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PREVALENCE OF STUNTING AND THINNESS AMONG ADOLESCENTS IN RURAL AREA OF BANGLADESH

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ABSTRACT

The primary causes of undernutrition in Bangladesh are its poverty, large population, socio-economic differences and inadequate access to health facilities. Adolescent are the most susceptible group for under nutrition and having great implication as they will be parent in future. Studies on the assessment of nutritional status of adolescents are less in number and have great implication for intervention. The present cross-sectional investigation evaluates the prevalence of undernutrition among rural adolescents (10 years - 17 years) from Chowhali subdistrict, Serajgonj, Bangladesh.The present investigation was conducted among 726 rural school-going adolescents (376 boys and 350 girls) belonging to the rural Muslim and Hindu communities. The nutritional status was assessed by anthropometry in terms of stunting (Height-for-age below 3rd percentile) and thinness (BMI-for-age below 5^{th} percentile). The prevalence of stunting and thinness were high and estimated to be 46.6% and 42.4% respectively. The prevalence of stunting was estimated among boys (43.1%) and girls (50.3%) ($p>0.05$).Incase of boys of 17 years (63.6%) and girls of age 15years (70%) prevalence is the highest. The mean Body Mass Index (BMI) of girls were more than the boys (16.8 ± 3.4 kg/m2 and 15.9 ± 2.1 kg/m2 respectively). The prevalence of thinness among boys (32.0) was more than the girls (32.0).The prevalence of thinness and stunting is high in the study area. Gender is a significant demographic factor of undernurition in the study area. Nutritional intervention and communication is necessary to improve their nutritional status.

Keywords: Anthropometry, Adolescent, Stunting, Thinness.

1. INTRODUCTION

Nutritional status is now recognized to be a prime indicator of the health of individuals. The World Health Organization (WHO) stated that the ultimate objective of nutritional assessments is the improvement of human health. Malnutrition is major public health problem in Bangladesh. Among this under nutrition is a problem of concern due higher prevalence and involvement of

vulnerable rural people of Bangladesh who have limited access of health cares [1]. Anthropometry is the most commonly used and convenience method for the assessment of nutritional status of different age groups. Adolescence is extremely important period of life cycle which is a transition time between childhood and adulthood. This period is characterized by rapid physical and mental growth [2]. During adolescent human body demands for more nutrients to cope with rapid growth. In case of girls adolescent period nutrition is very much important as they are the future mother. A well-nourished mother after adolescent period can give birth of a health baby. Nutrition during adolescent can improve the nutritional status of the community [3]. Adolescence is a right period of intervention for the future mothers [4]. During adolescence there is a rapid physical growth, changes of body mass, hormonal and mental changes are marked. Such a rapid change can risk them under nutrition and demanding more attention for nutrients and mental support. Adolescence offers the last opportunity to intervene and recover growth faltered in childhood and also support growth spurt and skeletal development to break the vicious cycle of inter-generational undernutrition [5]. In developing countries education, socioeconomic, demographic factors and food insecurity are directly and indirectly associated with undernutrition [6]. The high prevalence of chronic energy and micronutrient deficiencies of today's adolescent girls is directly linked to the quality of the next generation. It is important of focus on the vicious cycle of malnutrition derived from poverty, hunger and malnutrition which extends from one generation to the next. The results of this investigation will help policy makers to formulate policies and initiate strategies for the well-being of the adolescents and add to the meager national data available on their nutritional status.

