Lifestyle and Nutritional Status of School Going Adolescent Girls in a Semi Urbon Area of West Bengal, India

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Abstract: *Adolescence is a journey from the world of childhood to the world of adulthood. In India adolescents constitute 21.4% of the population that comprises one-fifth of the total population. The health and nutritional status of the children is an index of the national investment in the development of future manpower. Thus present study was undertaken to assess the nutritional status of school going adolescent girls in semi urban area of West Bengal. This study was conducted among 746 school children of 11-18 years studying in four girls' schools in Hooghly district. School was selected by simple random sample in two municipality areas. Nutritional status was evaluated using anthropometric indicators recommended by WHO(World Health Organization) experts committee. Height for age below 3rd percentile of NCHS (National Centre for Health statistics) /WHO reference values was classified as stunting. Thinness was defined as BMI-for-age $<5^{th}$ percentile of WHO/NCHS standard data. Over weight and obese were defined as BMI-for –age $>85^{th}$ percentile and $>95^{th}$ percentile respectively. The present study highlight the duel burdens of underweight and overweight in semi urban adolescent girls. Overweight is more urgent problem than underweight. Lifestyle (physical activity and fast food intake habit) was one of the contributing factor of overweight. To minimized both forms of malnutrition, it is essential to educate and create awareness programmes at the community levels. Health education programmes and effective policies are urgently required to promote healthy eating and physical activity.*
Keywords*: Adolescent girl, nutritional status, fast food, physical activity*

I. Introduction

Adolescence is a journey from the world of childhood to the world of adulthood. This period is very crucial since these are the formative years in the life of an individual when major physical, psychological and behavioral changes take place. Adolescence is a vulnerable period in human life cycle when nutritional requirements increase due to adolescent growth spurt. This period is characterized by rapid increase in height and weight and hormonal changes resulting in sexual maturation (1). Adolescence, one of the nutritional stress periods of life with profound growth, comes with increased demand for energy, protein, minerals and vitamins (2). Malnutrition, both under nutrition and over nutrition resulting from imbalance of nutrients is of public health significance among adolescents across the world (3). The coexistence of overweight/obesity and under weight is rather common in developing countries and is found to be increased proportionally over time (4, 5). In India adolescents constitute 21.4% of the population (6) that comprises one-fifth of the total population. The health and nutritional status of the children is an index of the national investment in the development of future manpower. Several studies have investigated the nutritional status of children and adolescents from different parts of India (7, 8).In India alone, there are approximately 60 million children who are under weight (9), and this prevalence is higher in rural areas compared to urban areas (10). However, India is now also beginning to experience the emerging problem of overweight (11). A recent study along Indian children in the age group of 6-18 years suggests the existence of double burden of underweight and over weight (12). Most of the studies regarding nutritional status of adolescent girls were carried out in rural areas and urban areas. No or little research on nutritional status of adolescent girls yet was undertaken in semi urban areas. Thus present study was undertaken to assess the nutritional status of school going adolescent girls in semi urban area of West Bengal.

II. Material And Methods

Study subject: The present study was conducted among school children of 11-18 years studying in four girls' schools in Hooghly district during their school hours from March 2013 to April 2014. The prior written permission of school authority was taken. Written consent from the parents of the students experimented in the study was obtained. The ethical clearance was duly sought from the Departmental Ethical Committee, Department of Physiology, Hooghly Mohsin College since the method was noninvasive. The subjects of this study were chosen at random irrespective of socioeconomic status and religion so that reflection of an overall picture of menstrual health status of study region could be achieved. All students who were willing to participate in the study were included in the study. They were invited to answer the questionnaires, which dealt with

background information such as age, physical activity and dietary habit. We excluded the students who are suffering from any chronic health condition and are using any medicines for long duration.

Measurement of body weight: Body weight was measured using bathroom scale accurate to 0.5kg. The scale was kept on a flat surface and adjusted with '0' mark. Now the subject was requested to step on it in bare feet. Weights were taken in light cloth. Weight was recorded to the nearest 0.5kg.

Measurement of body height: Height was measured using anthropometric rod. Height of the subject was recorded without footwear and expressed to the nearest 0.1cm.

Estimation of body mass index (BMI): BMI was calculated from the height and weight using following equation: BMI (kg / m^2) = weight (kg) / height^2 (m). BMI-for-age <5th percentile of WHO/NCHS standard was considered as thin, BMI for age between 5th to 85th percentile considered as normal.

