

Nutritional Status of Children with Neurodevelopment Disorders from a Tertiary Medical Center of Bangladesh

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Abstract

Background: Cerebral palsy (CP), CP with epilepsy, epilepsy, speech delay, Down's syndrome, autism, ADHD and vertigo are the most common disabilities among children in Bangladesh. Nutritional status assessment is important as these children are at risk of under nutrition, over nutrition or obesity. The primary objective of this study was to determine the nutritional status of children with neuro-disorder and secondary objective was to find out the factors correlated with poor nutritional status in these children.

Methods: A retrospective study was conducted from a vast number of patients with neurodevelopment disorder attending the out-patient department (OPD) of Institute of Paediatric Neurodisorder and Autism (IPNA), BSMMU, Dhaka with 149 sample cases from January 2015 to August 2015. Common indicators used to assess the nutrition status of neuro-disorder children were z-scores for weight-for-age, height-for-age, Body Mass Index-for-age percentile.

Results: During the 8 months study period, a total of 149 children were taken aged from 1-180 months where Cerebral palsy (CP), CP with epilepsy, epilepsy, speech delay, Down's syndrome, Autism, ADHD and Vertigo were included and most of the children's nutritional status were CP had moderately impaired nutritional (53%), CP with epilepsy had mildly impaired nutritional status (44%), Epilepsy and Speech delay both disorders had same moderately impaired nutritional status (53%), Autism had normal nutritional status (40%), children with Down's syndrome had severely impaired nutritional status (43%), ADHD children were mostly obese (33%) & most of the children with vertigo had moderately impaired nutritional status (67%).

Conclusions: In a developing country like Bangladesh it could be observed that children with Down's syndrome were at risk of being severely impaired nutritional status, while children with CP, epilepsy, speech delay & vertigo were at risk of being moderately impaired nutritional status and children with ADHD were at risk of being overweight or obese. Children with autism had mostly normal nutritional status, while children of CP with epilepsy were at risk of being mildly impaired nutritional status. Beside low monthly income family with low aged child was somewhere related with nutrition status.

Key words: Neurodevelopment Disorders, Cerebral palsy (CP), CP with epilepsy, epilepsy, Speech delay, Down's syndrome, Autism, ADHD, Vertigo, Nutritional Status.

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Introduction

Good nutrition is an essential component of good health. Nutritional status has a significant impact on overall health and quality of life in children with neurodevelopment disabilities; both under and over nutrition generally lead to increased health care use and reduced participation in educational and social activities. Malnutrition is frequently associated with impairment of linear growth, reduced peripheral circulation and wound healing, increased spasticity and irritability. The overall prevalence of malnutrition in neurological impairment children is difficult to estimate, due to the heterogeneity of neurological disorders.

Neurological disorder is a complex condition because it varies according to age, gender, socioeconomic status, cultural background, geographical area and health condition¹. The degree of disability for any individual with disability also depends upon the relationship between various environmental factors.²

Chronic diseases have a significant impact on nutritional status. In neurologically impaired (NI) patients, malnutrition negatively affects quality of life and is associated with increased health care use and impaired participation in various activities.³ Nutritional rehabilitation has been associated with improved overall health, improved peripheral circulation, healing of decubitus ulcers, decreased spasticity, decreased irritability and improved gastroesophageal reflux in patients with neuro-developmental disabilities.⁴⁻⁷ A significant proportion of children with neuro-developmental disabilities are undernourished.⁸⁻¹¹ This state of malnutrition may have been once considered to be part of the disease, but there is now a better recognition of the importance of nutrition in this population. Nutritional care of children with neuro-developmental disabilities has improved with the advent of less invasive enteral access methods and better tolerated enteral formulas. According to the United Nations Children's Fund (UNICEF), it was estimated that the number of children with disabilities under 18 years of age was approximately 150 million.¹² This included children with autism spectrum disorders (ASD), cerebral palsy (CP), Down syndrome (DS), Epilepsy, Speech Delay (SD) learning disabilities and other types of disabilities. We need to provide these often complicated patients with appropriate nutritional support by involving a multidisciplinary team of physicians, nurses, dietitians, speech and occupational therapists, and psychologists working to improve the child's and the family's quality of life.

