and low- and middle-income countries (LMICs)².

It is a group of permanent disorders of movement and posture, causing activity limitation that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain³. Although structural damage to the brain remains static and permanent, the consequent symptoms are variable and may change over time³. In addition to disordered movement or posture, children may have a range of associated disabilities, including intellectual disability, hearing and visual deficits, communication impairment, poor nutrition, feeding and swallowing problems, respiratory infections, and epilepsy¹.

In children with CP feeding difficulty is a common problem which ultimately leads to malnutrition. Malnutrition includes a group of conditions that refers to deficiencies, excesses, or imbalances in a child's intake, energy, or nutrients. In all its forms, malnutrition includes undernutrition (wasting, stunting, and underweight), micronutrients-related malnutrition, and overweight, obesity, and diet-related non-communicable diseases⁴. In children with CP, the aetiology of undernutrition is multifactorial and includes aspects such as hormonal problems, motor abilities, and the consequences of the brain lesion, but poor nutrition causes an increase in the need for health care assistance and reduces the child's participation, thereby affecting their nutritional status⁵.

Though much improvement has occurred in medical aspect but there has not been concomitant advance in routine identification of nutritional status nor in nutritional care in children with CP. This study aims to address this problem, particularly the nutritional aspect in children with cerebral palsy.

Methodology

This cross-sectional study was done in the Pediatric Neurology Unit of Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from October 2008 to December 2009 for a period of one year and three months. Children having CP aged 1 to 10 years was enrolled in this study after

obtaining their consent. Data were collected both from the patient attending follow-up clinic and admitted patient who fulfill the inclusion criteria. Parents were interviewed with a specific questionnaire. Special emphasis were given in birth history, feeding history, family history, socio-economic status, age and residence. Perinatal asphyxia was considered when there was a history of delayed crying associated with bluish coloration of body or severe pallor, lethargy or less activity. Feeding history including daily intake of different types of food and their average amount were noted in grams. The calorie value of each of the item then determined by using the standard calorie value of different foodstuff- published by Institute of Nutrition and Food Science (INFS)⁶. Finally the average total daily energy intake was determined from the summation of calorie value of different items. Difficulties during feeding like sucking, swallowing, choking were also recorded. Oro-motor dysfunction were determined from the history of feeding problem and later during examination. After history thorough physical examination including anthropometric measurements were taken. Nutritional status was assessed by Wellcome, Waterlow and WHO classification and on the basis of MUAC and BMI. Neurological assessment was done thoroughly and severity grading was done according to WHO manual 1987. This study was approved by the institutional review board (IRB) of this hospital.

Data were analyzed by Statistical Package of Social Science (SPSS) software, versions 22.0 (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.). P value of less than 0.05 was considered as significant. Continuous data were summarized in terms of the mean, standard deviation, minimum, maximum. Categorical or discrete data will be summarized in terms of frequency counts and percentages.

Results

A total number of 100 children with cerebral palsy were included in this study. Majority (70.0%) of children were in the age group of 1 to 5 years with male predominance.

About 15.0% mother of enrolled children had no educational background whereas 36.0% cases were educated up to primary level. Majority of the family (53.0%) had monthly income group of more than 5000 to 10000 taka. Most of the children (90.0%) were born at term and 82.0% cases had history of perinatal asphyxia (Table 1).

Table 1: Baseline Data of Study Population (n=100)

Variables	Frequency	Percent
Age Group		
• 1 to 5 Years	70	70.0
• >5 to 10 Years	30	30.0
Gender		
• Male	58	58.0
• Female	42	42.0
Residence		
• Urban	53	53.0
• Rural	47	47.0
Educational status of mother		
• Illiterate	15	15
• Primary	36	36
• Secondary	38	38
• Graduate	11	11
Monthly family income (BDT)		
• 1000-5000	46	46
• >5000-10000	53	53
• >10000	1	1
Gestational age		
• <37 weeks	10	10
• ≥37 weeks	90	90
H/O Perinatal Asphyxia	82	82

Most of the children took either semisolid or solid food and among enrolled children, 60.0% took adequate calorie. Feeding difficulty is a common problem among cerebral palsy patient. This study found that 32.0% and 26.0% of enrolled patient had difficulty in chewing and swallowing respectively. About 54.0% faced drooling. (Table 2).

