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NEED AND AVAILABILITY OF NUTRIENTS FOR ADOLESCENT GIRLS

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Abstract: A total of 152 adolescent girls were studied using a standard questionnaire to find out their nutritional needs and availability. Average age of the subjects was 15.05±1.13 yrs. Mean age at menarche was 12.33±1.11 years. Protein rich food such as fish, meat, egg, pulse, groundnut, soybean, and different seeds were scantly in their daily diet. Vitamins and minerals containing foods such as vegetables, egg, milk and fruits were not consumed for last 24 hours by 40.48%, 69.48% and 70.0% of adolescent girls respectively. Carbohydrate containing foods were chosen by 32% of girls. About 52% of girls liked to consume protein-containing foods. Mineral and vitamin containing foods were chosen by 42% of girls. Colocasia leaves, Amaranths leaves (red) and pumpkin were liked to consume by 13%, 11.48% and 19.74% of adolescent girls. Amalaki, sour fruit and pine Apple were disliked by only 4.61%, 3.95% and 3.29% of girls. The average total food intake was 704.26 g. Which is less by 29% of the RDA (991 g). Average cereals intake has declined by about 4% of RDA. Consumption of pulses has seriously declined by about 44% of RDA. Consumption of vegetables was glaring deficit. It dropped by about 53% compared to RDA (112 g.). Fish and fruits were increased. Intake of milk decreased 77.14% when compared to RDA (250 Ml.). Average energy intake was 1697.68 Kcal. making 71.07% of the requirement but according South East Asia criteria of all girls to have normal BMI needs to study for its validity of large scale.

Key words: Nutrient, nutritional requirements, adolescent girls, nutrient availability, food intake and health status

Introduction

Adolescence is a time of physical, mental and emotional transition from childhood to adult hood. There are three sub stages of adolescent-(i) early adolescence (10/11 to 13/14 yrs.); (ii) mid adolescence (14/15 to 16/17 yrs.) and (iii) late adolescence (17/18 to 20 yrs). Height and weight velocity increase and reach peak during the adolescent growth spurt. In girl, peak height velocity (PHV) occurs early (sex maturity rating, S.M.R, 2-3), while menarche is a late event (S.M.R. 4). Peak height velocity of boys is achieved later than in girls (S.M.R. 4) (Kilham, 1988). Adolescence is a critical period in human life. At this stage adolescent girls are faced too much problems. These problems are growth and development failure, menstrual disorders of adolescence, nutritional problems physical and intellectual disability. Malnutrition is a major

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cause of morbidity and mortality. About 70% of adult females in Bangladesh suffer from anaemia (Thomas, 1973) with at least 18% of adolescent anaemic girls. Nutrition in foetal life and infancy is reflected in the health and mortality in early life. This is linked with the subsequent development, survival and health in adult hood. Numerous studies showed that maternal nutrition is positively correlated with the infant birth weight (Luke, 1979). Poor nutritional status of adolescent girls is associated with dietary discrimination. This discrimination may even be evident more in early life. The unfortunate state of affairs depicted above is not due to the scarcity of food, but also due to the lack of knowledge on what to eat and how to eat in order to maintain an optimum state of health. Nutrition education among the adolescent girls can contribute to a great extent in solving the malnutrition problem, particularly by influencing the prevailing faulty food preparation and consumption practices, especially within the family setting. In the present study an attempt is made to find out the nutritional needs and availability of adolescent girls in Bangladesh on the basis of the information on anthropometrics, bio-chemical and food consumption. The objectives of the present study were-(i) to estimate the nutritional needs of adolescent girls by height, weight and age; (ii) to assess the dietary intake pattern of adolescent girls; and (iii) to measures to improve malnutrition situation in Bangladeshi adolescent girls.