There are no studies on nutritional status of children with neuro-disorder in our set up, the aim of this study was to evaluate the nutritional status and factors correlated with malnutrition amongst neuro-disorder children in out-patient department of IPNA, BSMMU between the ages of 1 month to 15 years. It was hoped that the study will promote interest in the nutritional status of these unfortunate.

Methods

A retrospective study was conducted from a vast number of patients with neurodevelopment disorder attending the out-patient department (OPD) of Paediatric Neurodisorder and Autism (IPNA), BSMMU, Dhaka with 149 sample cases from January 2015 to August 2015. The consecutive sampling method was utilized. All children with neurodevelopment disorder who met the inclusion criteria and whose parents/guardians gave consent during the study period were recruited. Clearance was obtained from the Hospital Ethical Committee of BSMMU and informed written consent was obtained from each parent or guardian at the time of interview.

Children with a diagnosis of neurodevelopment disorder made by medical doctor confirmed by patient records attending this center, aged between 1 month and 15 years, were consecutively recruited for the study. Patients with any other known chronic ailments that would independently affect nutritional status were excluded from the study.

Data collection took place in a side nutritional counseling room within the ward. A structured, pretested questionnaire was administered to the accompanying parent or caregiver to collect the bio-demographic data of patients.

Each child's weight was measured to use room scale. 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 was measured using a Stadiometer for patients aged more than 2 years who were able to stand flat-footed and straight. The recumbent length of participants less than 2 years of age and those who though 2 years or more were unable to stand erect was measured using a Stadiometer with a fixed head rest and a movable foot board.

All measurements were performed by the first author using the same instrument throughout the study. The anthropometric data were analyzed using the current WHO Growth chart (2006). Height and weight were used to classify the children into different types of malnutrition. Malnutrition was categorized using the WHO classification (2006).

The data was subjected to statistical analysis using the SPSS IBM 20 software package. Chi square test was

used to determine associations and $P < 0.05$ were taken as significant.

Ethical consideration

The study was conducted after getting approval from the ethical committee of the BSMMU Hospital. All children were recruited to the study only after explaining to the parents/guardians about the study and after the parents/guardians signed the consent form. All information obtained from the study was kept confidential.

Results

In total, 149 children with neuro-disorders were recruited into the study. The results in table showed that the majority (56%) of the Children belong to were from the age group of 0-36 months. A large percentage of the parents belong to were from the age group and occupation of 31-40 years (51%), Service holder (Father) and 21-30 years (50%), House wife (mother) respectively (Table-I).

Table I. Socio-demographic status of respondent (N=149)

Variables	Age group	Frequency	Percent
Children's age	0-36	84	56
	37-48	8	5
	49-60	17	11
Father's age	61 & above	40	27
	21-30	36	24
	31-40	76	51
Mother's age	40 & above	37	25
	<20 & 20	20	13
	21-30	74	50
Occupation category	31-40	49	33
	40 & above	6	4
Father's occupation	Day labour	13	9
	Service holder	71	48
	Business	51	34
	Home abroad	14	9
Mother's occupation	House wife	136	91
	Service holder	12	9

The education level of the parents shows that 30% of father had completed their graduation and above, 37% of mothers were below Secondary School Certificate (SSC) level (Table-II)

Table II. Level of education

Education level	Father's education Frequency	Father's education Percentage	Mother's education Frequency	Mother's education Percentage
Primary	32	21	22	15
Below SSC	35	23	55	37
SSC-HSC	38	25	40	27
Graduation & above	44	30	32	21

Among the total respondents, Majority (85%) of the respondent were no allergic reaction to any food beside most of the respondent (70%) were not avoided any food during at first 0-4 months pregnancy period. During full period of pregnant time, A large percentage (88%) of the respondents were not suffered any diseases. Approximately 44% of the participants were completed Exclusive Breast Feeding (EBF) (0-6 months) rest 56% were not completed (Table-III).