2. METHODS

All the three secondary schools under 'Kash Kwolia, a rural union of Chowhali upazila (subdistrict) of Serajgonj district in Bangladesh were visited prior to the commencement of the investigation. These schools had a substantial number of students belonging to the Muslims and Hindu communities. The total student strengths of the schools were almost identical. The 'Kash Kwolia School' located in village 'Kash Kwolia' was finally selected because of its location and accessibility. This village is located in the 'Kash Kwolia union a rural union of Chowhali upazila (subdistrict) of Serajgonj district in Bangladesh, which has a total population of 21978 individuals (11154 males and 10824 females). The 'Kash Kwolia School' comprised of classes from 5th class to 10th class and the total number of students was 1178. The students belonging to the adolescent category were selected by the method of multi-stage stratified sampling. Initially students belonging to the two communities were identified by utilizing their surnames and subsequently their religion and age was verified from the school records. A total of 796 subjects were identified and among them the adolescents belonging to the age group of 10 years to 17 years were approached. The number of adolescents thus identified and approached was 732 (380 boys and 352 girls). Finally 726 adolescents (376 boys and 350 girls) agreed to participate in the investigation (participation rate: 99.2). A pre tested and structured questionnaire containing different socio-demographic and socioeconomic variables (age, parents' occupation, education, monthly income, family size, birth order, number of siblings and ethnicity) was used for this purpose. The

questionnaire was completed by both school and household visits. Analysis of the schedules showed that all the 726 students belonged to a lower socio-economic group. Height and weight of the subjects were recorded using the standard techniques of Weiner and Lourie [7]. Height was taken with the help of a stadiometer to the nearest 0.1 cm. The weight of the student was measured to the nearest 0.5 kg using portable weighing machine and wearing minimum clothing. The age of the children was recorded from the school records and their birth certificates. Body mass index (BMI) was computed by using the standard equation BMI= weight (kg)/height (m^2). The Technical Errors of Measurements were calculated following Ulijaszek and Kerr [8] and the values were found to be within acceptable limits. Recommended anthropometric parameters and indices of WHO have been used to assess the nutritional status of the boys and girls. The growth retardation (stunting) was measure by height for age scale which primarily indicates chronic undernutrition. The height-for-age under the 3rd percentile of the National Centre of Health Statistics (NCHS) reference values were classified as stunting [9]. The thinness and overweight were measure by using WHO recommended age specific cut-off points of BMI where the BMI-for-age below 5^{th} percentile was classified as thinness or chronic energy deficiency (CED). The BMI-for-age above 85th percentile was considered as overweight [10]. The study was performed by following the ethical guideline established by the Helsinki Declaration of 2000 [11]. The necessary permissions were obtained from the school authorities prior to conducting this investigation.

3. STATISTICAL ANALYSIS

The data was statistically analyzed utilizing SPSS (version. 15.0) for Windows. Chi-square analysis was utilized to assess the differences in the overall prevalence of stunting and thinness among the boys and girls. Chi-square analysis was also used to analyze the differences in stunting and thinness between groups and also between sexes. The differences were considered to be statistically significant at $p<0.05$ level.

4. RESULTS

The prevalence of stunting and thinness in adolescents in the present study was estimated to be 46.6% and 42.4%. The prevalence of overall overweight was found to be almost negligible (0.3%). The age specific mean and standard deviation of weight, height and prevalence of stunting (below 3rd percentile of NCHS reference value) is presented in Table 1. The prevalence of stunting was more in girls (50.3%) than the boys (43.1%). The differences between stunting of boys and girls were not statistically significant in the present study. With the increase in age, girls showed a higher prevalence of stunting (Figure 1). When the age wise prevalence of stunting was considered, the highest prevalence was observed to be among 17 year old boys (63.6%) and 15 year old girls (70.0%). The age wise prevalence of stunting ranged from 21.9% (11 years) to 63.6% (17 years) among boys and 30.4% (10 years) to 70.0% (15 years) among girls. The age specific prevalence of stunting between all age groups among boys and girls (Table 2), was statistically not significant ($p>0.05$). The age specific means and standard deviations of BMI and prevalence of thinness among the studied subjects are depicted in Table 3. There was a positive linear increase of mean height and weight as both boys and girls approached higher ages from 10 years to 17 years. The

