

Role of nutrition education in improving the nutritional status of adolescent girls in North West areas of Bangladesh

Md. Abdur Razzak¹, Syed Mahfuz Al Hasan², Shaikh Shahinur Rahman³, Md. Asaduzzaman⁴, Farha Matin Juliana¹ and Md. Sabir Hossain¹

¹Department of Biochemistry & Molecular Biology, Jahangirnagar University, Savar, Dhaka, Bangladesh

²Department of Nutrition and Food Technology, Jessore University of Science & Technology, Jessore, Bangladesh

³Department of Applied Nutrition and Food Technology, Islamic University, Kushtia, Bangladesh

⁴Department of Biochemistry, Prime Asia University, Banani, Dhaka, Bangladesh

Abstract

Adolescent are nutritionally vulnerable group, even if nutrition vulnerability may not be as great as in infancy and childhood. The aim of this study was to assess the present nutritional status and evaluate the effect of nutrition education in improving the nutritional status on adolescent girls in North West areas of Bangladesh. A randomized controlled trail study with detailed questionnaire was used from January 2014 to April 2016 to collect primary data. At the baseline of the study the participants were randomly assigned to a control and an intervention group and both group had the same number (n=250) of adolescent girls. At the end line, 241 adolescent girls from intervention group and 236 from control group were finally interviewed to evaluate the role of nutrition education among the adolescent girls. This study showed that mildly (37.6 vs. 31.8) stunted adolescent girls were significantly ($p<0.05$) reduced whereas moderate and severe stunted girls were almost same from the baseline. Nutrition education played a significant role in reducing the thinness among the adolescent girls in the intervention group. In compare with control group, nutrition education also appreciably contributed on nutrition and health related knowledge ($p<0.001$), frequency of eating habit ($p=0.013$), intake of balance diet (8.5 to 22.8; $p<0.001$), vaccination coverage (28.8 to 44.0; $p<0.001$), and intake of iron tablet (15.7 to 56.8; $p<0.001$). Nutrition education not only reduced the percentage of mild stunted significantly but also increased the health and nutrition related positive behaviors, attitude and practice of the adolescent girls in the rural areas of Bangladesh.

Key words: Adolescent girls, Nutrition education, Malnutrition, Bangladesh.

Introduction

Adolescence refers to a period of 10-19 years while rapid physical, psychological and emotional changes occur and additional nutritional demands increased for their proper development of the body (Shofikul *et al.*, 2015). Raghunatha *et al.* (2007), share finding of the studies on adolescent in developing countries and found that about one-fifth of the world populations are adolescent girls and 84% lives in developing countries. In Bangladesh as a developing country, adolescent girls are more vulnerable due to their poor health condition, early marriage, lack of nutritional knowledge and poor dietary habits

(Gaikwad Surekha Ramrao, 2013). During this period, they have a tendency to refuse conventional dietary habits, as a result, they suffer from various nutritional problems like anemia, underweight and overweight or obesity, vitamin A deficiency, iodine deficiency disorders and so on (N Gupta and G Kochar, 2008). Adolescent girls still remain neglected in South Asian countries like Bangladesh, India, and Myanmar although they are considered as “mother to be” and the future nation depends on them (Measham A.R., 2000 and Rao S., 1996). In the case of malnourished adolescent girls, nutritional problems not only hampered their physical work capacity but also adversely affect their reproductive outcome (WHO,

1998). Adequate nutritional knowledge and healthy eating habit and physical exercise at this age would be a foundation for good health in adulthood. According to Gupta (2008), nutrition education were 1.67 times more effectual for improving the nutritional knowledge of adolescent girls (N Gupta and G Kochar, 2008). It also manifested healthy dietary habits and better food choices (Sachithanathan *et al.*, 2012). Previous studies also showed that nutrition education or counseling on elder person had a fruitful outcome (BNNMB, 2003). The aim of this study was to evaluate the role of nutrition education in improving the nutritional status of adolescent girls in rural Bangladesh. Besides this, the study it was also designed to assess the effect of nutrition education to improve the health and nutrition related positive behaviors, attitude towards these behaviors, and practicing pattern among the adolescent girls in rural areas of Bangladesh.

