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Nutritional status of adolescent girls in Bangladesh: findings of a community based survey

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Abstract

Poverty, large population, socio- economic inequalities and inadequate access to proper health care facilities are the key causes of under nutrition in Bangladesh. Adolescents are the most vulnerable group for under nutrition and having great consequence as they will be parent in future. Studies on nutritional status of adolescent girls are fewer in number and have great effect for intervention. The objective of this study was to assess the nutritional status and predisposing factors of under nutrition among the adolescent girls in Bangladesh. A community-based cross-sectional survey was carried out from July to December 2013. Adolescent girls were the study population. Data was collected by face to face interview at household level. According to BMI category (kg/m2) the prevalence of under-weight (BMI<18.5) was found 65.9% and as per Gomez Classification (Weight for age), the prevalence of malnutrition was 48.2% (mild), 23.5% (moderate) and 2.8% (severe) categories and finally, as per Water Low Classification wasting found 16.6% (mild), 3.5%(moderate) and 0.2% severe categories. On the other hand, stunting found 39.6 % (mild), 9.2% (moderate) and 2.3% (severe) categories. Prevalence of under nutrition was found much higher (82.3%) among younger age group (≤12 years). Higher prevalence of under-nutrition also found among the functionally illiterate adolescent girls, it was 75.8% and 51.3% among illiterate and literate group respectively. In both of the cases difference was statistically significant($p<0.001$). The prevalence of illness found higher among under-weight adolescent girls in last two weeks compare to healthy adolescent girls both in rural and urban settings. This difference also found statistically significant ($p<0.001$). Under nourishment found higher among younger and low literate girls. Prevalence of other symptoms is also found higher among them.

Keywords: Nutritional status, Under nutrition, Adolescent girls, Anthropometry, Bangladesh.

Introduction

The World Health Organization (WHO) defines adolescence as the period in human growth and development that occurs after childhood and before adult-hood, from ages 10 to19.[1] Generally girls begin their adolescent growth at 9 years of age; the pubertal growth lasts within two to four years, with the average rate of linear growth being 5-6 cm/year.[2] Adolescence is a crucial part of life. During this period, adolescents gain up to 50% of their adult weight, 20% or more adult height and 50% of their adult skeletal mass.[3] Nutrition influences growth and development throughout infancy, childhood and adolescence; it is, however, during the period of adolescence that nutrient needs are the greatest.[4]

About 1200 million adolescent in the world's and about 19% of the total population faces a series of serious nutritional challenges in developing country.[5] During shortage of food, most families give more attention that babies are well nourished rather adolescent. Inadequate diet can delay or impair healthy development. Stunting can occur in childhood or during adolescence. In some cultures, girls are fed last and fed least. In girls, poor nutrition can delay puberty and lead to the development of a small pelvis.[6] Poor nutrition starts before birth, and generally continues into adolescence and adult life and can span generations. Chronically malnourished girls are more likely to remain undernourished during adolescence and adulthood, and when pregnant. They are more likely to deliver low birth-weight babies.[7] If adolescents are well nourished, they can make optimal use of their skills, talents and energies and be healthy and

Practice Points

- Girls begin their adolescent growth at 9 years of age; the pubertal growth lasts within two to four years, with the average rate of linear growth being 5-6 cm/year.
- Nutrition influences growth and development throughout infancy, childhood and adolescence; it is, however, during the period of adolescence that nutrient needs are the greatest.
- During shortage of food, most families give more attention that babies are well nourished rather adolescent and in some cultures girls are fed last and fed least.
- Chronically malnourished girls are more likely to remain undernourished during adolescence and adulthood and when pregnant they are more likely to deliver low birth-weight babies.
- Well-nourished adolescents can make optimal use of their skills, talents and energies and be healthy and responsible citizens and parents of healthy babies tomorrow.

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responsible citizens and parents of healthy babies tomorrow. To accomplish such a task, and in order to break the intergenerational cycle of malnutrition, a special focus is needed for overcoming adolescent malnutrition. One of the ways to break the intergenerational cycle of malnutrition is to improve the nutrition of adolescent girls prior to conception.[8] Very little attention has been paid to adolescents so far, and adolescent nutrition has received inadequate attention in research as well as in programming for adolescent health.[9]

Malnutrition among the adolescent girls in the South East Asia has been an exceptionally large and complex problem. Among adolescent, 32% stunting was found in India and 47% in Nepal. Low body mass index (BMI) is 53% in India and 36% in Nepal.[10,11] A large numbers of adolescent girls are suffering from malnutrition both in urban and rural areas of Bangladesh. The prevalence of adolescent's stunting is 36% and low body mass index (BMI) is 50% in Bangladesh.[11,5] The average energy intake by rural adolescent girls in Bangladesh is 81% of the recommended dietary allowance (RDA) for age.[5] However, little published data exits on dietary intake, anthropometric measurement and energy intake of Bangladeshi low-income family's adolescent girls in the urban and rural groups. This study is therefore helpful in evaluating the nutritional status and stunting (according to WHO reference of BMI)[4] based on dietary intake and anthropometric variables of adolescents girls of both urban and rural settings. The aims of the study were to assess the nutritional status and its predisposing factors among the adolescent girls in Bangladesh.

