Original Article

Nutritional Status in Relation to Food Habits and Lifestyles among Adolescent Boys and Girls of Sombaria Village, West Sikkim

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Abstract

Background: Nutritional status is the health status of an individual resulting from the intake and utilisation of nutrients. Adolescence is a nutritionally vulnerable developmental stage, and insufficient dietary intake can lead to delayed sexual maturation and growth**.**

Objective: The present study was conducted to assess the nutritional status in relation to food habits and lifestyles among adolescent boys and girls of Sombaria village, West Sikkim.

Methods: Cross-sectional data on 100 adolescent boys and 100 adolescent girls were collected through a random sampling method from Sombaria village. An anthropometric rod and a weighing scale were used to measure height and weight respectively, following the standard technique of Lohman et al. Data on different food habits, exercise, sleeping hours and television time were collected from each subject. The prevalence of underweight and overweight was calculated by using z-scores for BMI for age and sex recommended by the WHO.

Results: The present study shows that the prevalence of underweight was found the same between adolescent boys (4.00%) and girls (4.00%). However, the prevalence of overweight/obesity was slightly higher among adolescent boys (13.00%) than girls (11.00%). The study reported the higher prevalence of overweight/obesity in both boys (15.76%) and girls (15.68%) who preferred restaurant foods.

Conclusion: Prevalence of overweight/obesity was higher than underweight in both sexes in the present study. Underweight was found to be more or less the same in both vegetarian and non-vegetarian adolescent boys and girls. However, the prevalence of overweight/obesity was higher in both sexes who preferred restaurant foods over home-cooked foods.

Keywords: Underweight, overweight, food habits, lifestyles, adolescent

Introduction

Adolescence is the transition phase from childhood to adulthood aged ranging from 10-19 years.[1] It is a nutritionally vulnerable developmental stage characterized by rapid growth and development in biological, psychological and

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social changes.[2] During this period, they gain up to 20 percent of adult stature, 40 percent of adult skeleton mass and 50 percent of adult weight.[3] However, insufficient dietary intake can result in delayed onset of sexual maturation and growth.[4,5] Malnutrition is the major health problem, which causes at least half of all childhood deaths, and one-third of child deaths are due to undernutrition only.[6] The double burden of malnutrition is more prevalent in low and middle-income countries where nutrition transition is rapidly underway.[7,8,9] It is especially prevalent in sub-Saharan Africa, South-East Asia, and the Pacific.[9] Approximately 90 percent of the world's adolescents reside in low and middle-income countries.[10] According to the National Family Health Survey (NFHS-4), 41.9 percent of adolescent girls and 44.8 percent of adolescent boys had a BMI less than 18.5 kg/m^2.[11] However, the same study reported the low prevalence of overweight/obesity as compared to underweight in both adolescent boys (4.8%) and adolescent girls (4%). Undernutrition during the adolescent period leads to delayed and stunted growth, impaired development, an increased risk for infectious diseases, and adverse pregnancy outcomes.[10,12,13] On the other hand, overweight adolescent has many immediate and long-term risks, including type 2-diabetes, high blood pressure, and adult obesity.[14,15]

Under this backdrop, the present study was conducted to assess the nutritional status of adolescent boys and girls of Sombaria village of West Sikkim and the associated food habits and lifestyle factors.

Materials and Methods

The data for the present study were collected from both adolescent boys and girls aged 12 to 19 years from Sombaria village of West Sikkim. Sombaria is a small village with a mixed population of Limboo, Lepcha, Bhutia, and other Nepali communities located at a distance of 112 km from Gangtok, the capital of Sikkim. Each community in Sombaria village has their own distinct culture, tradition and beliefs. The economy of Sombaria village is mostly based on agriculture, dairy and poultry farming. A cross-sectional data of 200 participants (100 adolescent boys and 100 adolescent girls) was collected through a random sampling method for the present study. Data were collected randomly so that participants had an equal chance of selection. An Anthropometric rod and a weighing scale to the nearest 0.1cm and 0.5 kg respectively, were used to measure height and weight following the standard technique of Lohman et al.[16] The prevalence of underweight and overweight was evaluated by using z-scores for BMI for age and sex.[17] According to this, BMI z-score >+2SD is considered as obese, BMI z-score >+1SD is considered as overweight, and BMI z-score <-2SD is considered as underweight.