Materials and Methods

Selection of sample: Sideswari women college, Dhaka central girls high school and Bangla Bazar high school in Dhaka city were selected purposively. All the adolescent girls aged 13 to 17 years were listed. A sample was drawn allowing standard error 5% using p = 0.5 and with 95% confidence limit. Thus the sample was estimated to 152 by using the sampling methods of PPS (Probability proportion to sample size). The study was cross- sectional and divided into two component parts, namely (a) the dietary survey and (b) the clinical, anthropometrics and blood hemoglobin. The dietary survey collected data on the foods intake of the sampled individuals. The clinical, anthropometrics and biochemical survey collected data on the age, height, weight, skin fold thickness, mid-arm circumference and blood for hemoglobin samples.

***Measurements*:**

***Dietary*:** The food habit of adolescent girls was measured by 24 hrs. dietary recall method. The consumption of the pattern seasonally available foods, total weight, dressed weight, boiled weight, cooked weight, fried weight and weight of edible part of the food item were also noted. In some cases weight of edible part was calculated by subtracting inedible weight from total weight. Weight of different parts of selected food items was measured in gram by using weighing standard balance. Standard cup, bati and spoon were also used measuring the size of food eaten. Weight and energy (in kcal) of food items were estimated by using standard conversion factors given by Ali *et al*. (1991). Reliability and validity test was done by taking 7 days dietary recall of 10% adolescent girls. The results adjusted according to the quality test and presented in the result section.

***Clinical, anthropometrics and bio-chemical factors*:** This part of the survey was conducted by a team of two members with a trained laboratory technician. All clinical examination was performed. The anthropometrics measurement of height, weight, skinfold thickness and mid- arm circumference was performed. By finger prick in aseptic condition a sample of food was collected for hemoglobin estimation by Gyanomethemoglobin method (Thomas, 1973).

Determination of hemoglobin: A sample of 20 cum, of blood was collected by finger prick from each adolescent girl. Blood sample was taken in to a hemoglobin pipette and dropped on to strip of filter paper. It was allowed to dry for about 10 minute at room temperature and then packed in small envelope for analysis. Subsequently in the INFS laboratory of Dhaka University the paper was placed for 30 minutes in a test tube containing 5 ml Gyanomethemoglobin solution. After low speed centrifugation and gentle shake the pink supernatant solution was used for the estimation of hemoglobin with a supertonic 20 (BAUSCH + LOMD) at 546 wave length.

Results

Table 1 present the age distribution of the study adolescent girls. The average age of the girls studied was 15.05±1.13 yrs. The highest and the lowest frequency 45 (29.61%) and 10 (6.58%) were found at the age 14 and 13 years respectively. The lowest to highest limit of age was found to be 13 to 17 years.

Table 1. Distribution of the adolescent girls by age (in year).

Age	f	% f
13	10	6.58
14	45	29.61
15	44	28.94
16	35	23.03
17	18	11.84
Total	152	100

F= frequency. Mean age ± SD = 15.05±1.13

Table 2 revealed that average height 151.17±4.27 cm for 13 years adolescent girls, 152.03± 4.67 cm by 16 years, 153.91±5.94 cm for 17 years, 153.59±5.67 cm for 16 years and 153.91±5.94 cm for 17 years adolescent girls. The average height of 152 adolescent girls was found to be 152.82±5.29 cm.

Table 2. Average height (cm) of the adolescent girls by age (in yrs).

Age	f	Mean ± SD
13	10	151.17 ± 4.27
14	45	152.03 ± 4.81
15	44	152.94 ± 5.27
16	35	153.59 ± 5.67
17	18	153.91 ± 5.94
Over all	152	152.82 ± 5.29

From Table 3 It was observed that average weight was 44.15± 5.63 kg for 13 years adolescent girls, 43.73±6.03 kg for 14 years, 45.27±6.05 kg for 15 years, 46.11±6.32 kg for 16 years and 45.47±6.30 kg, for 17 years adolescent girls. The average weight of 152 adolescent girls was found to be 44.96±6.36 kg.

Table 3. Average weight (kg) of the adolescent girls by age (in yrs).

