



Original Research Article

Assessment of Dietary Intake, Routine Physical Activities and BMI of Adolescent Girls Pursuing Undergraduate Studies at Orai, U.P.

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ABSTRACT

Study of nutritional status in adolescence is very important as adolescence is the time to learn and adopt healthy habits to avoid many health and nutritional problems later in life. Healthy lifestyle habits of adolescents' girls will have important role to play in maintaining future family health and nutrition. Keeping this in view a study was undertaken to assess dietary intake, routine physical activities and BMI of adolescent girls pursuing undergraduate studies at Orai (Dist. Jalaun) U.P. The cross-sectional study was carried out on a sample of 300 college going adolescent girls in the age group of 17-19 years. Results revealed that majority of the girls were underweight with BMI <18.5(66%). About 50% girls were found to be sedentary active. Deficient Protein (9.1↓ %) and energy intake (41.9↓ %) was seen when intake of these nutrients was compared to recommended dietary allowances (RDA) prescribed by ICMR. Summary of one way ANOVA of final scores of BMI, protein and energy intake among vigorously active, moderately active and sedentary active adolescent girls indicated a significant association ($p < 0.05$). This significant association points out that the activity plays a vital role in deciding the basal metabolic rate as well as affects protein and energy intake of the adolescent girls.

Keywords: Adolescent girls, nutrient intake, physical activity, BMI

INTRODUCTION

Adolescents constitute over one fifth of India's population. Adolescence begins when the secondary sex characteristics appear and ends when somatic growth is completed and the individual is psychologically mature, capable of becoming a contributing member of society.

^[1] Nutritional problems of adolescent girls are common in the developing countries. Inadequate diet and unfavourable environmental condition in developing

nations like India may adversely affect the growth and nutrition of adolescents. Malnutrition, both under nutrition and overnutrition, refers to an impairment of health, resulting from a deficiency or from an excess or imbalance of nutrients. It is of public health significance among adolescents across the world. ^[2] During this period, adolescents gain up to 50% of their adult weight, 20% or more than that of their adult height and 50% of their adult skeletal mass. Requirements of calories and protein

are maximal, as also requirements of other nutrients, e.g. iron, calcium and vitamins, which increase. [3] One US study showed that female adolescents generally did not tend to increase energy intake with increasing age. [4]

Healthy eating and physical activity habits formed during childhood can persist into adulthood and prevent or delay premature onset of a number of chronic diseases. There is evidence of an association between physical activity and dietary behaviours in adolescents. Therefore a need is felt to develop a database on the nutritional status of the adolescent girls from different parts of the country to enable the governments and other non-governmental agencies to formulate policies and initiate strategies for the well-being of adolescent. In this respect, an attempt has been made to assess dietary intake, routine physical activities and BMI of adolescent girls pursuing undergraduate studies at Orai U.P.

MATERIALS AND METHODS

Study Locale and Sampling

This cross-sectional study was carried out at Orai a town in district Jalaun U.P. As the study was focused on adolescents the sample comprised of 300 adolescent girls in the age group of 17- 19 years. All these girls were perusing their graduation courses from, Dayanand Vaidik Degree College Orai and Kailashi Devi Girls Degree College district (Jalaun) U.P. College authority was approached so that adolescent girls could be contacted. Once the permission was granted by the authorities, the class teachers of the respective classes were explained the purpose of the study and rapport was built up with the girl students and verbal consent of their participation in the study was obtained.

There are different factors that affect nutritional status of adolescents.

Socioeconomic status, age, sex, and mothers' educational level are among the important determinant factors of nutritional status of adolescents and socioeconomic status plays a major role in determining health. [5] In the present study majority of the girls belonged to lower middle income group according to Kuppuswamy's socioeconomic scale. Adolescence is generally characterized by marked declines in physical activity (PA), [6] and adolescents who have low levels of PA are likely to remain insufficiently physically active as they become adults. [7] Physical activity of the adolescent girls was noted by 24 hours activity recall questionnaires method. This served as basis for computation of energy expenditure. Energy expenditure of each study subjects was determined by multiplying their Basal Metabolic Rate (BMR) and rate of energy expenditure. On the basis of the values obtained on applying above stated formula all the adolescent girls were categorized as sedentary, moderate or vigorously active. [8]

Administration of Questionnaire for Data Collection

Questionnaire or interview schedule serves as important data gathering tool. Therefore a predesigned and pretested questionnaire was administered to the students which enabled researcher to acquire the data relevant to the study. Information regarding socio-demographic background of all the study subjects was recorded. Anthropometric data and dietary intake were obtained to describe nutritional status. All the adolescent girls were subjected to anthropometry (weight & height recording) using standard techniques. The body weight was recorded when the display of the body weight became stable on weighing scale. Height was recorded to the nearest centimeter using standard procedure. Nutritional status of girls was assessed on

the basis of body mass index (BMI). BMI was computed using the formula weight (kg)/ height (m²). Study subjects were categorized in different grades of nutritional status as indicated by BMI value. [9]

The diet survey provides information about dietary intake and pattern, specific foods consumed and nutrient intake by the people and brings out relative dietary inadequacies as judged by the available standards. [10] Inquiries were made retrospectively about nature and quantity of food consumed by the adolescents for three consecutive days by three day recall method of dietary survey. Their nutrient intake was computed by referring to “Nutritive Value of Indian Foods”. [11] Diet survey was not conducted on day after any festival or any other special occasion.