Information on lifestyle factors and food habits was collected from each subject following a recall method of one week period. Data on regular exercise and activities while eating were collected from each subject. Television watching time was divided into two categories: less than/equal to two hours per day and three/more than three hours per day. Data on sleeping hours was divided as less than/equal to eight hours per day and nine/more than nine hours per day. Data on food consumption were classified into two categories, namely vegetarian and non-vegetarian. Intake of non-vegetable items was divided as one-two times per week and three/more than three times per week. The data on the consumption of meals was divided into two times per day and three times per day. Data on main meals of the day, such as breakfast, lunch and dinner were also collected from each subject. The present study also collected data on preferred foods such as home-cooked foods and restaurant foods.

The data were analyzed using MS-Excel software. The parameters taken were analyzed statistically to find out mean and standard deviation for the anthropometric measurements. Overweight and obesity were grouped together as the prevalence of obesity in both adolescent boys and girls was found to be very less in the present study. Prevalence of underweight and overweight/obesity was calculated in relation to different food habits and lifestyle factors. In order to test the level of significance, both the t-test and chi-square test have been used in the present study.

Results

Table 1. Basic data on mean height, weight, BMI, underweight and overweight among adolescent boys and girls of Sombaria village

Sex	N	Mean Height (cm) ± SD	Mean Weight (kg)± SD	Mean BMI± SD	Underweight	Overweight/ obese
Boys	100	156.78±10.98	48.14±12.21	19.28±3.00	4 (4.00%)	13 (13.00%)
Girls	100	150.01±6.64	46.40 ± 8.87	20.50 ± 3.14	4 (4.00%)	11 (11.00%)
		t=4.824; df=98; p<0.05	t=0.993; df=98;p>0.05	t=2.840; df=98;p<0.05	χ^2=0.190; df=2; p>0.05	

Mean height was significantly (p<0.05) higher among adolescent boys (156.78±10.98) than adolescent girls (150.01±6.64) in the present study (table 1). The mean weight was also higher among adolescent boys (48.14±12.21) than adolescent girls (46.40±8.87). However, mean BMI was significantly (p<0.05) higher among adolescent girls (20.50±3.14) than adolescent boys (19.28±3.00). The frequency of underweight was found the same between adolescent boys (4.00%) and adolescent girls (4.00%). But, the frequency of overweight/obesity was found higher among adolescent boys (13.00%) than adolescent girls (11.00%).

Table 2. Distribution of different BMI values in relation to food consumption, non-veg intake and activities while eating among adolescent boys and girls of Sombaria village

Category	Boys	Underweight	Overweight/ obesity	Girls	Underweight	Overweight/ obesity
Vegetarian	23	1 (4.35%)	3 (13.04%)	25	1 (4.00%)	3 (12.00%)
Non-veg.	77	3 (3.89%)	10 (12.98%)	75	3 (4.00%)	8 (10.67%)
		χ^2=0.009; df=2; p>0.05			χ^2=0.034; df=2; p>0.05	
Intake of non-veg. per week						
1-2 times	38	2(5.26%)	6(15.79%)	63	3(4.76%)	7(11.11%)
3+ times	39	1(2.56%)	4 (10.25%)	12	1(8.33%)	2(16.67%)
		χ^2=0.970, df=2; p>0.05			χ^2=0.601; df=2; p>0.05	
Activities while eating						
Yes	53	0(0.00%)	8(15.09%)	38	1(2.63%)	1(2.63%)
No	47	4(8.51%)	5(10.64%)	62	3(4.84%)	10(16.13%)
		χ^2=4.940, df=2; p>0.05			χ^2=4.872, df=2; p>0.05	

Table 2 shows that the frequency of underweight was found to be more or less the same between vegetarians (4.35%) and non-vegetarians (3.89%) adolescent boys. Similarly, the prevalence of overweight/obesity was also found to be more or less the same between vegetarians (13.04%) and non-vegetarians (12.98%) adolescent boys. The frequency of underweight (4.00%) was found the same among adolescent girls who are vegetarians and non-vegetarians. However, the frequency of overweight/obesity was slightly higher among adolescent girls who are vegetarians (12.00%) than non-vegetarians (10.67%). The higher frequency of underweight (5.25%) and overweight/obesity (15.79%) was found among adolescent boys who eat non-vegetable items one to two times per week. However, the frequency of underweight (8.33%) and overweight/obesity (16.67%) was found higher among adolescent girls who eat non-vegetable items more than three times per week. The frequency of underweight (8.51%) was higher among adolescent boys who didn't do any activities while eating. Whereas, the frequency of overweight/obesity (15.09%) was higher among adolescent boys who engaged in activities like watching television and playing games on their mobile phone while eating. The frequency of both underweight (4.84%) and overweight/obesity (16.13%) was higher among adolescent girls who didn't do any activities while eating.