Age	f	Mean ± SD
13	10	44.15 ± 5.63
14	45	43.73 ± 6.03
15	44	45.27 ± 6.65
16	35	46.11 ± 6.32
17	18	45.47 ± 6.30
Over all	152	44.96 ± 6.36

It appeared from the Table 4 that the average age at menarche was estimated at 12.33±1.11. The maximum and the minimum frequency were found to be 52 (33.55%) and 4 (2.64%) at age 12 and 15 years respectively. The lowest to highest limit of age was found to be 10 to 15 years.

Table 4. Age distribution of first menarche period (in yrs).

Age	Frequency	%
10	5	3.29
11	31	20.39
12	51	33.55
13	43	28.29
14	18	11.84
15	4	2.64
Total	152	100

Average age at menarche ± SD = 12.33±1.11; Range of age at menarche = 10-15 years.

Table 5 shows the degree of relationship between height and weight by 14 years girls (r=0.36) and by 15 years girls (r=0.42) were found to be significantly ($p<0.05$) correlated. Relationship between height and weight by 16 years girls was found to be significantly higher proportion ($p<0.05$) and the rest were found to be insignificantly lower proportion.

Table 6 shows the category of body formation of the study adolescent girls. The highest frequency of medium size girls was counted to 86 (56.58%). While the lowest frequency of large size girls was counted to 16 (10.53%).

The food consumption pattern of adolescent girls should that (Table 7) more than 46% of adolescent girls did not eat potato. Pulse was not consumed in last 24 hours by 24% of the adolescent girls. More than 24% and 36% of the adolescent girls did not consume fish and meat for last 24 hours. About 70% of adolescent girls did not consumed milk. Only 20% was consumed fruit one time in last 24 hours. More than 40% of the girls did not consume vegetables in last 24 hours.

Table 5. Degree of relationship between height and weight of adolescent girls (in yrs).

Age	f	Correlation Coefficient (r)	Probability	Significance
13	10	0.09	$p > 0.0$	NS
14	45	0.36	$p < 0.05$	S
15	44	0.42	$p < 0.05$	S
16	35	0.54	$p < 0.05$	S
17	18	0.35	$p > 0.05$	NS

NS: not significant, S: significant

Table 6. Distribution of adolescent girls by their body formation.

Category	f	% f
Small	50	32.89
Medium	86	56.58
Large	16	10.53
Total	152	100

Table 8. Distribution of food items liked by adolescent girls.

Food items	f	% f
Fish	36	23.68
Meat	45	29.61
Pulse	7	4.61
Egg	16	10.53
Milk	16	10.53
Amla	10	6.58
Guava	9	5.92
Others fruit	23	15.15
Pumpkin	20	27.63
Lal sak	10	21.05
Kochu sak	34	22.39
Vegetable	18	11.84
Hot food	33	21.71
*Others	26	17.71

*Others included Ice cream, *Puri, Chanachur, Papor vhaja* and tea. Percent total is not mutually exclusive.

Table 9. Distribution of food items disliked by adolescent girls.

Food item	f	% f
Ruti	13	8.55
Pulse	25	17.44
Fat	76	50.58
Small fish	17	11.18
Egg	9	5.92
Milk	21	13.82
Sour food	12	7.89
Sweet food	45	29.61
Hot food	18	11.84
Bitter gourd	3	5.92
Pumpkin	30	19.74
Lal Sak	18	11.84
Colocasia leaves	20	13.56
Total vegetable	71	46.71
Amla	7	4.61
Sour fruit	6	3.95
Pine apple	5	3.29
Total fruit	18	11.84

Percent total is not mutually exclusive.

Table 7. Distribution of food habit of adolescent girls in last 24 hours.