Statistical Analysis

The data gathered through questionnaire was tabulated. Association between variables was determined using one way ANOVA. Statistical Package for Social Sciences (SPSS version 17.0) computer software was used for statistical analysis of the data.

RESULTS AND DISCUSSION

The entire numbers of subjects were divided into three groups as per their energy expenditure in terms of physical activity as sedentary, mediocre and high (vigorously active). Assessment of Body Mass Index (BMI), from the height and weight measurements of individuals, is a generally accepted measure of nutritional status. Based on the BMI, adolescent girls were classified as abnormally thin if their BMI was less than 18.5; overweight or obese if their BMI was 25 or more; and normal if their BMI was 18.5 or higher but less than 25. BMI less than 18.5 is usually classified as having chronic energy deficiency. The study highlighted that out of total 300 girls

only a small number of girls were either overweight or obese.

Table 1. BMI status of adolescent girls under study

BMI status	Total no. of adolescent girls =300	
	No.	%
<18.5 under weight	190	66.2
18.5-25 normal weight	83	28.6
25-30 over weight	17	5.4
Obesity BMI of 30 or greater	-	-
Total	300	100

Table above depicts data on BMI of the subjects under study. It clearly indicates that out of 300 subjects, 190 (66.2%) girls were under weight (BMI less than 18.5), 83(28.6%) girls were of normal weight and only 17 (5.4 %) girls were overweight. Thus it was observed that majority of the subjects in the study were underweight. Findings of a sample survey of 300 respondents from Khagrachhari district in Chittagong hill tracts region of Bangladesh are in accordance with our study which reports that 41.33% of adolescent girls fell into underweight category of BMI status and 35.00% of the adolescent girls were having normal BMI status. [12] It is reported in several research studies that nutritional inadequacy leads to health problems, especially during the period of increased demand. Underweight status has been associated with higher rates of morbidity and mortality, although to a lesser extent than obesity. Adolescents are a potential group in view of rapid growth and maturation which demands extra nutrients. Chronic diseases often become more severe during adolescence, further increasing nutrient and energy demands.

Table 2. Mean protein and calorie intake of the adolescent girls

Nutrients	Actual Nutrient Intake	RDA	% Difference
Energy (Kcal)	1415	2440	41.9↓
Carbohydrates (g)	238.6	300	20.4↓
Protein (g)	50.4	55.5	9.1↓
Fats(g)	19.4	35	44.5↓

The mean nutrient intake of, energy, protein, carbohydrate, and fat was found

deficient when compared with ICMR guidelines. It was observed that protein and energy intake was deficient by 9.1 % and 41.9% respectively when compared to ICMR standards. This dietary inadequacy for protein and energy might have been a contributory cause of underweight in adolescent girls under study. According to a study conducted in South India mean nutrient intake of the selected government school girls was significantly lower when compared with Recommended Dietary Allowance of Indians. Nutritional inadequacy is one of the main causes of prevalence of malnutrition that can lead to higher incidence of diseases among adolescents. [13] Yet another study highlighted the double burdens of underweight and overweight, though underweight is a more urgent problem than overweight among Meitei children and adolescents and emphasizes reducing both forms of malnutrition, with special attention to underweight, and suggests that it is essential to educate and create awareness programmes at the community levels. [14]

Table 3. Adolescent girls belonging to each category of Activity

S.No	Physical Activity Level	No.	%
1	Sedentary	155	55.66
2	Moderate	130	43.34
3	High	15	5

Assessment of activity level indicated that out of total 300 adolescent girls 155(55.66%) were sedentary active, 130 (43.34%) adolescents were doing moderate activity and remaining 15(5%) girls were vigorously active. Majority of the subjects were sedentary active showing declined physical activity level (PAL). Sedentary behavior has recently been undergone intense research and is believed to be associated with adverse health outcomes in a way that is thought to be different from those attributed to lack of physical activity. [15]

Table 4. Descriptive Statistics like Mean, Standard deviation of BMI of all groups of activity
Dependent Variable: BMI

Physical Activity	Mean	Std. Deviation	N
Sedentary	17.8708	2.73014	155
Mediocre	19.0119	2.00309	130
High	18.5467	2.28594	15
Total	18.3991	2.47464	300

Table 5. Summary of one way ANOVA of final scores of BMI among vigorously active, moderately active and sedentary adolescent girls
Dependent Variable: BMI