Materials and methods

Place of the study
The study was conducted in rural and urban areas of four selected districts of Bangladesh. Badargonj upazila (sub-district) of Rangpur district and Mohadevpur upazila (sub-district) of Nowgoan district were the rural setting. Konabari of Gazipur metropolitan city form Gazipur district and Bouniabadh of Dhaka metropolitan city from Dhaka district were selected as urban setting.

Study duration
From July 2013 to December 2013

Study design
A cross-sectional study design was adopted in this study.

Study population
Adolescent girls were the study population of this study.

Sampling
A multistage simple random sampling was used for selecting adolescent girls in both settings. Firstly, we have purposively selected four upazilas (sub-district)/ metropolitan cities from four districts. In second step 18 villages/mohallas were selected randomly from each Upazilas (sub-district)/metropolitan city and then 6 samples (adolescent girls) were selected randomly from each village but we collected 2 extra samples additionally and interviewed.

Sample size
Total sample size was 434. Among them, 217 were selected from rural and 217 were from urban.

Data collection procedure
After getting written informed consent from respondent and their guardians, Interview was conducted by using pretested structural questionnaire and the selected adolescent girls were examined clinically for their anthropometrical measurement (height, weight, body mass index).

Study Instrument
A structured questionnaire was used duly pre-tested to obtain relevant information on socio-economic condition, anthropometric data etc.

Measurements of outcomes
(i) *Anthropometric Measurement:* The anthropometric measurements including height and weight of each subject were measured using standard technique.[12] Trained field research assistants were assigned for measuring. During height measurement we used locally made wooden stadio-metres with a sliding headpiece, and digital weighing scales (TANITA) were used to measure weight. Height was measured to the nearest 0.1 cm and weight to the nearest 0.5 kg. Each subject was weighed with minimum clothing and no footwear. The scales were carefully handled and periodically calibrated by placing standard calibration weights of 5 kg iron bars on the scale to ascertain accuracy. If the scale weight did not match the 5kg iron bar weight, the scale was calibrated by adjusting its calibration screw. BMI of each participant was computed by using the formula weight (kg)/ height (m2) and were graded in different grades of nutritional status according to CDC guideline.[12] Nutritional status also determined by anthropometric measurement performing standard methods of BMI classification and Gomez Classification[13,14] as well as Water Low Classification.[13]

(ii) *Symptoms of malnutrition in adolescents:* The most common symptom is a notable weight loss. For example, those who have lost more than 10% of their body weight in last three months and are not dieting. This is usually measured using the body mass index (BMI). This is calculated by the weight in kilograms divided by the height in meters squared. A healthy BMI for adults usually lies between 18.5 and 24.9. Color photograph of mal-nutritional sign was provided to interviewer during observation and interviewed.

(iii) *Other symptoms include:* Weakness of muscles and fatigue, tiredness all day and lack of energy, increased susceptibility to infections, delayed and prolonged healing of even small wounds and cuts, irritability and dizziness, and dryness of skin and hair.[15] Skin may appear dry and flaky and hair may turn dry and nails may appear brittle and break easily. Persistent diarrhea or long term constipation, irregular menstruation or amenorrhea may present in malnourished women. Depression is common that could be both a cause as well as an effect of malnutrition.[15]

(iv) *Socio-demographic information:* A household questionnaire was used to collect socio-demographic information.

(v) *Age estimation:* By asking date of birth, age of first admission in school, which class she is reading, year of first menstruation etc. Field Research Assistant (FRA) were trained how to calculate actual age.

Data Analysis
Standard descriptive statistics were used to analyze the malnutrition status of the adolescent girls. Mean, standard deviation (SD) and proportion were used where appropriate. Malnutrition statuses were presented by age, level of literacy and place of residence. Chi Square test was done to see the statistical significance. The test of significance was done at 95% confidence interval.

Ethical Issue and consideration
The ethical clearance for the study was obtained from the Centre for Injury Prevention and Research, Bangladesh (CIPRB) Ethical Review Committee. Verbal consent was taken from each the respondents. Verbal consent form was approved by Ethical Review Committee. Anonymity of each interviewee was strictly maintained. The participants of the study were informed that the collected data would be used for the research only.