Food	Consumed	TIME		
		1	2	3
Rice	100	2.38	69.05	28.57
Pulse	24.39	21.95	43.90	9.76
Fish	19.05	45.25	33.33	2.38
Meat	36.59	43.90	19.51	None
Potato	46.34	31.71	19.51	2.44
Vegetable	40.48	40.48	19.04	None
Egg	40.48	47.62	11.90	None
Milk	69.05	30.95	None	None
Fruit	70.0	20.0	10.0	-
Others	33.33	11.90	47.62	7.15

However 40.48% were consumed leafy and non leafy vegetables. Table 8 shows the food items chosen by adolescent girls in last 24 hours. Fish and meat were chosen by 23.68 and 29.61% of the adolescent girls respectively. Only 4.61% liked pulses. Among the 30% girls who concentrated fruits are the last 24 hours, Mango, guava and others fruits were chosen by 6.58, 5.92 and 15.15% adolescent girls respectively. Vegetables were chosen by 11.84% adolescent girls. Sour food, hot food and sweet food were chosen by 22.39, 21.71 and 21.05% adolescent girls. Others food included ice-cream, *puri*, *chanachur*, *paporvaja* and tea were chosen by 17.17% of girls.

Table 9 shows the food items disliked by adolescent girls. It appears from the this Table that *Ruti* and fat were disliked by 8.55 and 50.0% girls. Small fish were disliked by 11.18% girls. Egg and milk were disliked by 5.92 and 13.82% girls respectively. Bitter gourd, pumpkin and banana green were disliked by 5.92, 19.74 and 7.89% girls respectively. *Lal sak* and *Colocasia* leave were also disliked by 11.48 and 13.0% girls respectively. *Amla*, Sour fruit and Pineapple were disliked by 4.61, 3.95 and 3.29% girls respectively.

Table 10 compares present per capita food intake by food groups with the RDA of 13 to 17 years adolescent girls. It appears from the Table that the mean consumption were 338.57 g, 14.78 g was pulses, 47.14 g was vegetables, 80.0 g was fish, 35.71 g was meat, 14.28 g was oil/fat, 97.14 g was fruit, 20.0 g was egg and 57.14 g was milk. Total food consumption was found to be 704.26 g. The requirement met only 71.01% of RDA.

Energy intake was recorded to be 1166 Kcal for cereals, 84.95 for pulses, 21.39 for vegetables, 88.67 for fish, 40.54 for meat, 128.52 for oil/fat, 65.36 for fruit, 35.40 for egg and 66.85 for milk (Table 11). Total intake of energy was found to be 1697.68 Kcal, which is less 312.32 Kcal. The Table revealed average calorie requirement 2,200 Kcal. for adolescent girls.

Table 12 depicts daily caloric consumption falls between 89.2 and 90.6 of 13-17 yrs. Girls. Table 13 26% of adolescent girls had hemoglobin level less than 12 mgdl^{-1} of blood. On the other hand 74% of girls had hemoglobin level 12 g dl $^{-1}$ and above.

Table 14 showed that 24.99%, 72.36% and 2.65% of adolescent girls were found to be malnourished, normal and obese respectively by BMI, but South Asian normality of 18.5, all girls had normal BMI . The average BMI of 152 adolescent girls was found to be 18.90% which was less that the standard BMI (20.6%) for female.

Table 15 shows individual PBMI was 18.43%, 78.28% and 3.29% including malnourished, normal and obese respectively. The mean PBMI of adolescent girls was estimated to be 92.16 which is within normal rang of 80 to120.

Table 11. Average daily intake of energy (person^{-1}day^{-1}) of adolescent girls by food groups.

Food group	Average daily intake of energy (kcal)	% total calorie
Cereals	1166.0	68.68
Pulses	84.95	05.00
Vegetables	21.39	01.26
Fish	88.67	05.22
Meat	40.54	02.39
Oil/Fat	128.52	07.57
Fruits	65.36	03.85
Egg	35.40	02.09
Milk	66.85	03.94
Total	1697.68 Kcal.	100

RDA (ICMR) = 2200 Kcal; Percent of RDA = 77.17

Table 10. Average food intake (g person^{-1}day^{-1}) by the adolescent girls.

