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Eating attitudes and its relationship with nutritional status: a micro level study on a group of adolescent girls in the city of Howrah, West Bengal

Abstract

Background: To assess the relationship between eating attitudes and nutritional status.

Methods: This cross-sectional study was conducted among 400 adolescent girls (258 aged 14–17 years and 142 aged 18–21 years) from the city of Howrah, West Bengal. Eating attitude was measured using eating distress syndrome (EDS) questionnaire. Nutritional status was assessed using body mass index, waist-hip ratio (WHR) and body fat percentage (BF%).

Results: Participants with disordered eating attitudes revealed significantly higher values for body mass index (BMI), WHR and BF% than those with normal eating attitudes ($p \leq 0.01$). Hierarchical linear regression analyses show that eating attitudes and socio-demographic characteristics (like mothers' education and occupation, age and birth order of the participants) significantly predict nutritional status.

Conclusion: The nutritional status of adolescents depends on their eating attitudes and socio-demographic characteristics.

Keywords: adolescent girls; eating attitude; Howrah; nutritional status; West Bengal.

Introduction

The nutritional requirement during adolescence remains the highest across the lifespan (1). Adolescent girls are at a greater need for nutritional requirement than boys because of loss of energy during periodic menstrual episodes (2). Literature reveals that the adolescents of contemporary period reported to have disordered eating attitudes and behaviors (abnormality in eating attitude and behavior) (3–9) with adolescent girls more frequently having disordered eating attitudes than boys (7, 8, 10–12) due to their excessive concern with body weight or obsession with thinness. Disordered eating attitude can lead to a number of immediate health problems, such as iron deficiency, deteriorating bone health and dental caries, under-nutrition, obesity and eating disorders (a severe form of disordered eating behavior) (13–15). In addition, adolescents with disordered eating attitudes were less likely to perform demanding cognitive tasks compared to those who have normal eating attitudes (16–18). In essence, all these earlier studies clearly showed the importance of positive eating attitudes on physical and mental health.

Anthropometric traits like body mass index (BMI) remain the most useful means for the assessment of nutritional status among adolescents (19–22). Previous studies indicate that BMI is positively associated with disordered eating attitudes and behavior (23–26). For example, an Australian-based study shows that a considerable number of obese girls reported abnormal attitudes toward their eating (3). In India, studies concluded that disordered eating is more prevalent among overweight adolescent girls compared to their counterparts who were normal weight and underweight (27, 28).

To the best of the understanding of the authors, barring one (27) no extensive work has been carried out in India to explore the relationship between eating attitudes and nutritional status of adolescent girls. Hence, we aimed to find out the relationship between eating attitudes and nutritional status among a group of urban adolescent girls in West Bengal.

Methods

Study area

The present cross-sectional study was conducted in the city of Howrah, one of the rich urban heritage centers of the State of West Bengal,

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India. This city is mostly inhabited by people belonging to Bengali linguistic group. The location of Central Howrah (under Howrah Municipal Corporation) was chosen as the unit of study because of its proximity to the metropolitan city Kolkata, the state capital and for operational convenience as well.

Study design and population

There are 24 senior secondary schools and four undergraduate colleges located in the central Howrah region and one high *Madrasah* in Shibpur, a residential area situated between central and southern part of the city of Howrah. The *Madrasahs* are educational institutions which impart education among Muslims. The syllabus and subjects taught in High *Madrasahs* are same as those of the Madhyamik system except two subjects, Arabic and Islam *Parichay*.

The study participants represent a group of 400 adolescent girls (Bengali speaking Hindu and Muslim), of which 258 represents the age category 14–17 years and 142 represents 18–21 years. The sole inclusion criterion of this study was the age range (14–21 years) of the participants. The objectives and benefits of the study were explained to and written consent was obtained from all the participants who volunteered to participate. The participants were interviewed in the school and college premises during the period September, 2012–July, 2013 and information was collected with the help of standard questionnaires.