Study of dietary practices: dietary practices were assessed by putting questions on dietary preference, junk food intake and, frequency of intake of green vegetable.

Junk foods include chips, chocolate, icecream, soft drinks, burgers, pizzas, chowmein, pakora, samosa etc (13). Junk food consumption was studied on the basis of frequency of eating:

Category a: junk food intake 0- 1 day/ week

Category b: junk food intake 2-3 days/ week

 Category c: junk food intake 4-5 days/ week

Category d: junk food intake regularly 6- 7 days/ week

Study of physical activity: Physical activity was ascertain by asking for daily physical activity (running, fast walking, cycling, dancing). Physical activity was divided into four categories by modifying the method of Soudarssanane et al (14): Very mild (<1 hour/day); Mild (1hr/day); moderate (2-3hour/day) and heavy (>3 hour/day).

Determination of nutritional status: Nutritional status was evaluated using anthropometric indicators recommended by WHO experts committee. Height for age below 3rd percentile of NCHS/WHO reference values was classified as stunting (15). Thinness was evaluated using WHO recommended age-specific cut off point based on WHO reference data. Thinness was defined as BMI-for-age <5th percentile of WHO/NCHS standard data. Over weight and obese were defined as BMI-for –age >85th percentile and >95th percentile respectively (16).

Statistical analysis: the parameters taken were analyzed statistically to find out the mean and standard deviation. Percentile of height, weight and BMI were computed. These were compared with existing international standards for evaluation of nutritional status of the selected subjects. Correlation between obesity and frequency of fast food intake and physical activity was estimated. Chi square test was used to estimate the significance of correlation. P<0.05 was consider as significant.

III.   Results

Total 811 girls were interviewed but 65 girls were excluded. Age wise distribution subjects were given in table 1. All the subjects are unmarried. Age varies from 11 to 18 years with average of 14.67 years. 4.9% girls were coming from Hindu families, 31.36% from Muslim and 3.69% from other religions.

Table-1: Age wise distribution of study subjects

Characteristics		Number	Percentage
	11	28	3.75
	12	48	6.43
	13	133	17.83
	14	134	17.96
	15	164	21.98
	16	118	15.82
	17	71	9.52
	18	50	6.70
	Hindu	624	83.65
	Muslim	122	16.35
	Other	nil	------
	Unmarried	746	100
	Married	Nil	----

The mean height, weight and BMI of the study subjects in different ages was given in table-2

Table2: Mean of anthropometric parameters by age

Age (year: month)	Height (cm)	Weight (kg)	BMI (kg/m^2)
11:0 to 11:11 (28)	145.89 ± 5.89	36.89 ± 9.52	17.24 ± 4.01
12:0 to 12:11 (48)	147.7 ± 5.84	41.13 ± 9.84	18.73 ± 3.72
13:0 to 13;11 (133)	148.36 ± 6.15	41.95 ± 8.72	19.00 ± 3.60
14;0 to 14:11 (134)	151.37 ± 4.90	48.16 ± 11.91	20.88 ± 4.39
15;0 to 15:11 (164)	152.39 ±4.67	46.79 ± 10.42	20.12 ± 4.18
16:0 to 16:11 (118)	153.00 ±6.98	48.70 ± 8.81	20.77 ± 3.33
17:0 to 17:11 (71)	153.33 ± 4.72	49.29 8.55	20.93 ± 3.36
18:0 to 18;11 (50)	152.60 ± 6.63	48.94 ± 8.75	20.94 ± 3.00

Mean Height was far lower than median values of WHO standard. There was no significant difference of BMI of study subjects with median value of WHO standard.

Table-3: comparison of mean height and BMI of study subject with WHO standard

	Median height (cm)		Median BMI (kg/m^2)	
	WHO standard	Present study	WHO standard	Present study
11:0 to 11:11 (28)	148.20	145.89	17.60	17.24
12:0 to 12:11 (48)	154.00	147.70	18.40	18.73
13:0 to 13;11 (133)	158.30	148.36	19.20	19.00
14;0 to 14:11 (134)	160.90	151.37	19.90	20.88
15;0 to 15:11 (164)	162.20	152.39	20.50	20.12
16:0 to 16:11 (118)	162.70	153.00	20.90	20.77
17:0 to 17:11 (71)	163.00	153.33	21.20	20.93
18:0 to 18;11 (50)	163.10	152.60	21.30	20.94

Prevalence of stunting of study subjects was represented in table-3. In respect to NCHS standard 31.37% of study subjects were stunted. Stunted was noted in all age group of study and maximum in 16 year age group subjects.