Table 3. Distribution of different BMI values in relation to the number of meals, main meal and preferred food among adolescent boys and girls of Sombaria village

Category	Boys	Underweight	Overweight/ obesity	Girls	Underweight	Overweight/ obesity
Number of meals/day						
2 times	11	1(9.09%)	2(18.18%)	24	2(8.33%)	3(12.50%)
3 times	89	3(3.37%)	11(12.35%)	76	2(2.63%)	8(10.52%)
		χ^2=1.213; df=2; p>0.05			χ^2=1.673; df=2; p>0.05	
Main meal of the day						
Breakfast	24	1(4.17%)	1(4.17%)	22	0(0.00%)	4(18.18%)
Lunch	22	0 (0.00%)	3(13.64%)	17	0(0.00%)	1(5.88%)
Dinner	54	3(5.55%)	9(16.67%)	61	4(6.56%)	6(9.83%)
		χ^2=3.638; df=4; p>0.05			χ^2=4.275; df=4; P>0.05	
Food preference						
Home-cooked	68	4(6.25%)	8(11.76%)	49	3(6.12%)	3(6.12%)
Restaurant	32	0(0.00%)	5(15.62%)	51	1(1.96%)	8(15.68%)
		χ^2= 2.142; df=2; p>0.05			χ^2= 3.245; df=2; p>0.05	

Table 3 shows that the frequency of underweight (9.09%) and overweight/obesity (18.18%) was higher among adolescent boys who eat meals twice a day. Similarly, the frequency of underweight (8.33%) and overweight/obesity (12.50%) was higher among adolescent girls who eat meals twice a day. The higher frequency of underweight (5.55%) and overweight/obesity (16.67%) was found among adolescent boys whose main meal of the day is dinner. Among adolescent girls, the higher frequency of underweight (6.56%) and overweight/obesity (18.18%) was found in those whose main meals of the day are dinner and breakfast, respectively. The higher frequency of underweight was found among adolescent boys (6.25%) and girls (6.12%) who preferred home-cooked foods. However, the frequency of overweight/obesity was found higher among adolescent boys (15.62%) and girls (15.68%) who preferred restaurant foods.

Table 4. Distribution of different BMI values in relation to exercise, television watching and sleeping hours among adolescent boys and girls of Sombaria village

Category	Boys	Underweight	Overweight/ obese	Girls	Underweight	Overweight/ obesity
Exercise						
Yes	58	0(0.00%)	7(12.07%)	38	1(2.63%)	6(15.79%)
No	42	4(9.52%)	6(14.28%)	62	3(4.84%)	5(8.04%)
		χ^2=6.020, df=2; p<0.05			χ^2=1.649, df=2; p>0.05	
Television watching						
≤2hours	69	3(4.35%)	6(8.69%)	64	3(4.69%)	8(12.50%)
3hours+	31	1(3.22%)	7(22.58%)	36	1(2.78%)	3(8.33%)
		χ^2=3.659; df=2; p>0.05			χ^2=0.673; df=2; p>0.05	
Sleeping hours						
≤8 hours	33	0(0.00%)	6(18.18%)	30	1(3.33%)	3(10.00%)
9hours+	67	4(5.97%)	7(10.45%)	70	3(4.28%)	8(11.43%)
		χ^2=2.995, df=2; p>0.05			χ^2=1.503; df=2; P>0.05	

Table 4 shows that the frequency of underweight (9.52%) and overweight/obesity (14.28%) was found to be higher among adolescent boys who didn't exercise. The prevalence of underweight (4.84%) and overweight/obesity (15.79%) was higher among adolescent girls who didn't exercise and who exercised, respectively. The frequency of underweight (4.35%) and overweight/obesity (22.58%) was found higher among adolescent boys who watched television for less than/equal to two hours per day and more than three hours per day, respectively. Among adolescent girls, the frequency of underweight (4.69%) and overweight/obesity (12.50%) was found higher in those who watched television less than/equal to two hours per day. The higher frequency of underweight (5.97%) and overweight/obesity (18.18%) was found among adolescent boys who slept for more than nine hours and eight hours per day, respectively. Among adolescent girls, the higher frequency of underweight (4.28%) and overweight/obesity (11.43%) was found in those who slept over nine hours per day.