Material and Methods

Study design and area: A randomized control trial of nutrition education was designed from January, 2014 to April, 2016 to analyze the impact of nutrition education on adolescent girls aged 10-19 years. At the baseline of the study exactly the same number (n=250) of adolescent girls was randomly assigned to a control and an intervention group from rural areas of North West part of Bangladesh. The samples adolescent girls were selected from three study areas named Kaliyaboripur, Khokshabari and Saydabad under Sirajgonj district of Bangladesh.

Intervention design: Nutrition education other than the course curriculum was provided only to the intervention group

whereas no nutrition education was provided to the control group. Nutrition education was communicated to all of the subjects through group or personal discussion using charts, leaflets, posters etc. After two years of nutrition education intervention the groups were assessed at the end line of the study. At end line, 241 adolescent girls from intervention group and 236 from control group were finally interviewed to evaluate the role of intervention and nutrition education among the adolescent. The drop out for the study participants were mainly due to their unwillingness to continue the study and marriage at the time of study. Married and /or pregnant adolescent girls were not included in this study.

Data collection and measurement: Data was collected by questionnaire cum face to face interviewing methods and study variables like socio-demographic, health and nutrition, attitude and anthropometric measurements were considered for this study. Basic anthropometric measurement, height and weight were measured using standard anthropometric techniques. Nutritional status was measured based on the height for age and BMI for age Z scores. These Z scores were calculated using WHO AnthroPlus software.

Statistical analysis: Data was analyzed by using statistical package for social science (SPSS) software. The normality of the continuous variables was checked using Shapiro-Wilk test. Chi-square test was done to look for the significant difference on categorical variables between the intervention and control group. Independent sample t-test was done for assessing the

significant difference in anthropometric Z scores between the groups. Significant level was set at $P < 0.05$.

Results and Discussion

Table 1 shows the health and nutrition related behaviors of the adolescent girls in the intervention and the control group. About 30% of the adolescents in the intervention group used hygienic pit latrine while only 13.3% from the control group used hygienic latrine. Nutrition and health related knowledge was found significantly very well ($P < 0.001$) among the adolescent

girls in the intervention group compared to the control group. Adolescents from the intervention group were significantly well knowledgeable about malnutrition and its cause compared to the control group (35.7 vs. 7.2; $P < 0.001$). Knowledge on food types and its function (78.4 vs. 18.6; $P < 0.001$), knowledge about food preparation (74.3 vs. 20.8; $P < 0.001$), knowledge on iron rich food (98.3 vs. 70.3; $P < 0.001$), and knowledge on balance diet (89.2 vs. 39.4; $P < 0.001$) all were significantly higher among the adolescent girls in the intervention group when judge against the adolescents from the control group.

Table 1: Health and nutrition related behaviors of the adolescent girls in the intervention and the control group

Characteristics	Control	Intervention
Type of latrine use		
Hygienic private pit latrine	13.3	29.7**
Knowledge on malnutrition and its causes		
No knowledge	75.8	12.0**
Poor knowledge	16.9	52.3**
Good knowledge	7.2	35.7**
Knowledge on food types and its function		
No knowledge	54.2	2.5**
Poor knowledge	27.1	19.1**
Good knowledge	18.6	78.4**
Knowledge about food preparation		
No knowledge	57.6	10.4**
Poor knowledge	21.6	15.4**
Good knowledge	20.8	74.3**
Knowledge on iron rich food		
Have knowledge	70.3	98.3**
Knowledge on balance diet		
Have knowledge	39.4	89.2**
Food taboos		
Take banana during cold (+)	12.3	35.7**
Twin banana begets twin child (+)	0.8	3.3

*Significance level at $p < 0.05$

**Significance level at $p < 0.001$

Table 2: Attitude and practicing of healthy behavior variables of the adolescent girls in the intervention and the control group

Characteristics	Control	Intervention
Taking IFA tablet	8.1	37.3**
Frequency of eating		
More than 3 times	22.9	32.4*
Nervous during menstruation	27.1	23.7
Hygienic material used at menstruation		
Sanitary napkin/ new cloth	14.0	17.8
Taking Vitamin C with iron rich food	17.4	42.7**
Treatment taken from qualified personnel		
Government and NGOs clinic	33.9	37.8
Quack doctor and pharmacy	66.2	62.2
Take balance diet	8.5	22.8**
Have taken vaccine	28.8	44.0**
Have taken iron tablet	15.7	56.8**

* Significance level at $p < 0.05$

** Significance level at $p < 0.001$

Table 3: Percentage changes of stunted adolescent girls from the baseline to the end line of the study between the intervention and control group based on height for age Z scores.