Results

A total of 434 adolescent girls were interviewed, among them 217(50%) adolescent girls were selected from rural and another 217 (50%) were selected from urban area. About 42% adolescent girls were under ≤12 years' age categories, 37.6% under 13-14 years' age categories and 20.7% under ≥15 years' age group. By study area, 44.7% girls were ≤12 years' category and 41.0% were 13-14 year category in rural settings. On the other hand, in urban settings it was 38.7% and 34.1% respectively. By birth order categories of adolescent girls, most of them both rural and urban area it was≤2 and by sibling of adolescent girls, it was found between 3-5 both rural and urban area. By occupation category, Majority of adolescent girls were student it was 92.2% and 73.3% in rural and urban area respectively. By father occupation most of them were found agriculture in rural area and business in urban area (Table 1).

Considering both rural and urban, according to the BMI category, about 66% adolescent girls were found under-weight, 0.9%over-weight and only 0.2% obese. By Gomez classification,[14] 48.2% adolescent girls were found with mild mal-nourished, 23.5%moderate mal-nourished and 2.8% severe mal-nourished. Finally, by the Waterlow Classification,[14] 16.6% found mild wasting, 39.6% mild stunting, 3.5% moderate wasting and 9.2% moderate stunting (Table 2).

Prevalence of under-weight was found very much similar in both urban and rural area. The proportions were, 65.3% and 64.8% in rural and urban area respectively. According to the age group, most of the under-weight adolescent girls found under ≤12 years' age category followed by 13-15 years and then ≥15 years. It was 82.3%, 58.1% and 42.0% respectively. The proportion is significantly higher compare to another age group (p=<0.01). By education categories, most of the functionally illiterate adolescent girls were found under-weight category compare to literate adolescent girls. It was found 75.8% and 51.3% respectively. The difference was fond statistically significant (p<0.01) (Table 3).

Higher prevalence illness found among under-weight adolescent girls compare to healthy weight adolescent girls. Among underweight, 66.7%suffered from were fever in last two weeks 71.1% from common cold, 66.7% from Jaundice 68.8% suffered from others type of illness. (Table 4). Mal-nutritional symptom found

Table 1: Socio-economic characteristics of adolescent girls in relation to study areas

Characteristics	Categories	Rural (%) n=217	Urban (%) n=217
Age of adolescents girls	<12 years	97 (44.7%)	84 (38.7%)
	13-14 years	89 (41%)	74 (34.1%)
	>15 years	31 (14.3%)	59 (27.2%)
Total family members of respondents	Three and less	21 (9.7%)	30 (13.8%)
	Four - five members	141 (65%)	118 (54.4%)
	Six and above	55 (25.3%)	69 (31.8%)
Order of respondents	<2 Number	154 (71%)	141 (65%)
	3 - 5 number	61 (28.1%)	67 (30.9%)
	>6 members	2 (0.9%)	9 (4.1%)
Sibling of respondents	Sibling less than 2	75 (34.6%)	62 (28.6%)
	Sibling 3 to 5	136 (62.7%)	133 (61.3%)
	Sibling more than 5	6 (2.8%)	22 (10.1%)
Religion of respondents	Islam	199 (91.7%)	212 (97.7%)
	Hindu	18 (8.3%)	5 (2.3%)
Occupation of respondents	Student	200 (92.2%)	159 (73.3%)
	Service	-	19 (8.8%)
	Other	17 (7.8%)	39 (18%)
Education of respondents	Functionally illiterate	103 (47.5%)	140 (64.5%)
	Secondary Incomplete	108 (49.8%)	77 (35.5%)
	Secondary Complete	6 (2.8%)	-
Fathers occupation of respondents	Service	13 (6%)	28 (12.9%)
	Business	32 (14.7%)	70 (32.3%)
	Agriculture	105 (48.4%)	17 (7.8%)
	Daily wage earner	45 (20.7%)	71 (32.7%)
	Others	22 (10.1%)	31 (14.3%)

Table 2: Number of adolescent girls according to BMI category (kg/m2), Gomez Classification (Weight for age) and WaterLow Classification [Weight for Height (wasting) and Height for Age (stunting)]

BMI category (kg/m2)		Gomez classification		Water Low Classification		
Weight category	n (%)	Malnutrition categories	n (%)	Undernutri-tion categories	Wasting n (%)	Stunting n (%)
Underweight	286 (65.9%)	Normal	111 (25.6%)	Normal	346 (79.7%)	212 (48.8%)
Normal weight	143 (32.9%)	Mild	209 (48.2%)	Mild	72 (16.6%)	172 (39.6%)
Overweight	4 (0.9%)	Moderate	102 (23.5%)	Moderate	15 (3.5%)	40 (9.2%)
Obese	1 (0.2%)	Severe	12 (2.8%)	Severe	1 (0.2%)	10 (2.3%)

higher in under-weight adolescent girls compared to healthy weight. Among underweight 66.1% found short-tempered, 71.9% found irregular menstruation and 62.1% found weight loss and felt weak (Table 5).