Food group	Average daily food intake	RDA (ICMR)	% RDA
Cereals	338.57	350	96.73
Pulses	14.28	70	20.40
Vegetables	47.14	112	42.09
Fish	80.0	58	137.9
Meat	35.71	58	61.57
Oil/Fat	14.28	35	40.8
Fruits	97.14	30	323.8
Egg	20.0	58	34.48
Milk	57.14	250	22.86
Total	704.26	991	71.07

RDA Recommended Dietary Allowances of Indian Council of Medical Research (ICMR, 1981).

Table 12. Average daily intake of energy (Kcal). of adolescent girls by age (in yrs).

Age	Average energy intake (kcal/day)	RDA (FAO/WHO)	Percent of Kcal Consumed
13	1651.08	1824	90.50
14	1674.38	1876	89.20
15	1697.68	1895	89.60
16	1720.98	1905	90.30
17	1744.28	1926	90.60

Table 13. Distribution of adolescent girls by different level of hemoglobin.

Hemoglobin gm/dl of blood	f	% f
Bellow 12 (anaemic)	40	26
12 & above (non anaemic)	112	74
Total	152	100

According to WHO guidelines anaemia was considered for adolescent girls when hemoglobin level is below 12g/dl.

Discussion

A total of 152 adolescent girls of age 13 to17 years were studied to find out their nutritional needs and availability. The average age of the randomly select girls was 15.05±1.13 years. The Average height of 16 years girls of 153 cm. and 17 years girls of 153.91 cm. were satisfactory when compared with the desirable height range of 153-160 cm. On the other hand the average height of 13 old girls had 151.17 cm, 14 years girls had 152.83 cm and 15 years girls had 152.94 cm which were below the desirable height range. It is remarkable that over all average height 152.82 cm of 152 adolescent girls was dejected when compared with the desirable height range of 153-160 cm. Ahmad *et al.*(1982) found that the average height of 139±7.9 cm, 146±8.4 cm, 146±5.8 cm, 149±4.8 cm and 148±4.5 cm for age 13, 14, 15, 16 and 17 years of rural girls respectively.

It was noted that the average weight of 16 years girls was 46.11 kg. Average weight of 14 years girls was 43.73 kg, which was not satisfactory when compared with the desirable range of 44-50 kg. The average weight of 44.96 kg of 152 adolescent girls was desirable when compared with the standard weight rang of 44-50 kg. Ahmad *et al.* (1982), found that the average weight 30.6±6.0, 33.9±7.4 g, 37.4±5.1 g, 40.8±4.8 g and 40.5±5.0 g for the age 13, 14, 15, 16 and 17 years for rural girls. In India, Tamilarasi *et al*. (1990) studied 20 obese adolescent girls and found that out of 20 girls, 6 had an average weight which lies between the range of 60 and 63 kg, 10 had an average weight which lies between the range of 64 and 67 kg and 4 had an average body weight of 68 kg and above.

Degree of relationship (r=0.54) between the height and weight of 16 years girl was found to be significantly higher ($p<0.05$) than the others. Relationship between height and weight and of 14years (r= 0.36) and 15 years (0.42) girls were also found to be significantly ($p<0.05$) correlated. However the correlation coefficient between height and weight of 13 years(r=0.09) and 17 years (0.45) adolescent girls were found to be poor.

Table 14. Distribution of body mass index (BMI) of the adolescent girls (13-17 yrs) by age.

Age	Malnourished (%)	Normal (%)	Obese (%)	Mean BMI ±SD (exact value)
13	2.63	4.61	-	19.35±2.52
14	7.89	14.47	1.33	18.69±2.32
15	5.92	21.71	1.32	18.79±3.75
16	5.26	23.68	-	19.34±2.70
17	3.29	7.89	-	18.62±3.23
Over all	24.99	72.36	2.65	18.90±2.95

Standard BMI for female = 20.6; 20.6 : Normal. <17:Malnourished.> 25: Obese.

