

Nutritional status and eating behavior of children: A study among primary school children in a rural area of West Bengal

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ABSTRACT

Background: Dietary preferences and childhood eating behavior has marked influence on nutritional status of children. The objective of the study was to find out eating behavior of primary school children in a rural area of West Bengal using Child Eating Behavior Questionnaire and to determine association of body mass index (BMI) with eating behavior. **Methodology:** It was an institution-based observational study with cross-sectional design done from May to August, 2018. The study was done among 142 children studying at four primary schools at Singur, in the rural field practice area of our institute. The four schools were selected randomly using list of primary schools in the area. Eating behavior of children was assessed using Child Eating Behavior Questionnaire (CEBQ). BMI of the children was assessed using WHO Z scores tables for children. Data analysis was done using SPSS Version 16 and binary logistic regression was done to find out association of BMI with eating behavior of study participants. **Results:** The proportion of under-nutrition and overnutrition was 22.0% and 16.0%, respectively. Food fussiness was significantly associated with thinness [BMI below (-2SD)]. Enjoyment of food, satiety response was significantly associated with overnutrition [BMI above (+1 SD)]. Food avoidance subscale was significantly associated with thinness [OR: 2.5, CI: 1.11, 5.63] and this subscale was protective for overweight [OR: 0.22, CI: 0.07, 0.69]. **Conclusion:** This study showed association of BMI with child eating behavior. Therefore, awareness among parents should be created to change problematic eating of their children which would further help them to achieve normal BMI.

Keywords: Body mass index, CEBQ, children, nutritional status, primary school

Introduction

Childhood is the best time to determine the nutritional status and take action accordingly because this is the most effective period of child's life when introducing proper dietary habits and nutritional advices will help them throughout their life and will also improve the total health of a child as well as the future adult population of our country.^[1] Early childhood period is now

recognized as a key target for the prevention of underweight, overweight, and obesity, and the habits that children acquire at this time about food, proper eating behaviour, and its health benefits can influence their dietary choices and preferences in later life.^[2]

Previous studies had suggested that the variations in weight of children can, to some extent, be explained by their individual differences in eating behavior.^[3,4] Some recent studies also support the interesting fact.^[5-7] There are different types of eating behaviors that adversely affect somatic and mental health (including leading to a change in BMI).^[6]

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Eating behavior of a child develops in infancy, and the various influencers are genetic predispositions of the child, natural food responses and taste preferences influenced by the exposure to foods and variable parental feeding practices.^[8]

Obesity is associated with specific eating behaviors like under-responsiveness to internal satiety cues (low satiety responsiveness, high speed of eating) and over-responsiveness to external food cues such as taste, smell, availability, and emotions (high enjoyment of food, food responsiveness and emotional overeating).^[3,9]

One of the most comprehensive tools now present for the researchers is the Children's Eating Behaviour Questionnaire (CEBQ) to measure eating behavior of children. CEBQ was developed by Wardle *et al.*^[4,10] The CEBQ tool was also validated in previous research studies.^[11,12]

The CEBQ is a 35-item questionnaire, designed as a parent-reported questionnaire to measure eating behavior traits related to nutritional status among children.^[10,13] The CEBQ contains eight dimensions of eating behaviors; four subscales which measure food-approach behaviors and other four subscales which detect food-avoidant behaviors.^[10,14]

Healthy nutritional status, mainly healthy weight is important for school age children because nutritional imbalance in school-age children can have serious health implications for their lifetime. Eating behavior of children plays a major role in the diet and food intake of children which is an important determinant in variation of nutritional status. Some simple parental education and affordable interventions can develop a healthy eating habit among children from their infancy.

Early detection of abnormal eating habits at young age also help children and their parents to adopt healthy eating habits with less effort. There is inadequate number of study present in West Bengal to describe the association of the BMI with the child eating behavior of primary school going children using CEBQ. So this study is conducted to get some information about child eating behavior and their association with BMI status of primary school going children in a rural area of West Bengal with the objectives to assess the BMI status of study participants, to find out the eating behavior of study participants using CEBQ and to find out the association between BMI and eating behavior of the study participants.

Materials and Methods

Study design

An institution-based observational cross-sectional study was carried out from May to August 2018 at four randomly selected primary schools in rural field practice area of our institute in Singur. This area consisted of 64 villages and 74 primary schools. All students who were present during the data collection period were included. Students who did not give assent and/or parents

of students who did not give informed written consent were excluded.