mean BMI also increased when boys and girls approached higher ages except in the age of 17 years among girls. The overall mean BMI for girls (16.8 ± 3.4 kg/m2) was slightly higher than boys (15.9 ± 2.1 kg/m2). The highest mean BMI was measured to be 0.6 kg/m^2 (aged 16 years -17 years) and 1.1 kg/m^2 (aged 11 years - 12 years) in boys and girls respectively. When the prevalence of thinness (5th percentile of BMI for age) was evaluated, boys (52.1%) were more affected than girls (32.0%). The overall prevalence of thinness among boys and girls was found to be statistically significant ($p<0.05$). The boys and girls of early adolescence showed a higher prevalence of thinness (Figure 2). The age wise prevalence of thinness was higher at 69.0% and 73.9% in 10 years among both boys and girls respectively. The number of adolescents below the 5th percentile BMI-for-age of NHANES ranged from 30.4% (17 years) to 69.0% (10 years) among boys and 73.9% (10 years) to 8.3% (16 years) among girls. The prevalence of thinness between the age groups between the boys and girls was statistically not significant ($p>0.05$). But it is statistically significant for the ages of 12 years, 14 years and 16 years (Table 2).

Table-1. Mean ± SD of weight, height and prevalence of stunting (<3rd percentile) among the adolescent boys and girls.

Age	Boys				Girls			
(Years)	f	Weight(kg)	Height(cm)	Stunting*	f	Weight(kg)	Height(cm)	Stunting*
10	29	23.2 (±3.7)	128.9 (±7.1)	13 (44.8)	23	24.9 (±5.7)	133.8 (±10.9)	7 (30.4)
11	32	28.0 (±4.9)	138.3 (±7.8)	07 (21.9)	37	26.9 (±5.1)	135.3 (±6.9)	17 (46.0)
12	61	29.8 (±6.0)	141.1 (±9.4)	26 (42.6)	59	32.1 (±5.5)	142.7 (±6.4)	27 (45.8)
13	58	33.3 (±6.7)	146.6 (±9.8)	23 (39.7)	72	34.3 (±6.8)	145.4 (±7.5)	35 (38.6)
14	75	36.7 (±6.8)	151.4 (±9.6)	32 (42.7)	51	37.8 (±5.9)	147.7 (±5.6)	30 (58.8)
15	45	42.2 (±7.2)	156.1 (±9.5)	18 (40.0)	40	38.5 (±7.3)	148.0 (±5.9)	28 (70.0)
16	43	45.2 (±6.1)	160.2 (±6.9)	22 (51.2)	36	41.4 (±5.4)	148.09 (±6.2)	19 (52.8)
17	33	47.6 (±6.0)	161.2 (±6.2)	21 (3.6)	32	43.4 (±5.5)	152.3 (±6.7)	13 (40.6)
Total	376			162 (43.1)	350			176 (50.3)

* <3 percentile Figures in parenthesis indicate percentages.