Table 15.Body mass index (PBMI) of the adolescent girls by age.

Age	Malnourished (%)	Normal (%)	Obese (%)	PBM±SD
13	1.32	6.58	-	94.09±12.28
14	5.92	21.05	1.32	90.71±11.71
15	4.61	17.76	1.32	93.91±13.12
16	3.29	23.68	-	93.34±11.82
17	3.29	9.21	-	88.39±12.81
Over all	18.43	78.28	3.29	92.16±12.62

PBMI = BMI X 100 /Standard BMI; Standard BMI : male = 22.1 Female = 20.6; PBMI: <80 : Loan/malnourished. 80-120: Normal; 121-139: Obese. ≥ 140: Very Obese.

The average age at menarche period was 12.33±1.11. Naomi, (1992) reported that the average age and age range at menarche was 12.1±1.0 and 10.1-14.9 respectively, which is almost similar to the present study. It was observed that 56.58% of adolescent girls were found to be medium framed. According to age, 10.53% of adolescent girls were large size. More than 32% of girls were small in size. It is observed from the present study that cereal is consumed as the staple food. Potato, which is another potential source of energy, 46% of adolescent girls did not consumed potato over the last 24 hours. Proteins are nitrogenous substances present mainly in fish, meat, egg, pulse, groundnut, soybean and other seeds. The principal function of protein is to construct the body skeletal structure and to build new tissues and repair and maintenance of tissues that have already built (Naomi, 1992). In acute deficient intake of carbohydrate and fat, protein acts as the main source of energy. From the results it was observed that in some cases protein rich food is scanty in the daily diet. Indian worker (Naomi, 1992) has also observed similar trend. Therefore consumption of protein rich food such as fish, pulses and meat should be increased in the daily diet of adolescent girls.

The present study showed that about 48.48%, 69.48% and 70.0% of adolescent girls did not eat vegetable, egg, milk and fruits in the last 24 hours during the survey, but this foods are sources of mineral and vitamins. Thus lower rate of consumption of these foods may make the girls susceptible to diseases.

The distribution of food items liked by adolescent girls that 32% of girls were chosen carbohydrate foods. Protein containing foods from animal source were chosen by 45% of girls. Only 7% of adolescent girls liked to eat protein-enriched food from plant sources. Mineral containing foods were chosen by 42% of girls. Vitamin containing foods were like consumed by 42% of adolescent girls. There was none to like fat rich foods. It was observed that more than 8% and 50% and 50% of adolescent girls disliked wheat product food and fat. Whereas these food items gives us maximum energy for various body activities. Small fish is a source of calcium, which is needed for the formation of bone and teeth. It was observed that more than 11% girls were disliked small fish.

Iron is needed for blood formation. At deficient intake of iron blood will not be formed properly and hence the body shall suffer from anemia. Liver, meat, egg, pulses, molasses, dried fish, dark green leafy vegetables, colocasia leaves etc. are good sources of Iron. It was observed that egg,