Sample size

A study done by Pal *et al.*^[15] among 6–13 years students in West Bengal, the prevalence of malnutrition was 25.8% [undernutrition 22.8%, overnutrition 3%] in the study. The minimum sample size was calculated using the formula: $n = (Z_{\alpha/2})^2 pq / l^2$, where $n = 1.96^2 \times 25.8 \times 74.2 / [7.5^2] = 131$ (taking proportion $P = 25.8\%$ and $q = 74.2\%$, $(100 - p)$, allowable error $(l) = 7.5\%$, standard normal deviate $Z = 1.96$ (for 95% confidence interval). Taking the non-response rate as 10%, the sample size was calculated to be 144. In the present study, 142 study participants were included as for final analysis.

Method of data collection

After the selection of the schools, the permission was taken from school authorities to conduct the study. The informed written consent was taken from parents of the study participants. The verbal and written assent was taken from each study participants. The permission from the Institutional Ethics Committee of All India Institute of Hygiene and Public Health, Kolkata was taken on 15-11-2017 to conduct the study. Health camps were organized within schools and parents of the students were invited in the camps. A pre-designed, pre-tested structured self-administered schedule was distributed among parents. Anthropometric examination of students was done as per standard operating procedure. A health record card which was prepared by researcher was given to each student. Lastly, the filled questionnaires were collected from the parents.

Study tools

The main tool for study was a pre-designed, pre-tested, structured questionnaire containing sociodemographic information, Child Eating Behaviour Questionnaire [CEBQ].^[10,13] In the sociodemographic domain, data was collected about age, gender, religion, caste, education and occupation of parents, monthly income, type of family and presence of BPL card in family.

CEBQ was a parent reported questionnaire used to measure eating behavior among children. The CEBQ contains eight dimensions of eating behaviors; four subscales which measure food-approach behaviors [Food Responsiveness (FR), Enjoyment of Food (EF), Emotional Overeating (EOE), Desire to Drink (DD)] and other four subscales which detect food-avoidant behaviors [Satiety Responsiveness (SR), Slowness in Eating (SE), Emotional Undereating (EUE) and Food Fussiness (FF)].^[10] CEBQ had 8 subscales. Each question in CEBQ had 5 responses [never, rarely, some -times, often, always]. Scores for the responses are 1, 2, 3, 4, 5, respectively. Some questions also had reverse coding.^[10,13]

A non-stretchable measuring tape and calibrated weighing machine was to measure height and weight of the study participants. A stethoscope was also used for clinical examination.

A health record card was distributed after among students after anthropometric and clinical examination.

Operational definitions

BMI of study participants were classified according to gender-wise World Health Organisation [WHO] BMI Z scores tables^[16,17] for 5–19 years of age group. The classification was: Normal [−2SD to +1SD], Thinness [−2SD to −3SD], Severe thinness [−3SD], Overweight [+1SD to +2SD], Obesity [>+2SD)].^[16,17] In our study, thinness and severe thinness were taken as undernutrition and overweight and obesity were taken as overnutrition.

Item mean of each of the eight subscales in CEBQ taken as cutoff point. Below mean score was taken as satisfactory score and above mean score was taken as unsatisfactory score for eight subscales.

In the study, dependant variable was Body Mass Index [BMI] of the students. The independent variables were sociodemographic variables including age, gender, religion, caste—type of family, education and occupation of parents, per capita monthly income and child eating behavior measured by CEBQ.

Statistical analysis

Data analysis was done on IBM SPSS version 16 software. Descriptive statistics was shown by tables and figures. Logistic regression was done to find out predictors. $P < 0.05$ was considered as the cutoff for deciding statistically significant association.

Results

Sociodemographic characteristics of the study participants

23.2% students were studying in class 1 in our study. 60.6% students were male and 39.4% were female. 34.5% study participants belonged to the age group 96–120 months. 51.4% fathers and 46.5% mothers of the study participants studied up to class 12. 35.2% fathers were farmers following 27.5% were doing business. Majority of mothers [88.7%] were homemaker by occupation. Most of the students [74.6%] belonged to general caste followed by SC [19%]. Major [86.6%] of the study participants were Hindu by religion. 33.8% students were in Class IV [986-1971] of modified BG Prasad Scale, 2018 [Per capita income, RS/Month]. 64.1% children belonged to joint family. 21.8% students had BPL card.

CEBQ questionnaire

From CEBQ, it was found that 43.7% parents told that their child love food. Responses from emotional overeating domain was quite attractive. 51.4%, 62.7%, 64.8% parents thought that their child ate more when they are worried, annoyed, anxious, respectively. 53.5% parents told that if allowed their child eat too much and 35.9% parents thought that their child ate most of the time if they had choice.