Table 2: Feeding Related Data of Studied Population (n=100)

Variables	Frequency	Percent
Daily Calorie Intake		
• Adequate*	60	60.0
• Inadequate	40	40.0
Type of Food		
• Liquid	5	5.0
• Paste	6	6.0
• Semisolid	33	33.0
• Solid	56	56.0
Forced Feeding		
• Yes	26	26.0
• No	74	74.0
Problems or Difficulty During Feeding		
Unable chew solid food	32	32.0

Difficulties in swallowing	26	26.0
Vomiting	16	16.0
Coughing	15	15.0
Choking	16	16.0
Drooling	54	54.0
Refuses food	38	38.0
Spits food	26	26.0
Takes Small Food	27	27.0

In this study, spastic quadriplegia (48.0%) is the most frequent type of Cerebral Palsy followed by mixed type (22.0%) (Table 3).

Table 3: Distribution of type of Cerebral Palsy (n=100)

Type of CP	Frequency	Percent
Spastic	68	68.0
• Diplegia	12	12.0
• Hemiplegia	08	8.0
• Quadriplegia	48	48.0
Mixed	22	22.0
Dyskinetic	7	7.0
Hypotonic	2	2.0
Ataxic	1	1.0

Mixed=Spastic and dyskinetic

Table 4: Anthropometric Measurement of Studied Population (n=100)

Variables	Frequency	Percent
OFC		
• ≥3SD	6	6.0
• <3SD	4	4.0
Mid upper arm circumference (MUAC)		
• <12.5(Malnourished)	5	5.0
• 12.5-13.5(Borderline)	36	36.0
• >13.5 (Normal)	59	59.0
Distribution according to Welcome classification		
• Normal	62	62.0
• Undernutrition	32	32.0
• Kwashiorkor	0	0.0
• Marasmus	6	6.0
• Marasmic Kwashiorkor	0	0.0
Distribution according to Waterlow Classification		
Stunting		
• None	42	42.0
• Mild	45	45.0
• Moderate	9	9.0
• Severe	4	4.0

Wasting		
• None	56	56.0
• Mild	14	14.0
• Moderate	22	22.0
• Severe	8	8.0
Distribution according to Body mass index		
• Normal	68	68.0
• Overweight	8	8.0
• Thinness	8	8.0
• Severe Thinness	16	16.0

<12.5=Malnourished; 12.5-13.5=Borderline; >13.5=Normal

About 34.0% children with cerebral palsy had microcephaly. According to Welcome classification of cerebral palsy, 32.0% had undernutrition and 6.0% had marasmus.

When the enrolled children were classified according to Waterlow classification, 58.0% and 44.0% of them had stunting and wasting of varying grade respectively. Considering body mass index, 8.0% was overweight and 16.0% had severe thinness (Table 4).

Table 5: Relationship between Welcome classification and type of Cerebral Palsy

Welcome Classification	Types of CP						
	Diplegia	Hemi	Quadri	Dyskinetic	Mixed	Hypotonic	Ataxic
Normal	10(16.1%)	7(11.3%)	29(46.8%)	4(6.4%)	11(17.7%)	1(1.6%)	0(0.0%)
Undernutrition	2(6.2%)	1(3.1%)	15(46.9%)	2(6.2%)	10(31.3%)	1(3.1%)	1(3.1%)
Marasmus	0(0.0%)	0(0.0%)	4(66.7%)	1(16.7%)	1(16.7%)	0(0.0%)	0(0.0%)
Total	12(12.0%)	8(8.0%)	48(48.0%)	7(7.0%)	22(22.0%)	2(2.0%)	1(1.0%)

Normal=62 cases; Undernutrition=32 cases; marasmus=6 cases; quadri=quadriplegia; hemi=hemiplegia; CP=cerebral palsy

Among children with marasmus, 66.66% had quadriplegia. Undernutrition was predominantly found in quadriplegic and mixed type of cerebral palsy (Table 5).