Discussion

Adolescence is an important period in which nutritional needs increase for the growth of bone, muscle and development.[18] The health behaviours related to diet and physical activities shaped during this time persist into adulthood.[19] The present study shows that the frequency of underweight (4.0%) was found the same in both adolescent boys and girls. However, overweight/obesity was slightly higher among adolescent boys (13.0%) than girls (11.0%). The prevalence of overweight/obesity was higher than underweight in both sexes in the present study. A study in rural West Bengal shows the prevalence of underweight (boys-31.1%; girls-21.1%) and overweight/obesity (boys-4.1%; girls 5.2%) among adolescents.[20] Another study by Panda et al. shows the prevalence of underweight (boys-15.8%; girls-8.8%) and overweight (boys-7.5%; girls-10.3%) among adolescents in Sikkim.[21] The economic status of households is an important indicator of access to adequate food supplies and good health care facilities. An increase in westernization and globalization has led to a nutritional transition in low and middle-income countries which characterized the coexistence of undernutrition and overnutrition.[22]

Adolescence is a time when individuals experience increasing control over their food choices.[23] The present study shows that the prevalence of underweight and overweight/obesity was more or less the same in both vegetarian and non-vegetarian adolescent boys and girls. The prevalence of both underweight and overweight/obesity was higher among adolescent girls who eat non-vegetable items more than three times a week in the present study. It was higher among adolescent boys who eat non-vegetable items one-two times a week. The differences in the prevalence of underweight and overweight/obesity in relation to the intake of non-vegetable items were statistically insignificant in the present study. Breakfast is considered the most important meal of the day to stay healthy, yet breakfast is more commonly missed than any other meal.[24] It is estimated that children consume approximately 20 percent of their daily energy intake at breakfast.[25] In the present study, the prevalence of underweight was higher in both sexes who considered dinner as their main meal of the day. The study further shows the higher frequency of overweight/obesity among adolescent boys and girls who considered dinner and breakfast respectively as the main meals of the day. The prevalence of nutritional status in relation to the main meals of the day was statistically insignificant in the present study. Many studies have reported that people who missed breakfast had lower energy and macronutrient intake compared with those who usually consumed breakfast.[26,27] Adolescents consume a larger percent of energy intake at fast food and other restaurants, [28] which often leads to weight gain by accumulating excess fat. The present study shows a higher prevalence of overweight/obesity in both sexes who prefer restaurant foods, and underweight was higher in both sexes who preferred home-cooked foods.

Several studies reported the negative association between the level of physical activity and overweight in children.[29] The prevalence of underweight was higher in both sexes who didn't exercise in the present study. However, overweight/obesity was higher in adolescent boys and girls who didn't exercise, and those who did exercise, respectively. An increasing level of physical activity can contribute to weight management.[30] Many studies have shown an association between television time and obesity.[31]

Eating while viewing television increases energy intake in children.[32] The present study shows that overweight/obesity was higher among adolescent boys who played mobile games and watched television while eating. It was found the opposite in case adolescent girls. However, underweight was higher in both sexes who didn't play mobile games and watched television while eating. These differences were statistically insignificant. Children who spend more time on television consume more energy-dense foods and drinks resulting in higher energy intake.[33,34] The present study shows a higher prevalence of overweight/obesity among boys who slept for eight hours or less per day. However, it was slightly higher among girls who slept for more than nine hours per day. The underweight was higher in both sexes who slept over nine hours per day. The prevalence of both underweight and overweight/obesity in relation to sleeping duration was found statistically insignificant in the present study. Short sleep duration may produce hormonal changes associated with weight and nutrition.[35] It may also contribute to physical inactivity and decreased energy expenditure.[36,37]

Conclusion

The prevalence of overweight/obesity shows higher than underweight in both sexes in the present study. Prevalence of both underweight and overweight in relation to consumption of non-vegetable items shows fluctuation in both sexes. However, the prevalence of overweight/obesity shows a positive relation in both sexes who prefer restaurant foods. The underweight was higher in both sexes who considered dinner as their main meal of the day. The prevalence of nutritional status shows differences in relation to lifestyle factors such as exercise, television time, activities while eating, and sleeping hours. Therefore, awareness and proper education on health should be provided to identify the factors influencing nutritional status and its health consequences.

Informed Consent: Data were collected during mandatory Anthropological fieldwork by my students for their master's dissertations under my guidance. During the fieldwork, written informed consent was not taken from the participants. However, the nature and purpose of the research work were clearly explained to the participants verbally before the data collection. Participants were also informed the measurements involved, such as height and weight, as well as some of the questions on lifestyles and food habits. Participants were involved in data collection voluntarily.

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Conflict of Interest: No

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