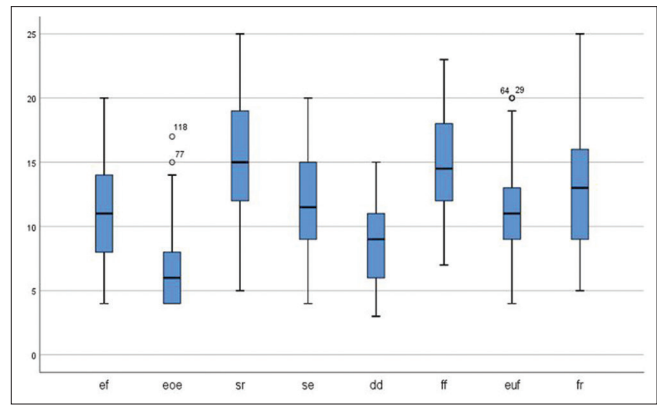


Figure 1: Box plot showing distribution of CEBQ scores among study participants [$n = 142$]

Figure 1 shows the distribution of the scores of eight CEBQ subscales in box plots. Median scores, minimum and maximum scores of eight subscales were 11 [4–20], 6 [4–17], 15 [5–25], 11.5 [4–20], 9 [3–15], 14.5 [7–23], 11 [4–20], 13 [5–25] for the subscales EF, EOE, SR, SE, DD, FF, EUF, FR, respectively.

From Figure 2, it can be seen that the portion of overnutrition was 16% [overweight was 11% and obesity was 5%] and proportion of undernutrition was 22% [thinness was 19% and severe thinness was 3%].

From Table 1, the association of eight subscales with different sociodemographic can be seen. The enjoyment of food was significantly associated with age of the students, education of father, per capita income, and education of mother. The emotional overeating was significantly associated with age, per capita income education of mother. Desire to drink, food fussiness, emotional undereating also had some association with sociodemographic factors. So it is evident that sociodemographic factors had important role in development of child eating behavior.

From Table 2, it can be seen that more score enjoyment of food was protective for undernutrition and more EF score was significantly associated with overnutrition. Emotional overeating had more odds of having undernutrition, may be the abnormal overeating in emotional stress may lead to indigestion and weight loss. More satiety response score was protective for overnutrition and food fussiness was significantly associated with undernutrition.

Discussion

In the present study, proportion of undernutrition and overnutrition were 22% and 16% among primary school children in a rural area of West Bengal, respectively. Eating behavior subscales from CEBQ significantly associated with undernutrition were enjoyment of food [EF], emotional overeating [EOE], and food fussiness [FF] and eating behavior subscales significantly associated with overnutrition were enjoyment of food [EF] and

Table 1: Univariate logistic regression showing association of unsatisfactory scores of CEBQ sub scales with sociodemographic characteristics of study participants (n=142)

		[EF] OR	[EOE] OR	[SR] OR	[SE] OR	[DD] OR	[FF] OR	[EUE] OR	[FR] OR
Age ↑		0.79 *	1.23*	0.88	0.97	0.72*	1.18	0.79*	0.83
Education of father↑		1.11 *	0.97	1.04	1.12	1.19*	1.03	1.12*	1.05
PCI	≤2000	0.42 *	2.52*	0.57	0.67	0.15*	0.75	0.67	1.03
	>2000	1	1	1	1	1	1	1	1
Education of mother↑		1.18	0.64*	1.02	1.04	1.38*	0.96	1.21	1.03
Occupation of mothers	Home maker	0.61	1.18	1.01	1.33	1.03	1.8	0.67	1.25
	Others	1	1	1	1	1	1	1	1

*P<0.05 [statistically significant association]

Table 2: Univariate logistic regression showing association of undernutrition and overnutrition with CEBQ sub-scales, n=142

Scores		Undernutrition present [number, %]	OR	P	Overnutrition present [number, %]	OR	P
EF	Satisfactory	23, 30.7	1	0.02	6, 8.0	1	0.009
	Unsatisfactory	9, 13.4	0.35		16, 23.9	3.61	
EOE	Satisfactory	12, 15.8	1	0.001	14, 18.4	1	0.42
	Unsatisfactory	20, 30.3	2.32		8, 12.1	0.61	
SR	Satisfactory	13, 19.1	1	0.08	17, 25.0	1	0.003
	Unsatisfactory	19, 25.7	1.47		5, 6.8	0.22	
SE	Satisfactory	14, 19.7	1	0.18	14, 19.7	1	0.16
	Unsatisfactory	18, 25.4	1.38		8, 11.3	0.52	
DD	Satisfactory	16, 23.9	1	0.87	10, 14.9	1	0.86
	Unsatisfactory	16, 21.9	0.86		12, 16.0	1.09	
FF	Satisfactory	10, 14.1	1	0.001	15, 21.1	1	0.07
	Unsatisfactory	22, 31.0	2.74		7, 9.9	0.41	
EUE	Satisfactory	19, 22.9	1	0.07	15, 18.1	1	0.31
	Unsatisfactory	13, 22.0	0.95		7, 11.9	0.61	
FR	Satisfactory	14, 20.3	1	0.09	12, 17.4	1	0.54
	Unsatisfactory	18, 24.7	1.29		10, 13.7	0.75	