Table-4: Prevalence of stunting of the selected adolescent girls

| Age (year: month)	Height for age (cm)		
	NCHS standard (3rd percentile)	Present study (mean ± SD)	Stunted (<3rd percentile) Number (%)
11:0 to 11:11 (28)	135.0	145.89 ± 5.89	01 (3.57)
12:0 to 12:11 (48)	140.6	147.7 ± 5.84	05 (10.42)
13:0 to 13;11 (133)	144.9	148.36 ± 6.15	28 (21.05)
14;0 to 14:11 (134)	147.7	151.37 ± 4.90	47 (35.07)
15;0 to 15:11 (164)	149.2	152.39 ±4.67	49 (29.88)
16:0 to 16:11 (118)	150.0	153.00 ±6.98	42 (35.59)
17:0 to 17:11 (71)	150.4	153.33 ± 4.72	18 (25.350
18:0 to 18;11 (50)	150.8	152.60 ± 6.63	12 (24.00)
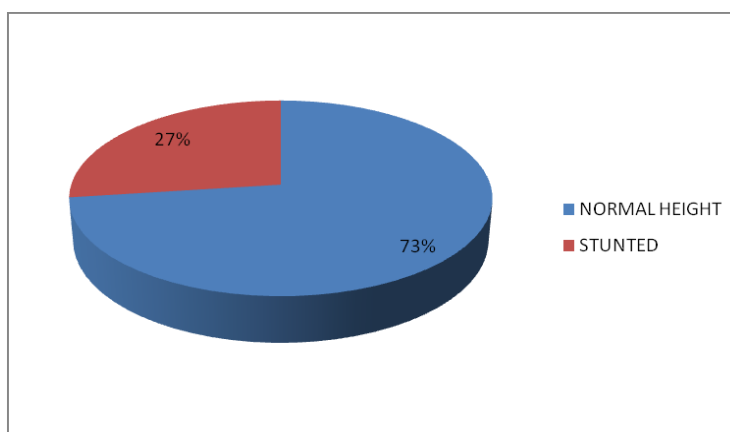
Fig.1: Prevalence of stunting among adolescent school going girls

Health status in respect to BMI was represented in table-5. Nearly 15% of the subjects, in the present study were found to be thin and 23% were overweight.

Table-5: Nutritional status of the selected adolescent girls

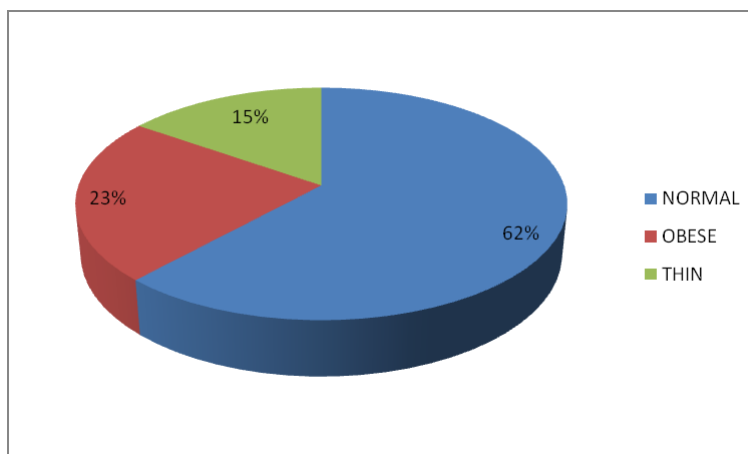| Age (year)	Thin	Overweight and obese	Normal
11 (n=28)	4 (14.290	3 (10.71)	21 (75.00)
12 (n=48)	4 (8.33)	9 (18.75)	35 (72.92)
13 (n=133)	7 (5.26)	58 (43.61)	68 (51.13)
14 (n=134)	30 (22.39)	19 (14.18)	85 (63.43)
15 (n=164)	32 (19.51)	31 (18.90)	93 (56.71)
16 (n=118)	20 (16.95)	28 (23.73)	76 (64.41)
17 (n=71)	14 (19.72)	12 (16.90)	47 (66.20)
18 (n=50)	3 (6.00)	11 (22.00)	36 (72.00)

Fig.2: Nutritional status adolescent school girls

To correlate between overweight and life style we studied fast food intake frequency and physical activity status of the selected adolescent girls. Percentage of obesity is more in group of subject those fast food intake frequency was more than other group (table-6).