Data types

Socio-demographic characteristics: Date of birth and birth order of the participants, monthly household expenditure [in Indian rupees (INR)], educational status and occupational types of the parents were collected with a set of well-tested questionnaire following Mciza et al. (29).

Eating attitudes: A cross-culturally tested questionnaire namely eating distress syndrome (EDS), developed by Srinivasan et al. (30), was used to measure abnormal attitudes towards eating relevant to Indian situation. This 15-item questionnaire was analyzed quantitatively on the basis of a cut-off score of 5. The respondents scoring 5 or more were considered to have shown disordered eating attitudes. This questionnaire was pretested on a small group of the same study population before the final data collection.

Habits related to eating attitudes: A structured questionnaire was used to assess the participant's habits related to their eating attitudes. This questionnaire consisted of six statements. The statements were "Skipping of meals", "Skipping of breakfast", "Urge for dieting", "Initiation of exercise to reduce body weight", "Snacking between meals" and "Consumption of junk/fast foods". The response options of first four statements were in "yes" or "no" categories and of last two statements were based on weekly frequency. Pretesting was carried out before the questionnaire was administered.

Anthropometric traits: It includes height (cm), weight (kg), mid-upper arm circumference (MUAC) (cm), waist and hip circumferences (cm) and body fat percentage (BF%). Height was measured to the nearest 1 mm; weight was measured to the nearest 0.1 kg and MUAC,

waist circumference (WC) and hip circumference (HC) were measured using a non-stretchable measuring tape following standard protocol (31). Height and weight measures were used to derive BMI (kg/m²), and WC and HC to calculate waist-hip ratio (WHR). The BF% was estimated with the help of an Omron Body Fat Monitor (model HBF 302, Japan). The entire data were collected by one of the authors (NM) of this study.

Data analysis

Descriptive statistics were used to calculate the frequency of socio-demographic characteristics and eating attitudes among the participants. Bivariate statistics like independent sample t-test was conducted to find out the difference between eating attitudes and anthropometric traits, whereas the χ^2-test was used to assess the association between eating attitudes and its related habits. Hierarchical linear regression analyses were carried out to understand the association between socio-demographic characteristics and eating attitudes with the nutritional status. Here, each of the measures of nutritional status (BMI, WHR and BF%) was used as a dependent variable separately for each hierarchical linear regression analysis. Information on socio-demographic characteristics (age of the participants at the time of interview, birth order of the participants, educational level and occupational types of fathers and mothers) and eating attitudes (on the basis of EDS score) were used as independent variables. In the first step, only socio-demographic characteristics were considered as independent variables. In the subsequent step, eating attitudes were included along with socio-demographic characteristics. The co-linearity of the independent variables was measured with the help of conditional index and the values were found to be within the acceptable unit. A minimum cut-off point of $p \leq 0.05$ was used to determine the level of significance. The software Statistical Package for Social Science (SPSS) version 16.0 (SPSS Inc, Chicago) was used for analysis of the entire data.

Ethical considerations

The study was approved by Institutional Bio Ethics Committee for Human and Animal Research Studies, University of Calcutta (approval number: 2014-23).

Results

More than half of the participants were between 14 and 17 years of age at the time of interview; and around 60% of them belonged to the household with a monthly expenditure of 10,000 (INR) and below. Parents of these participants (fathers and mothers independently) mostly attended education up to class 10th (secondary level). More than two-fifth of the fathers of the study participants were in business, followed by service (34.5%). It is notable that an overwhelming number (91.0%) of mothers of these participants were homemakers (Table 1). Table 2 demonstrates that only one-fifth of participants have

Table 1: Socio-demographic characteristics of the study participants.