Table III. Pregnancy history and breast feeding of the respondent

During pregnancy history	Present/ Absent	Frequency	Percentages
At first 0-4 months of pregnant period			
Allergic reaction to any food	Yes	23	15
	No	126	85
Avoid any food	Yes	45	30
	No	104	70
Full period of pregnancy			
Suffered any diseases	Yes	18	12
	No	131	88
After delivery			
Child completed EBF	Yes	65	44
	No	84	56

The figure is clearly evident that 53% of the patients with neuro-disorder were male and 47% were female (Figure 1).

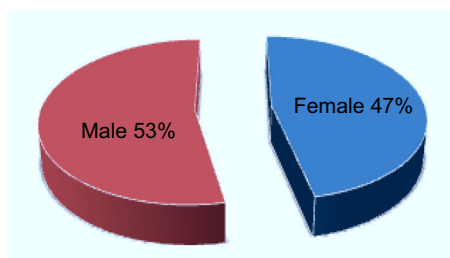


Figure 1. Male-female distribution of the children

The study shows that Majority (94%) of the patients was Muslim rest of others were from the Hindu and Buddha (Figure-2).

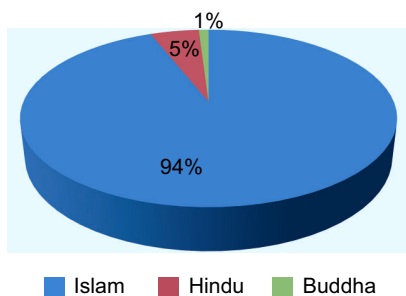


Figure 2. Distribution of the respondents by Religion

Among the total participant, a majority (70%) of the patients were birth by caesarian delivery beside minority (30%) were home delivery (Figure 3).

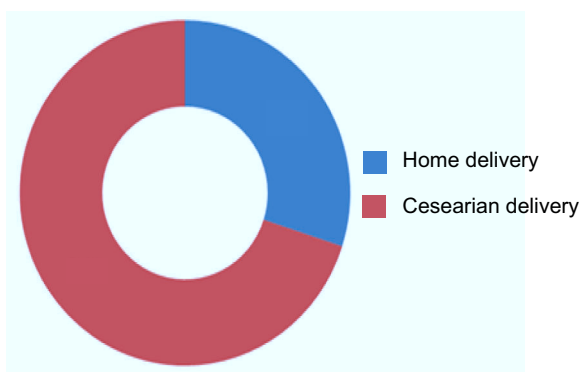


Figure 3. Distribution according to mood of delivery

The study revealed that most of the respondents lived in urban (56%), whereas others lived in semi urban (33%) and rural (11%) (Figure 4).

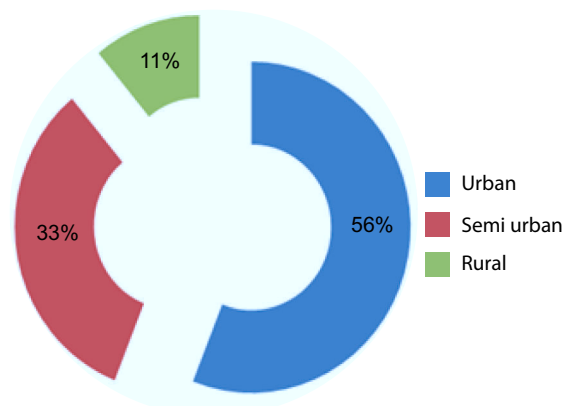


Figure 4. Distribution according to residence

Concerning about correlation between nutritional status and independent variable

The results in Figure 5-IX demonstrate the correlation with nutrition status were not found in allergy, food avoidance in pregnancy and mother educational background in somewhere it was mildly correlated with monthly family income and low child age.

Correlation with monthly income and nutritional status

In case of below 10,000Tk. Income more children were moderately and severely impaired nutrition status where as 11,000-25,000 income range highest number of children were moderately and severely impaired nutrition status (Figure-5).