Source of variance	Type III Sum of Squares	df	Mean Square	f	Remark
Physical Activity	92.413	2	46.207	7.893	P<0.05
Error	1738.618	297	5.854		
Total	103388.727	300			
Corrected Total	1831.031	299			

It is evident in the table above that the f value for group being 7.893 is significant with df= 2/297. It indicates that the mean scores of BMI of vigorously active, moderately active and sedentary adolescent girls differ significantly. This means that the activity plays a vital role in deciding the basal metabolic rate of the adolescent girls. To find out which group had the higher levels of BMI a post hoc test was administered and higher levels were found in moderately active and vigorously active adolescent girls. If at all the number

of samples of vigorously active girls would have been a little high then the means of highly active subjects would have also been higher. But the fact remains the same as young girls of now flinch themselves from intense activity

The output indicates that significant differences do exist between the various groups, and the Duncan's table reveals that mediocre girls in terms of activity possesses higher BMI than the other groups

Table 6. Summary of Post Hoc Test for Activity for the variable- BMI through Duncan test

Physical Activity	N	Subset
	1	1
Sedentary	155	17.8708
High	15	18.5467
Mediocre	130	19.0119
Sig.	.055	

Table 7. Descriptive Statistics like Mean, Standard deviation of energy intake of all groups of activity

Physical Activity	Mean	Std. Deviation	N
Sedentary	1386.32	292.402	155
mediocre	1448.84	230.498	130
High	1599.53	142.061	15
Total	1424.07	265.430	300

Table 8. Summary of one way ANOVA of final scores of Energy Intake among vigorously active, moderately active and sedentary adolescent girls

Dependent Variable: Energy Intake

Source of variance	Type III Sum of Squares	df	Mean Square	F	Remark.
Physical Activity	762492.679	2	381246.340	5.577	p < 0.05
Error	20303024.851	297	68360.353		
Total	629458127.000	300			
Corrected Total	21065517.530	299			

From the table above, it is clear that the f value for group being 5.577 is significant with df= 2/297. It indicates that the mean scores of energy intake of vigorously active, moderately active and sedentary adolescent girls differ significantly. This means that the activity plays a vital role in deciding the energy intake of the adolescent girls. To find out which group hand the higher levels of energy intake a post hoc test is administered and higher levels were found in vigorously active and in moderately active adolescent girls.

The output of Duncan test shows that the differences are though non-significant,

the levels are high in vigorously active group followed by the mediocre active group.

Table 9. Summary of Post Hoc Test for Activity for the variable- energy intake through Duncan test

Physical Activity	N	Subset	
	1	2	1
Sedentary	155	1386.32	
Mediocre	130	1448.84	
High	15		1599.53
Sig.	.304	1.000	

Table 10. Descriptive Statistics like Mean, Standard deviation of protein intake of risk factors of all groups of activity

Physical Activity	Mean	Std. Deviation	N
Sedentary	48.5819	10.88499	155
mediocre	52.6593	16.26488	130
High	59.2600	9.41525	15
Total	50.8827	13.67289	300

Table 11. Summary of one way ANOVA of final scores of Protein intake among vigorously active, moderately active and sedentary adolescent girls

Dependent Variable: Protein Intake

Source of variance	Type III Sum of Squares	df	Mean Square	F	Remark
Physical Activity	2283.506	2	1141.753	6.325	p < 0.05
Error	53613.904	297	180.518		
Total	832612.158	300			
Corrected Total	55897.410	299			

It is evident in the table above that the f value for group being 6.325 is significant with df= 2/297. It indicates that the mean scores of protein intake of adolescent girls who are vigorously active, moderately active and sedentary differ significantly. This means that physical activity triggers the protein intake of the adolescent girls To find out which group hand the higher levels of protein intake a

post hoc test is administered and higher levels were found in vigorously active and in moderately active adolescent girls.

The output of Duncan test shows that the differences are though non-significant, the levels are high in vigorously active group followed by the mediocre active group.

Table 12. Summary of Post Hoc Test for Activity for the variable – Protein Intake through Duncan test

Physical Activity	N	Subset	
		1	2
Sedentary	155	48.5819	
Mediocre	130	52.6593	
High	15		59.2600
Sig.	.192	1.000	

CONCLUSION

Malnutrition, especially under-nutrition, is a major health problem affecting the development of children in many low and middle income countries. The high prevalence of inadequate dietary intake, unhealthy dietary habits and sedentary physical activity among adolescent girls were observed in the present study is a major public health concern. Underweight status has been associated with higher rates of morbidity and mortality, further under nutrition is likely to aggravate the situation and lead to ill health and chronic diseases in later life. Future research is required to address the determinants of sedentary behaviours, inactivity, and unhealthy dietary habits and initiate interventional programs to combat unhealthy lifestyle habits in adolescents.

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