Variables		Study participants, n (%)	
Age groups (years)			
14–17		258 (64.5)	
18–21		142 (35.5)	
Religion			
Hindu		357 (89.2)	
Muslim		43 (10.7)	
Monthly household expenditure (INR)			
Above 20,000		29 (7.2)	
15,001–20,000		46 (11.5)	
10,001–15,000		80 (20.0)	
5001–1000		126 (31.5)	
Below 5000		119 (29.8)	
Fathers' education		Mothers' education	
Non-literate	12 (3.0)	Non-literate	17 (4.2)
Up to class 10th	225 (56.2)	Up to class 10th	261 (65.2)
Classes 11th and 12th	65 (16.2)	Classes 11th and 12th	65 (16.2)
Below and up to graduate	83 (20.8)	Below and up to graduate	49 (12.2)
Above graduate	15 (3.8)	Above graduate	8 (2.0)
Fathers' occupation	138 (34.5)	Mothers' occupation	364 (91.0)
Service	6 (1.5)	Home maker	19 (4.8)
Professional	184 (46.0)	Service	3 (0.8)
Business	23 (5.8)	Professional	10 (2.5)
Labor	9 (2.2)	Business	4 (1.0)
Pension holder	40 (10.0)	Others[b]	
Others[a]			
Birth order of the participants		114 (28.5)	
Single child		286 (71.5)	
More than single child			

[a]Others: driver, carpenter, mason, factory worker and *jari* worker, [b]others: domestic help and labor.

Table 2: Assessment of eating attitudes [on the basis of score of eating distress syndrome (EDS)] among the study participants.

Assessment of eating attitudes	Cut-off values for interpretations	Study participants n (%)
Abnormal attitude toward eating	EDS[a] Score (< 5)	320 (80.0)
	Score (≥ 5)	80 (20.0)

[a]EDS score ≥ 5 – disordered eating attitudes.

disordered eating attitudes, while the majority of them have normal eating attitudes. Habits like skipping of breakfast and the urge to diet were found to be significantly higher among participants with disordered eating attitudes than those with normal eating attitudes ($p \leq 0.05$). Other eating habits like frequent snacking between meals, urge to diet and consumption of junk/fast foods were also found to be common among participants with disordered eating attitudes (Table 3). Anthropometric traits of the participants reveal that indices like BMI, WHR and BF% were significantly higher among those participants who

have disordered eating attitudes (score ≥ 5) than those with normal eating attitudes (score < 5) (Table 4).

Results of hierarchical linear regression analyses (Table 5) show that a combination of socio-demographic variables and eating attitudes (step 2) presents a better model (as observed from R^2 change) for all the measures of nutritional status (BMI, WHR and BF%). However, all these regression models could explain only a small amount of variance of the outcome variables. For BMI, in the initial model (step 1), age of the participants at the time of interview, birth order of the participants and mother's

Table 3: Few habits related to eating attitudes of the participants.

Variables	EDS		χ², p-Value	Total
	Score < 5	Score ≥ 5		
Skipping of meal				
Yes	58 (18.1)	18 (22.5)	χ² = 0.79	76 (19.0)
No	262 (81.9)	62 (77.5)	p = 0.37	324 (81.0)
Skipping of breakfast				
Yes	33 (10.3)	15 (18.8)	χ² = 4.31	48 (12.0)
No	287 (89.7)	65 (81.2)	p = 0.03[a]	352 (88.0)
Urge for dieting				
Yes	94 (29.4)	35 (43.8)	χ² = 6.05	129 (32.2)
No	226 (70.6)	45 (56.2)	p = 0.01[b]	271 (67.8)
Engaged in exercise to reduce body weight				
Yes	33 (10.3)	12 (15.0)	χ² = 1.40	45 (11.2)
No	287 (89.7)	68 (85.0)	p = 0.23	355 (88.8)
Snacking between meals				
> 3 days in a week	122 (38.1)	38 (47.5)	χ² = 2.34	160 (40.0)
≤ 3 days in a week	198 (61.9)	42 (52.5)	p = 0.12	240 (60.0)
Consumption of junk/fast foods				
> 3 days in a week	36 (11.2)	10 (12.5)	χ² = 0.09	46 (11.5)
≤ 3 days in a week	284 (88.8)	70 (87.5)	p = 0.75	354 (88.5)

[a]$p \leq 0.05$, [b]$p \leq 0.01$.