	Baseline			End line		
	Control	Intervention	Total	Control	Intervention	Total
Normal	59.6	40.4*	36.2	54.3	45.7*	39.0*
Mild	47.3	52.7*	37.6	46.1	53.9*	31.8*
Moderate	40.5	59.5*	21.2	49.1	50.9	21.4
Severe	40.0	60.0*	5.0	40.5	59.5*	7.8

* Significance level at $p < 0.05$

** Significance level at $p < 0.001$

Table 4: Percentage changes of the nutritional status of the adolescent girls from the baseline to the end line of the study between the intervention and control group based on BMI for age Z Scores (BAZ).

	Baseline			End line		
	Control	Intervention	Total	Control	Intervention	Total
Normal	55.2	44.8*	47.8	47.4	52.6*	60.5*
Mild	47.3	52.7*	30.4	47.1	52.9	22.2*
Moderate	45.8	54.2*	16.6	63.4	36.6*	10.9*
Severe	30.7	69.3*	5.2	52.2	47.8*	4.8
Over	0.0	0.0	0.0	57.1	42.9*	1.6*

* Significance level at $p < 0.05$

** Significance level at $p < 0.001$

Table 5: Summary of statistical anthropometric measurements of the adolescent girls

Variables	Base line		End line	
	Control (Mean±SD)	Intervention (Mean±SD)	Control (Mean±SD)	Intervention (Mean±SD)
Age in years	13.6±2.18	14.11±2.26	14.32±2.14	14.85±2.29
Height in cm	147.64±7.02	146.45±6.65	148.48±6.96	148.11±6.06
Weight in kg	38.24±8.48	36.73±7.39	39.11±6.86	40.27±6.96
MUAC ¹ in cm	21.87±2.91	21.31±2.59	21.83±2.79	23.17±3.72
HFA ² Z-score	-1.11±1.11	-1.49±1.01	-1.05±1.48	-1.29±1.39
BFA ³ Z-score	-0.91±1.29	-1.2±1.33	-0.77±1.31	-0.62±1.33

¹ Mid upper arm circumference

² Height for age

³ BMI for age

Table 2 shows the attitude and practicing of healthy behavior of the adolescent girls in the intervention and the control group. Considerably 37% of the adolescents in the intervention group had taken IFA whereas only 8% from the control group had taken IFA. Frequency of eating was significantly ($P=0.013$) increased in the intervention group (32.4%) compared to the control girls (22.9%). Comparatively more girls from the intervention group used hygienic materials (sanitary napkin, new cloths) at the time of their menstruation compared to the control girls though the difference was not fund statistically significant (17.8 vs. 14.0; $P=0.085$). Intake of balance diet (22.8 vs. 8.5; $P<0.001$), vaccination coverage (44.0 vs. 28.8; $P<0.001$), and intake of iron tablet (56.8 vs. 15.7; $P<0.001$) all of these percentages were significantly higher among the adolescent girls in the intervention group related to the adolescents from the control group.

Table 3 depicts the changes of nutritional status of the adolescent girls based on their HFA (Height for age) Z scores. Percentage of total mildly (37.6 vs. 31.8) stunted adolescent girls was significantly ($P<0.05$)

reduced from the baseline whereas moderate and severe stunting were not significantly reduce from the baseline. Percentage of normal adolescent girls was significantly increased in the intervention group (40.4 vs. 45.7; $P<0.05$) and decreased in the control group (59.6 vs. 54.3; $P<0.05$) between the baseline and end line of the study which indicates that the intervention has significantly ($P<0.05$) reduced the percentage of stunted adolescent girls. Moderate stunted was significantly reduced (59.5 vs. 50.9; $P<0.05$) in the intervention group from the baseline of the study whereas mild stunted was increased in the intervention group from the baseline but the augmentation was not significant ($P=0.143$).