*P<0.05 [statistically significant association]

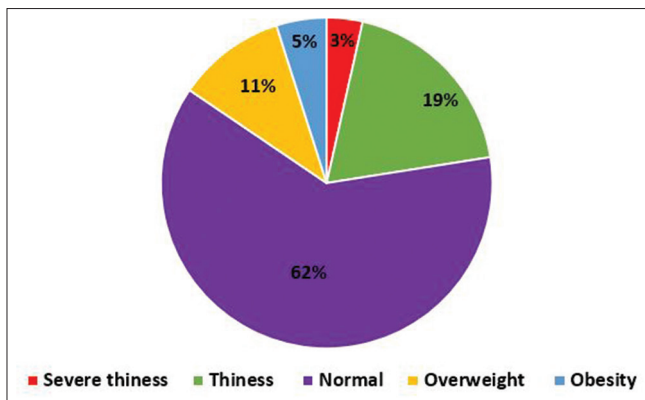


Figure 2: Distribution of study participants according to their BMI [n = 142]

satiety response [SR]. This study was conducted in a rural area of West Bengal. Primary school students were included in this study.

In a study done by Bhargava *et al.*^[18] in Dehradun the proportion of overweight was 15.6% which is quite similar to our study. A study done by Obembe *et al.*^[19] at public primary schools in Nigeria found that wasting wise undernutrition was predominant among the rural regions (80.9%) compared to the urban (19.1%) and the findings were quite different from the current study.

A study was done by Dasgupta A *et al.* among primary school students of Kolkata.^[1] The proportion of undernutrition and overnutrition were 4.40% and 38%, respectively. In this study, hierarchical multiple logistic regression was used to find out factors associated with overnutrition and eating behavior subscales FF, EOE, and SR had significant association with the dependant variable, overnutrition.^[1] In our study, EF and SR is significantly associated with overnutrition.

A study done by Sleddens *et al.*^[20] among 135 children of 6–7 yrs of age in 5 primary schools of Netherland in the year 2008. Significant relations with child BMI z-scores were found for FR, EF, SR, and slowness in eating [SE]. Concordant findings were also present in our study.

Viana V *et al.* studied among 240 Portuguese children aged 3–13 years.^[21] In this study in discussion, hierarchical regression controlling for sex, socioeconomic status, and age was used to find out factors associated with BMI Z scores and all eating behavior subscales had significant association with the dependant variable here. In our study discordant result was found.

Svensson V *et al.*^[22] made a study among 174 children aged 1–6 years recruited from five kindergartens in Stockholm, Sweden. They found that the children’s relative weight was not

related to any of the eating behaviors when controlling for age, gender, parental weight and education, and only associated with parental weight status. In our study, the association of BMI of the study participants with child's eating behavior was seen but we could not take the weight of parents.

Conclusion and Recommendation

The proportion of undernutrition, overnutrition among primary school going children were 22.0%, 16.0%. The CEBQ scales EF and SR had significant association with overweight and obesity. Food avoidant subscale also had significant association with overweight and obesity. The CEBQ scales EF, EO, and FF had significant association with thinness. Food avoidant subscale also had significant association with thinness.

Appropriate parental education is needed to develop a healthy eating habit of children from infancy. Proper guidance is essential to change any problematic eating behavior of children. Proper eating behavior also leads to a healthy dietary habit which can prevent noncommunicable diseases in future. Awareness must be created among school children regarding these types of information.

Healthy child eating behavior is important in preventing and fighting against malnutrition and determining the development and growth of children.^[23] Appropriate eating behavior of a child may lead to a healthy adult in future. Early detection of unsatisfactory eating behavior in primary health care setting may offer the parents to change the unsatisfactory eating behavior of their children with some appropriate interventions.

The "5As" model of behavior change provides a framework of behavior change model (Assess, Advise, Agree, Assist, Arrange) that can be applied in primary healthcare settings for different types of behaviors and health conditions.^[24] Diffusion theory of behavior can be applied to change the unsatisfactory behavior in primary healthcare level.^[25] Health workers and doctors in the primary healthcare centers regularly found children with unsatisfactory eating behaviors, these types of behavior change models and interventions may help them succeed in achieving a healthy eating behavior.^[26]

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Conflicts of interest

There are no conflicts of interest.

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