Discussion

Cerebral palsy is a chronic motor disability. About 8.0% to 10.0% of total population is suffering from some form of disability and 3 million disable children live in Bangladesh⁷. But one survey of autism and neurodevelopmental disorders in Bangladesh conducted in 2013 found that the prevalence is 4/1000 live birth⁸. The health management of children with CP requires nutritional assessment as growth disorders and nutritional deficits are present in approximately one third of these pediatric patients⁹. For this purpose, a variety of methods, parameters, and classifications have been suggested, leading to results and interpretations at different clinical levels, making it difficult to collect data and perform meta-analyses¹⁰.

CP can affect both genders; however boys are affected slightly higher than girls. In this current study, it has been observed that the ratio is of 1.38:1. Consistent with these results, Johnson et al¹¹ reported boy/girl ratio as 1.33 in Europe and Bhati et al¹² reported as 2.6 in India. Severe asphyxia is the leading perinatal cause of Cerebral Palsy in this study which was observed in 82% of the cases. This observation is similar to the studies from developing countries¹³⁻¹⁶. But it is an uncommon

risk factor in developed countries like Australia, accounting for only 7.0% to 10.0% cases of CP¹⁷.

Spastic quadriplegia has been the commonest type of CP in developing countries with the rates between 36.0% and 71.0% whereas spastic diplegia (5.0% to 47.0%) is commoner in the developed world¹⁸⁻²⁵. It is likely that the higher rates of diplegia in high-income settings partly reflect better neonatal services and higher rates of premature survivors, whereas higher rates of spastic quadriplegia in low-income settings reflect increased perinatal and postnatal causality like asphyxia, meningitis²⁶. This study has found the same results with the present research work.

Oromotor dysfunction (OMD) affects up to 90.0% of patients with CP and is major determinant of malnutrition in children with a neurodevelopmental disorder²⁷⁻²⁸. Inadequate sucking, dysfunctional swallowing, increased pharyngeal reflex, sialorrhea due to inadequate mouth closure and decreased ability to chew make oral feeding difficult. In this study, daily calorie intake was inadequate in 40.0% cases and most of the cases, the region were difficulty in chewing, swallowing and drooling.

In children with severe cerebral palsy, linear growth is reduced to lower than the third percentile, considering growth curves for healthy children. This reduction in linear growth can occur due to factors related to the brain injury itself²⁹⁻³⁰. Children with CP grow and develop, but at a slower pace. However, their development is not only delayed,

but disorderly and impaired as a result of the brain injury³¹. Moreover, chronic malnutrition or other nutritional deficiencies can impair proper growth and development³². There are evidences of a significant deviation of anthropometric parameters in relation to the reference values of healthy children in this research. In this study, according to Welcome classification 32.0% children were undernourished whereas 6.0% had marasmus. Prevalence of overweight found to vary from 2.0% in Nigeria³³ to 16.0% in Norway³⁴. Another study of Dhaka Shishu Hospital in 1997 has found 48.0% undernourished, 31.0% marasmic and 0.6% has marasmic-kwashiorkor. According to Waterlow classification, this study found that majority children had stunting whereas only 30.0% has moderate to severe wasting.

This study found that undernutrition and marasmus were most frequent in spastic quadriplegic type of CP; whereas in mixed type most children had undernutrition. It is probably due to feeding difficulty children faced due to oro-mandibular dysfunction and severe form of motor disabilities.

Conclusion

In conclusion malnutrition is a common problem among patients with cerebral palsy. However severe malnutrition is less. Inadequate calorie intake, poor maternal education, feeding difficulties, vomiting and severe form of disabilities were markedly observed among the malnourished children. Further study is required to find out the risk factors causing malnutrition in patients with cerebral palsy.

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