Table 4 also represents the percentage changes of nutritional status of the adolescent girls based on their BMI for age Z scores (BAZ). Percentage of total mildly (30.4 vs. 22.2) and moderately (16.6 vs. 10.9) thinness were significantly ($P<0.05$) reduced from the baseline whereas severe thinness were not significantly reduces from the baseline. Percentage of normal adolescent girls was significantly increased

in the intervention group (44.8 vs. 52.6; $P<0.05$) and decreased in the control group (55.2 vs. 47.4; $P<0.05$) between the baseline and end line of the study which indicates that the intervention has significantly ($P<0.05$) reduced the percentage of thinness among the adolescent girls. Percentage of moderate (54.2 vs. 36.6) and severe (69.3 vs. 47.8) thinness were significantly ($P<0.05$) reduced in the intervention group from the baseline of the study whereas percentage of mild thinness was very slightly increased in the intervention group from the baseline of the study though the increment was not significant at all ($P=0.261$). Percentages of moderate and severe thinness were significantly ($P<0.05$) increased in the control group from their baseline percentages. Percentage of total overweight adolescents was significantly increased (0.0 vs. 1.6; $P<0.05$) between the baseline and the end line of the study but the increment was significantly lower in the intervention group compared to the control group (42.9 vs. 57.1).

Table 5 shows that mean height and weight of the adolescent girls changed from the baseline to the end line of the study. Height and weight both significantly increased better in the intervention group compared to the control group. Mean MUAC, height for age (HFA), and BMI for age (BFA) Z scores significantly improved more in the intervention group than the control group. The mean HFA was -1.49 at the baseline of the intervention group which increased to -1.29 at the end line. Mean HFA also increased in the Control group at the end line from the baseline but the increment was not larger than the intervention group. Mean

BFA Z score was improved at the end line compared to the baseline of the intervention group (-1.20 vs. -0.62). The mean BFA Z score also improved in the control group (-0.91 vs. -0.77) but the improvement was not greater than the intervention group.

Conclusions

Nutrition education changed the thinness tendency among the adolescent girls and also reduced mild stunting. Though nutrition education significantly improved the nutritional status and health-related behaviors of the adolescent girls, poor knowledge, lack of proper hygiene and sanitation, and poor dietary diversity, food taboos were still persisted significantly among the adolescents in both control and intervention group. Urgency is required to address this situation. Nutrition-sensitive integrated programs might crucial for these adolescent girls. Most important think are the integration of WASH, Nutrition, sexual and reproductive health information including fertility awareness, sex education, and contraception can give the best effort for a healthy generation.

Acknowledgement

The authors are thankful to the participants of this study who participated and shared their valuable time to fill their oral questionnaire and various types of anthropometric measurements.

Reference

Bangladesh National Nutrition Monitoring Bureau (BNNMB), 2003.

Gaikwad Surekha Ramrao (2013). Impact of nutrition education on adolescent girls of Purna Maharashtra. *Adv. Appl. Sci. Res.*, 4(1), 386-391

Measham, A.R. and Chatterjee, M. (2000) Wasting Away-The Crisis of Malnutrition in India: The World Bank.

Gupta N, Kochar G., (2008). Role of Nutrition Education in Improving the Nutritional Awareness among Adolescent Girls. *The Internet Journal of Nutrition and Wellness*. Volume 7 Number 1.

D Raghunatha Rao, T Vijayapushpam, G M Subba Rao, G M Antony and K V R Sarma (2007). Dietary habits and effect of two different educational tools on nutrition knowledge of school going adolescent girls in Hyderabad, India. *European Journal of Clinical Nutrition* 61, 1081–1085; doi:10.1038/sj.ejcn.1602622.

Rao, S. (1996) Nutrition in Adolescence: proceedings of the nutrition society of India, Vol. 43:3.

Sachithananthan V., Buzgeia M., Awad F., Omran R., & Faraj A (2012). Impact of nutrition education on the nutritional status. *Nutrition & Food Science*, 42(3), 173-180.

Shofikul Islam, Sk. Shahinur Rahman, Md. Kamruzzaman, Md. SalimRaza, Md. Saifuzzaman, Mst. Jesmin Aktar and Md. Sabir Hossain (2015). Impact of Nutrition Education on Nutritional Status of Adolescent Girls in South-west Region of Bangladesh. *AJNFS*, 2(1):1-6 *American Journal of Nutrition and Food Science* DOI: 10.12966/ajnfs.01.01.2015

World Health Organization (1998) Nutritional status of adolescent girls and women of reproductive age. Report of regional consultation Geneva, world health organization. SEA'NUT'141: 3.