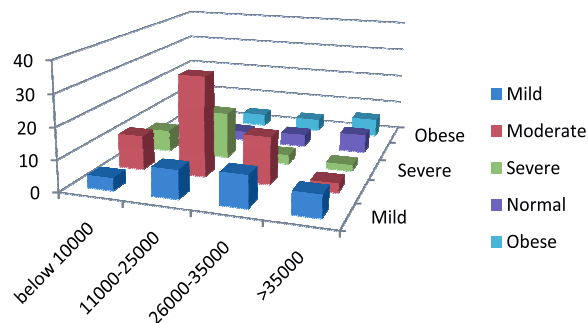


Figure 5. Correlation with monthly income and nutritional status

Correlation with NDD child’s ages and nutritional status

It could be observed that in 0-36 month’s age range moderately deprived nutrition status children were more. In 36-48 months age range obese were more where as

in 48-60 months age range moderately and severely deprived nutrition status common. But in 60 and above months age range moderately deprived nutrition status more (Figure 6).

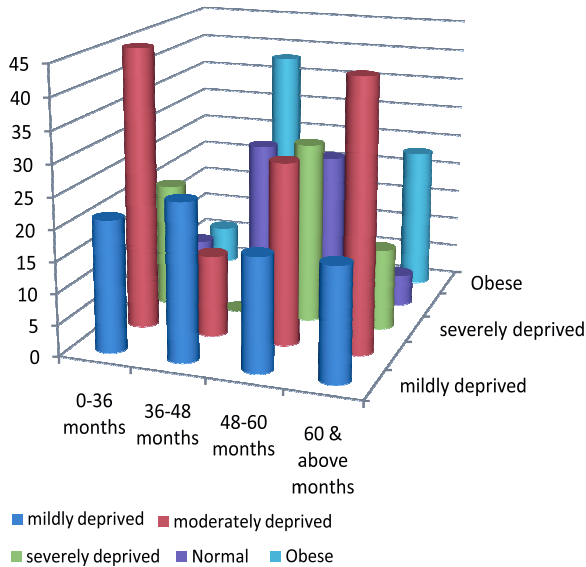


Figure 6. Correlation with NDD child's ages and nutritional status

Correlation with food avoidance and nutritional status in pregnancy

There were almost no correlation with nutrition status and avoidance of food in pregnancy (Figure 7).

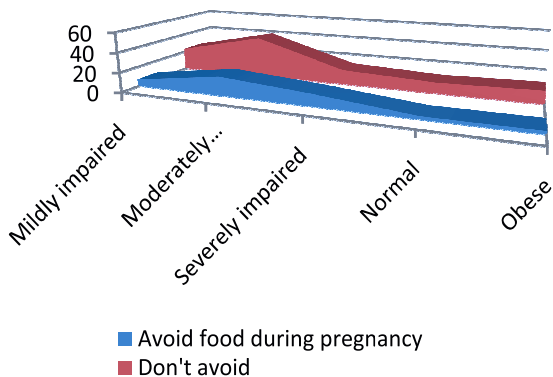


Figure 7. Correlation with food avoidance and nutritional status

Correlation with having or not food allergy of mother during pregnancy and nutritional status.

Nutrition status and food allergy during pregnancy were not associated with each other in this study (Figure 8).

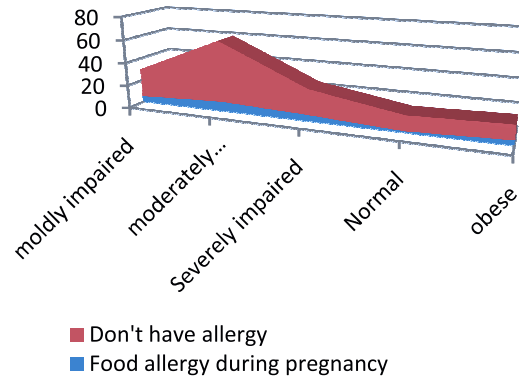


Figure 8. Correlation with having or not food allergy of mother during pregnancy and nutritional status

Correlation with mother's education and nutritional status

Mother educational background could not effect the nutrition status of the children in this study (Figure-9).