colocasia leaves and others leafy vegetable were disliked by only 5.92%, 13.56% and 11.18% of the adolescent girls (Table 9). The main source of vitamin C in any diet is fruit, which should be consumed raw. Because of the heat labial nature vitamin C is destroyed significantly during cooking. We need to take regular supply vitamin C because it is not stored in the body. It has various functions in the body. Vitamin C helps in wound healing, in absorption of iron from intestinal tract, in smoothing the skin etc, Deficiency of vitamin C for long period causes scurvy-characteristic of swollen, bleeding gum, hemorrhages into the skin. Locally available fruits rich in vitamin C such as *amlaki*, guava, *amra*, ripe *mano*, orange, lemon and *jambura* should be eaten regularly. The present study showed that *amlaki*, sour fruit and pineapple were disliked by only 4.61%, 3.95% and 3.29% adolescent girls (Table 9). Average cereals intake by the adolescent girls was found to be 338.57 g person^{-1}day^{-1} (Table10) which was 97% of the requirement. This constituted about 48 % of total food intake; Consumption of pulses was recorded to be 14.28 g person^{-1} day^{-1}. There was a mean decrease of 55.72 g when compared to RDA (70 g) (Table10). There was a glaring deficit in the intake (47.14 g) of vegetables when compared to the RDA (112 g). This intake was lower by 64.86 g which implies that 42.09% of the RDA. In the case of fish there was a mean increase of 22 g when compared to RDA (58 g). Average intake (35.71g) of meat was decreased of 22.29 g which implies 61.5% of RDA (58 g). The average intake of fruits was found to be 97.14 g compared to RDA (30 g). This increase intake was more than three times of RDA, may be due to abundance of fruits available during the survey period. Average intake of egg was 20 g. This intake was lower by 38 g, which implies 34.48% of RDA (58 g). There was a glaring deficit in the intake of milk decrease of 192.86 ml when compared to RDA (250 ml). In the case of oil, there was a mean decreased of 20.7 g when compared to RDA (35 g). This implies 40.81% of RDA (35 g). Average intake of total food was found to be 704.26 g. This contributed 71.07% of the RDA (991g) (Table 10). Ahmad *et al.* (1982) reported that the average consumption of food of rural Bangladesh was 765 g person^{-1} day^{-1}. In India, (Tamilarasi, 1990) the average intake of obese adolescent girls was 422 g by cereal, 73 g by pulses, 49 g by leafy vegetables, 55 g by pther vegetables, 23 g by fruits, 325 ml by milk and 45 g by oil. Ahmad *et al.* (1982) was found that average food intake (g person^{-1}day^{-1}) of rural population of Bangladesh were 488 g by cereal, 8 g by pulses, 20 g by leafy vegetables, 46 g by non-leafy vegetables, 13 g by milk & milk products and 3 g by fats and oils. The average intake of energy by the 13-17 years adolescent girls was found to be 1697.68 kcal. This intake was 71.07% of the requirement. The average intake of energy of 13, 14, 15, 16 and 17 years girls were 90.5%, 89.2%, 89.6%, 90.3% and 90.6% of the RDA respectively. It was found that the average intake of energy of obese adolescent girls was 2481 kcal. Ahmad *et al.* (1982) reported that the average intake by the rural Bangladeshi was 1943 Kcal. It was observed that 25 out of 152 adolescent girls had less than minimum acceptable Hb (12 gdl^{-1} of blood). From the above results it was predicted that 16% or 18% of adolescent girls were found to be anemic. In present study the prevalence of iron deficiency in adolescent girls is likely to be due to a low intake iron containing foods. According BMI 4.16% of 13 years girls was found to be normal, more than 14% of 14 years girls were estimated to be normal. About 22% of 15 years girls were found to be normal. More than 23% of 16 years estimated to be normal. Only 7.89% of 17 years girls were predicted to be normal. Over all 24.99%, 72.36% and 2.65% were predicted to be malnourished, normal and obese respectively. The average BMI of 152 adolescent girls was 18.90 which were below the normal, BMI of south Asia stands and it was normal.

Conclusion

The findings of the present study are matter of great concern. The intakes are deteriorating and a serious situation would arise unless it is halted. Consumption of potato, pulses, vegetables and milk have seriously declined. The deficiency of energy in which about 29% girls run short of

requirement. The average height and weight of the adolescent girls were 152.82 cm and 44.96 kg. Average body mass index was found to be 18.90 According to BMI over all 24.99%, 72.36% and 2.65% were estimated to be malnourished, normal and obese respectively Bio- chemical and clinical. About 17% of adolescent girls did not have the minimum acceptable level of hemoglobin in blood. About 23% and 3% of the girls were malnourished and obese by any nutritional status criteria.

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