Table 4: Anthropometric traits among the participants by their eating attitudes.

Parameters	EDS[a]	Mean	SD	t, p-Value	95% CI	
					Lower	Upper
Ht (cm)	(Score < 5)	152.34	5.99	t = 0.55	− 2.74	1.55
	(Score ≥ 5)	152.94	6.90	p = 0.58		
Wt (kg)	(Score < 5)	47.33	10.70	t = 3.72	− 10.41	− 3.14
	(Score ≥ 5)	54.11	11.58	p = 0.01[b]		
BMI	(Score < 5)	20.34	4.17	t = 3.89	− 4.15	− 1.33
	(Score ≥ 5)	23.08	4.48	p = 0.01[b]		
MUAC (cm)	(Score < 5)	23.35	3.57	t = 3.99	− 3.31	− 1.10
	(Score ≥ 5)	25.56	3.46	p = 0.01[b]		
WC (cm)	(Score < 5)	67.15	9.62	t = 4.23	− 9.52	− 3.41
	(Score ≥ 5)	73.62	9.62	p = 0.01[b]		
HC (cm)	(Score < 5)	86.27	8.99	t = 3.31	− 7.63	− 1.89
	(Score ≥ 5)	91.03	9.05	p = 0.01[b]		
WHR	(Score < 5)	0.77	0.05	t = 3.37	− 0.04	− 0.01
	(Score ≥ 5)	0.80	0.05	p = 0.01[b]		
Triceps	(Score < 5)	17.14	5.88	t = 2.53	− 4.39	− 0.51
	(Score ≥ 5)	19.59	6.15	p = 0.01[b]		
BF%	(Score < 5)	25.60	7.26	t = 4.46	− 7.08	− 2.704
	(Score ≥ 5)	30.50	6.83	p = 0.01[b]		

Ht, Height; Wt, weight; UAC, upper arm circumference; WC, waist circumference; HC, hip circumference; BF%, body fat percentage.
[a]EDS score ≥ 5 – disordered eating attitudes, [b]$p \leq 0.01$.

occupation were found to be significant socio-demographic predictors. In the final model (step 2), education level of the mothers and eating attitudes were added as two more significant predictors for BMI. For WHR, in the initial model (step 1), age of the participants at the time of interview was the only significant socio-demographic predictor. In the final model (step 2), eating attitudes was added as one more significant predictor for WHR. Moreover, birth order of the participants and mother's education and occupation were significant socio-demographic

Table 5: Result of hierarchical linear regression analyses for several variables predicting nutritional status among the participants.

Dependant variables	Significant predictor(s)	B	SE	p-Value	R^2	R^2-change
BMI	Step 1					
	Age of the participants (at the time of interview)	0.10	0.43	0.03	0.08	
	Birth order of the participants	0.11	0.45	0.02		
	Mother's occupation	0.09	0.68	0.04		
	Step 2					
	Age of the participants (at the time of interview)	0.10	0.42	0.04	0.11	0.03
	Birth order of the participants	0.12	0.44	0.01		
	Mother's occupation	0.10	0.67	0.03		
	Mother's education	− 0.13	0.55	0.04		
	Eating attitudes[a]	0.18	0.48	0.001		
WHR	Step 1					
	Age of the participants (at the time of interview)	− 0.12	0.002	0.02	0.02	
	Step 2					
	Age of the participants (at the time of interview)	− 0.12	0.002	0.02	0.04	0.01
	Eating attitudes	0.14	0.002	0.02		
BF%	Step 1					
	Birth order of the participants	0.13	0.81	0.01	0.09	
	Mother's occupation	0.09	1.22	0.04		
	Mother's education	− 0.13	0.99	0.03		
	Step 2					
	Birth order of the participants	0.14	0.79	0.004	0.12	0.03
	Mother's occupation	0.10	1.20	0.03		
	Mother's education	− 0.14	0.98	0.01		
	Eating attitudes	0.18	0.86	0.001		

Only significant variables have been presented in the table. BMI, Body mass index; WHR, waist-hip ratio; BF%, body fat percentage.
[a]Eating attitudes measured on the basis of score of eating distress syndrome (EDS).

predictors for BF% in the initial model (step 1) and eating attitudes were added as one more significant predictor for BF% in the final model (step 2).