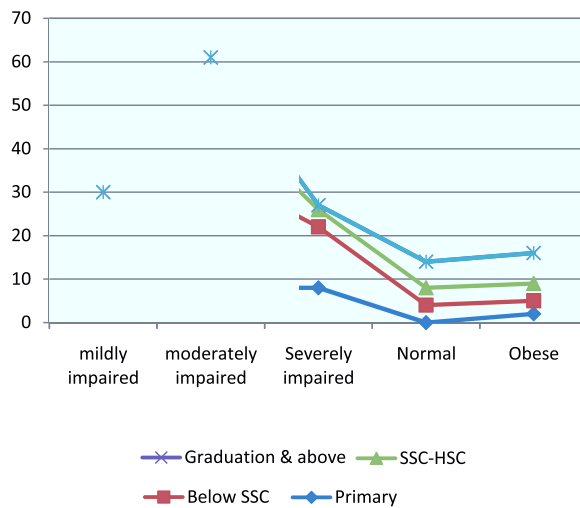


Figure 9. Correlation with mother's education and nutritional status

Nutritional status of different types of NDD children
Overall, the study found that children with Down's syndrome were severely impaired nutritional

status(43%) and at risk of being underweight, while children with ASD were normal nutritional status(40%) and children with CP tend to be at risk of being moderately impaired. Different types of neurodevelopment disorder children had different types of nutritional status impairment (Figure-10).

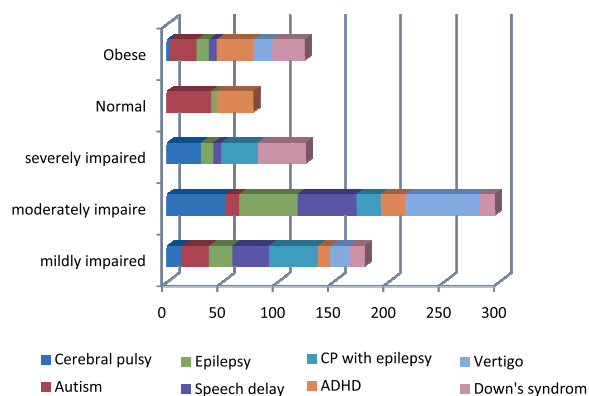


Figure 10. Nutritional status of different types of NDD children

Down syndrome

The study has shown that children with DS were shorter in height than the standard references of typically developing children, so they had severely impaired nutritional status(43%).

Cerebral palsy and CP with Epilepsy

This study reported that a large proportion of children with CP had moderately impaired nutritional status(53%) on the other hand CP with epilepsy were mildly impaired nutritional status(44%).

Epilepsy

The study investigated the nutritional status of children CP with epilepsy were mildly impaired nutritional status(44%) while Epilepsy were moderately impaired nutritional status(53%)

Autism spectrum disorders

According to the study investigated the nutritional status of children with ASD children were normal nutritional status(40%) and they tend to be overweight or obese as compared to the general population.

ADHD

The nutritional status of children with ADHD were at risk of being overweight or obese whereas nutrition

status of child with ASD was normal nutritional status(40%).

Speech Delay

Although Speech delay is the common symptom of ASD children, in this study nutritional status of children with ASD children were normal but only children with speech delay were at risk of being moderately impaired nutritional status.

Discussion

Nutritional status is an important indicator of the overall health status and wellbeing of children with neuro-disorder. It portrays the physical and mental growth of children and whether they are at risk of being underweight, overweight or obese. This study sought to assess the nutritional status and factors associated with malnutrition among children with neurodisorder who were attended to at BSMMU hospital outpatient child neurology center using anthropometrics measurements.