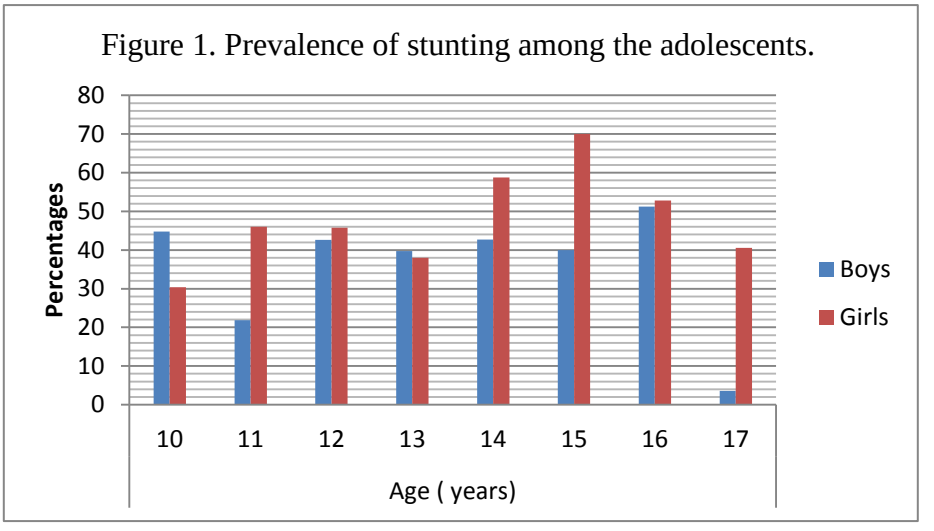


Table-2. Test for significant differences in nutritional status between the adolescent boys and girls using chi-square analysis.

Category	Age (years)	Stunting*		Thinness**	
		Chi-value	p	Chi-value	p
Boys vs. Girls	10	0.51	0.48	0.08	0.78
	11	2.17	0.14	0.02	0.9
	12	0.04	0.83	4.6	0.03
	13	1.06	0.52	2.75	0.1
	14	2.28	0.3	5.39	0.02
	15	0.01	0.13	1.57	0.21
	16	1.09	0.94	5.09	0.02
	17	1.38	0.29	0	0.95
	Total	1.38	0.24	12.28	0

* <3rd percentile
** <5th percentile

5. DISCUSSION

The present investigation is based on the WHO proposed cut-offs given for the assessment of undernutrition among adolescents in terms of thinness and stunting. It is evident from this investigation, that there is a very high prevalence of undernutrition among rural adolescents as the prevalence of stunting was 46.6% and thinness was estimated to be 42.4% . The extent of undernutrition was higher than those reported among Nepali adolescents by Woodruff et al. [12] (34.0%). The findings are also markedly higher than the reported values from Ethiopia [13] but lower than those of Kenyan adolescent reported by the International Rescue Committee [14]. From Table 1 it can be observed that the stunting was higher among girls (50.1%) than boys (43.1%) and the differences were observed to be statistically not significant ($p>0.05$). When the prevalence of stunting between boys and girls of each age was considered, the differences were statistically not

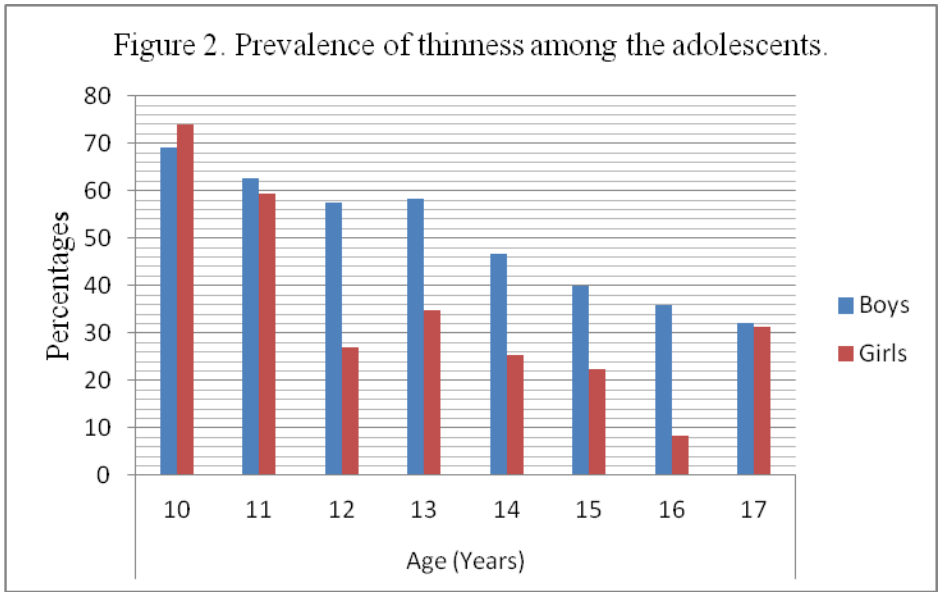
significant (p>0.05). The WHO Report on Regional Consultation on the nutritional status of adolescents reported that prevalence of stunting among girls was 45.0% and that among boys was 20.0%, with an average of 32.0% in both sexes [14]. In a recent study among adolescents, Tahmed et al. [15] reported that overall 36.1% of adolescent from rural area suffered from stunting.