Discussion

With the advent of globalization, people in developing countries in general and Indians in particular are experiencing a major socio-cultural change (32, 33), especially related to their dietary practices. For example, the young Indians are banking more on fast/junk foods than their traditional diet (34). The media holds a great responsibility in popularizing these food items in the market. As a result, the transition from traditional foods to globalized food is significantly increasing in the society and is considered to be a major cause of increase in the prevalence of overweight and obesity. Simultaneously, because of exposure to mass media, a section of the urban girls are shifting toward the concept of thin body image, failing which leads to the dissatisfaction over body weight (35–37). This in turn leads to the development of disordered eating attitudes among them. Thus, adolescent girls remain at a cross-road of their serious concerns over body shape and adoption of the right kind of food habits. In this context, we attempted to investigate the relationship of eating attitudes with nutritional status of adolescent girls.

Our study shows that a considerable section (20%) of the participants have disordered eating attitudes, as observed in previous studies (3, 30, 38–41). However, a study on an affluent Indian urban group shows a reverse trend (27). Thus, it is difficult to establish a relationship between socioeconomically advantageous group and disordered eating attitude (8, 42).

Previous studies identified a number of factors like socio-economic status (43, 44), excessive concern over body weight (8, 12, 43), parental influence (45, 46), peer pressure (47, 48), media habits (49, 50) and body weight dissatisfaction (12) to be responsible for the development of disordered eating attitudes. However, body weight dissatisfaction among the adolescent girls appears to be the most significant factor in developing weight and eating concerns (12). As a result, they are more likely to be engaged with disordered eating attitudes and behavior than boys (3, 8, 51).

Our study implies that participants with disordered eating attitudes are significantly more obese than those with normal eating attitudes. Several studies corroborate with this finding (51–56). In our study, lack of physical activity among the participants could be one of the reasons to become obese despite their effort in controlling diet to reduce body weight. Moreover, eating habits like skipping of meals or breakfast, frequent snacking between meals, urge for dieting and consumption of junk/fast foods at the cost of principal meals are found to be more among the participants with disordered eating attitudes than those with normal eating attitudes, which corroborates with some previous studies (57, 58). Such habits could be another possible reasons of weight gain and obesity as reported in many studies (56, 59, 60).

A good number of studies reveal that socio-demographic factors often influence adolescents' nutritional status (61–66). Hierarchical linear regression analyses of our study show that nutritional status can best be predicted by the model which combines both eating attitudes and socio-demographic characteristics as independent variables. Precisely, the findings of our study demonstrate a positive association between mothers' education and occupation (as an indicator of socio-economic status) and nutritional status of the participants. This finding also conforms to the findings of earlier studies (67–71). The role of the mother in rearing a child is very important and her socio-economic status becomes an impediment for proper nutrition. Birth order of the participants is found to be another significant predictor of nutritional status. Therefore, our results reject the hypothesis that the single child showed higher BMI scores than those who have siblings (64). An explanation for such result may be that a few of the participants of our study represents from single child family. However, our study clearly indicates that eating attitude alone is not a significant predictor for nutritional status, but also socio-demographic factors do have an important role to play in determining the nutritional status of our participants. Therefore, we suggest that the socio-demographic factors which may mediate the association between eating attitudes and nutritional status should be clearly identified in future research.

Strengths and limitations

This is a population-based study, which allowed for more generalization than clinical samples or convenience samples recruited for the purpose of examining eating attitudes. However, data on quantifying the consumption of foods could have provided a better picture on the present issue.

Conclusion

Eating attitudes play a significant role on the nutritional status of this group of adolescent girls. Our study would be an important step in making public health recommendations in helping young people to develop positive eating attitudes.

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