The impact of poor nutritional status and poor growth among children with disability may eventually lead to poor motor function, bone health, social participation and healthcare utilisation¹³. For example, the consequences of overweight and obesity problems in children with DS are the increased risk of developing adult obesity and non-communicable diseases such as diabetes and hypertension¹⁴. Malnutrition among children with neurodevelopment disorder can lead to poor growth and nutrient deficiencies¹⁵. However, evidence on the nutritional status of children with DS, CP, and ASD, ADHD, Epilepsy, Speech Delay is still limited and little is known on the overall prevalence of the nutritional status of these children, including the methods, tools and indicators to assess this. Various tools may be required to assess the nutritional status of children with disability due to the disparities in their health conditions, growth and development stage. Good knowledge and understanding are required among health care professionals in order to monitor the health status of these children, so that further treatment or intervention could be planned for this group.

In total, 149 children with Neuro-disorder were recruited into the study. The above table show that Majority(56%) of the Children belong to were from the age group of 0-36 months. Majority of the parents belong to were from the age group and occupation of 31 to 40 years

(51%), Service holder (Father) and 21 to 30 years (50%), House wife (Mother) respectively. Among the parents, 30% of father had completed their Graduation and above, 37% of mothers were below SSC level. Among the total respondents, Majority (85%) of the respondent were no allergic reaction to any food beside most of the respondent (70%) were not avoided any food during at first 0-4 months pregnant time. During full period of pregnant time, Majority of the respondents (88%) were not suffered any diseases. Approximately 44% of the participants were completed Exclusive Breast Feeding (0-6 months) beside 56% were not completed.

In case of below 10,000Tk. income more children were moderately and severely impaired nutrition status where as 11,000-25,000 income range highest number of children were moderately and severely impaired nutrition status. It could be observed that in 0-36 months age range moderately deprived nutrition status children were more. In 36-48 months age range obese were more where as in 48-60 months age range moderately and severely deprived nutrition status common But in 60 and above months age range moderately deprived nutrition status more. Overall, the study found that children with Down's syndrome were severely impaired nutritional status (43%) and at risk of being underweight, while children with ASD were normal nutritional status (40%) and children with CP tend to be at risk of being moderately impaired. The study has shown that children with DS were shorter than the standard references of typically developing children, so they had severely impaired nutritional status (43%). This study reported that a large proportion of children with CP had moderately impaired nutritional status (53%) beside CP with epilepsy were mildly impaired nutritional status (44%). The study investigating the nutritional status of children CP with epilepsy were mildly impaired nutritional status (44%) while Epilepsy were moderately impaired nutritional status (53%). According to the study investigating the nutritional status of children with ASD children were normal nutritional status (40%) and their tend to be overweight or obese as compared to the general population. The nutritional status of children with ADHD were at risk of being overweight or obese while nutrition status of children with ASD were normal nutritional status (40%). Although Speech delay is the common symptom of ASD children, to this study

informed us nutritional status of children with ASD children were normal but only children with speech delay were at risk of being moderately impaired nutritional status.

Therefore, the present review will explore evidence on the nutritional status among children with neuro-disability, particularly among children with DS, CP, Epilepsy and ASD. It is hoped that these findings will support future research on the nutritional status for children with disability and the future planning of health interventions for this population.

Conclusion

In conclusion, there is emerging evidence on the nutritional status of children with ASD, DS, CP, CP with Epilepsy, Speech Delay, Vertigo and ADHD, although this is still very limited in developing countries including Bangladesh. Findings of this scoping review demonstrated that children with Down syndrome were at risk of severely impaired nutritional status, while children with CP, Epilepsy, Speech delay and vertigo were at risk of being moderately impaired nutritional status and children with ADHD were at risk of being overweight or obese. Children with Autism had mostly normal nutritional status, while children of CP with Epilepsy were at risk of being mildly impaired nutritional status beside low monthly income with low aged child was somewhere related with nutrition status.

Recommendations

- Nutritional support should be an integral part in the management of neuro-development disorder children.
- Nutritional problems of children with neuro-developmental disorder should be identified early and screened regularly with a multidisciplinary team for malnutrition.
- Excessive intake should be avoided to become obese.
- Parents should be educated on nutrition for the betterment of the child's health.
- Government should take proper steps for improving nutrition of neuro-development disorder children.
- Large scale studies should be needed to improve the overall situation.

Conflict of interest: Nothing to declare.

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