Table-3. Mean ± SD of BMI and prevalence of thinness (<5th percentile of BMI-for-age) among the adolescent boys and girls.

Age	**Boys**			**Girls**		
(Years)	f	BMI (Mean±SD)	Thinness*	f	BMI (Mean±SD)	Thinness*
10	29	13.9 (±1.4)	20 (69.0)	23	13.9 (±1.1)	14 (73.9)
11	32	14.5 (±1.6)	20 (62.5)	37	14.58 (±2.3)	22 (59.5)
12	61	15.0 (±1.3)	35 (57.4)	59	15.9 (±1.7)	16 (27.1)
13	58	15.3 (±1.5)	34 (58.7)	72	16.8 (±5.7)	25 (34.7)
14	75	16. 0 (±1.6)	44 (48.7)	51	17. 8 (±1.9)	13 (25.5)
15	45	17. 0 (±1.8)	18 (40.0)	40	17. 9 (±2.4)	09 (22.3)
16	43	17. 6 (±1.9)	15 (34.9)	36	18. 6 (±1.9)	03 (8.3)
17	33	18. 2 (±2.1)	10 (30.4)	32	18. 5 (±2.0)	10 (31.3)
Total	376	15.9 (±2.1)	196 (52.2)	350	16.8 (±3.8)	112 (32.0)

Figures in parenthesis indicate percentages.

*<5th percentile



The prime cause behind stunting which indicates chronic undernutrtion is due to lack of dietary intake of nutrients, improper health care services and lack of knowledge. The prevalence of under nutrition among girls is another well known and accepted fact in almost every rural community in Bangladesh [16]. In this study BMI-for-age was used as an indicator of thinness and overweight.

The WHO expert Committee has been recommended that it is the best indicator for the adolescents to assess undernutrition (thinness) or overweight. It is evident from Table 3 that the prevalence of thinness was higher among boys (52.1%) than girls (32.0%). The differences were statistically significant in case of overall prevalence ($p<0.05$). The prevalence of thinness was significantly higher in the early age groups in most of the cases, but decreased with age. A similar trend has been reported by Siyam et al. [17] who opined that the prevalence of thinness decreased with age. It has also been observed in case of thinness that adolescent boys were more affected than adolescent girls (59.4% versus 41.3%). The prevalence of overweight in the present study is almost negligible. Adolescents suffering from overweight was only 0.3%. Low prevalence of overweight were also reported among rural adolescents from Bangladesh (0.3%) [15]. The present study explored that the adolescent from rural areas of Bangladesh are at high risk of undernutrition which is marked in the girls and have impact on their upcoming life. The poor nutritional status of the adolescents, particularly girls, has important implications in terms of physical work capacity and adverse reproductive outcomes. These delicate consequences of adolescence of undernutrition were subsequently confirmed by the other researchers among different Indian communities [15].

6. CONCLUSION

In conclusion, the present investigation has successfully documented the prevalence of undernutrition in terms of stunting and thinness among a rural adolescent sample from Chowhali sub-district of Serajgonj district in Bangladesh. The prevalence of stunting and thinness among adolescent were high in the study area. There is a significant association between age and gender with the prevalence of undernutrition in this rural area. The findings from this study will be helpful for programmatic intervention to reduce the rate undernutrition among rural adolescents.

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Authors' contributions:

Mohammad Azizur Rahman- conception of study, data collection, analysis and interpretation of results, drafting of manuscript;

Rezaul Karim- conception of study, data collection, review of manuscript and interpretation of results.

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