Discussion

More than two third adolescent girls in this study found under weight, which is really a crucial public health concern for a nation. Adolescent, a period of transition between childhood and adulthood, occupies a critical position in the life of human beings. This period is characterized by an exceptionally rapid rate of growth. The peak rates of growth are exceeded only during the fetal life and early infancy.[16] The poor nutritional status of adolescents, especially girls, has important implications in terms of physical work capacity and adverse reproductive outcomes.[17]

Adolescents (aged 10 to 19 years) have specific health and development needs, and many face challenges that hinder their well-being. The findings of this study are kind of similar to some of the previous studies.[7] Age was found as an associated factor for nutritional status of adolescent girls. Significantly higher prevalence of under-nourished found among the younger age group compare to elder age group. Low literacy also found as contributory factor for undernourishment similar findings observed in other studies.[5]

Disease/illness was a vital factor to effect nutritional status in adolescent girls. It was found, majority of under-nutritional adolescent girls they had tendency fall different types of disease/illness compare to healthy

Table 3: Distribution of under-weight and healthy weight adolescent girls by study area, age and education

Categories	Under-weight	Healthy weight	*p*-value
Study Area			
Rural	141 (65.3%)	75 (34.7%)	0.92
Urban	138 (64.8%)	75 (35.2%)	
Age group of adolescent girls			
<12 years	149 (82.3%)	32 (17.7%)	0.00
13-14 years	93 (58.1%)	67 (41.9%)	
>15 years	37 (42%)	51 (58%)	
Education of adolescent girls			
Functionally illiterate	182 (75.8%)	58 (24.2%)	0.00
Literate	97 (51.3%)	92 (48.7%)	

Table 4: Diseases reported in last two weeks by under-weight and healthy weight respondents

Diseases	Under-weight	Healthy weight
Fever	42 (66.7%)	21 (33.3%)
Common cold	27 (71.1%)	11 (28.9%)
Body ache	5 (71.4%)	2 (28.6%)
Jaundice	2 (66.7%)	1 (33.3%)
Inching	1 (100%)	-
Diarrhea	1 (33.3%)	2 (66.7%)
Others	22 (68.8%)	10 (31.3%)

Table 5: Symptoms of malnutrition in under-weight and healthy weight respondents

Symptoms of malnutrition	Under-weight	Healthy weight
Weight loss and feel weak	95 (62.1%)	58 (37.9%)
Hair fall in large amount	113 (57.4%)	84 (42.6%)
Skin & hair appear dry	42 (70%)	18 (30%)
Nails appear brittle and break easily	12 (75%)	4 (25%)
Ulcer in the tongue & corner of the mouth	34 (66.7%)	17 (33.3%)
Irregular menstruation	133 (71.9%)	52 (28.1%)
Frequent diarrhea	19 (73.1%)	7 (26.9%)
Depression	83 (65.4%)	44 (34.6%)
Short-tempered	166 (66.1%)	85 (33.9%)

adolescent girls. Besides these most of the under-nourished adolescent girls found mal-nutritional syndrome compare to others. Under-nutrition may cause different types of complications that may be life threaten and future burden.[7] There is no magic pill that can reduce or increase the nutritional status. If the individuals are conscious about nutritional knowledge, nutritional deficiency diseases, nutritional value of food and dietary practices, they can easily overcome those problems and can make sound health and body without wasting excess money.[7]

Limitation of the study

The study has a number of limitations in relation to sample size and sample selection. Mostly low and lower middle income group were selected. The sample may not represent the national nutritional status of adolescent girls of Bangladesh.

Conclusion and recommendations

Majority of adolescent girls found under-nourished both in rural and urban areas. Under nourishment found higher among younger and low literate girls. Prevalence illness found higher among undernourished girls. Adolescent nutrition should be considered as a public health problem. An intervention need to be developed to address the adolescent nutrition problems in Bangladesh.

Competing interest

The authors declare that they have no competing interests.

Authors' contributions

SRM analyzed and interpreted data and helped to draft the manuscript, co-authored the paper. FR reviewed the final draft of the manuscript, co-authored the paper. MKH wrote the manuscript and prepared the manuscript for submission to the journal. All authors read and approved the final manuscript.

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