Table-6: Fast food intake and prevalence of over weight

Frequency of fast food intake (day/week)	Number of subject	Number (%) of obese	Significance
0-1	194	21 (10.82)	Chi square=40.483
2-3	201	29 (14.42)	df=3
4-5	197	45 (22.84)	$p<0.001$
6-7	154	56 (36.36)	

We found that physical inactivity minimizes chance of overweight. Prevalence of overweight was more in subject those are physically inactive or less active than physically active subjects (table-7).

Table-7: Physical activity and prevalence of over weight

Physical activity	Number of subject	Number (%) of obese	Significance
Very mild (<1hour/day)	153	53(34.64)	Chi square
Mild (1hr/day)	296	61 (20.61)	=31.326
Moderate (2-3 hr/day)	205	30 (14.63)	df=3
Heavy (> 3hr/day)	92	7 (7.61)	$p<0.001$

IV. Discussion

The aim of this study was to assess the nutritional status of adolescent school going girls having age limit 11-18 years. Height for age below 3rd percentile of NCHS/WHO reference values was considered as stunted and above 3rd percentile as healthy (15). The findings indicate that 27% of the adolescent girls were found to be stunted (fig.1). This finding is comparable to other micro-level studies carried on adolescent girls in different parts of India (17, 18). Stunting has important implications for reproductive health of adolescent girls as it can lead to obstructed labor during child birth due to a small birth canal (19).

15% of the study subjects were found to be thin (fig.2). Thinness has implication on reproductive health. It can result in poor pregnancy outcome especially in terms of low birth weight and increased risk of infant mortality (20).

Adolescent obesity is one of the major global health challenges of the 21st century (21). Rapidly changing dietary practices and a sedentary life style have lead to the increasing prevalence of childhood obesity

(22). Adolescent obesity causes dual problems: firstly obesity is associated with serious medical problems, including high blood pressure, diabetes mellitus, atherosclerotic cardiovascular diseases, coronary heart disease etc. Secondly, overweight and obesity acquired during childhood or adolescence may persist into adulthood and increase the risk of some chronic diseases later in life. 22.92% of selected adolescent girls were overweight (BMI >85th percentile) / obese (BMI >85th percentile).

The new millennium has signaled an important transition for our species with more people being overweight than underweight globally (11). Result of the present study also supports this where thinness was 15.28% and overweight was 22.92% (Table-5). In several of the developing nations across the world and even Africa, a continent usually associated with starvation, the prevalence of overweight/obesity is increasing (23). The basic reasons accounting for this change over the last three decades are attributed to a nutrition transitions towards increasing consumption energy dense foods and high calorie liquids as well as an increasing and more stable access to low-priced processed foods (24, 25). Our study also supports this observation. We noted significant association between obesity and frequency of fast food intake. These foods are lack of nutrients that body needs to stay healthy, rich in fat and calorie and lacking in protein, vitamins, essential minerals and fibers (26).

Improvements in socioeconomic status of populations are often attributed as another reason (27). Increasing levels of urbanization, mechanization of jobs, transportation and dependence on television for leisure along with parallel declines in physical activity have increased sedentary behaviors of both children and adults (28-30). In our study most of the adolescent girls (61.8%) performed very mild to mild physical activity. We also noted significant association between low physical activity and prevalence of overweight/obesity. Obesity/overweight and low physical activity among adolescent and school children was also reported in two different studies, one in China (31) and in Ludhiana (32). Thus rapidly changing diets and lifestyles are fuelling global obesity epidemic (30). The globalization of fast food is also beginning to affect children's eating patterns in many countries undergoing nutrition transition (33).

V.   Conclusion

The present studies highlight the duel burdens of underweight and overweight in semi urban adolescent girls. Overweight is more urgent problem than underweight. Therefore, to reduce both forms of malnutrition, it is essential to educate and create awareness programme at the community levels. Health education programmes and effective policies are urgently required to promote healthy eating and physical activity. Further studies need to be conducted in order to understand clearly whether the coexistence of underweight and overweight among semi urban adolescent girls is related to the influence of any other   reasons.

Acknowledgements

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