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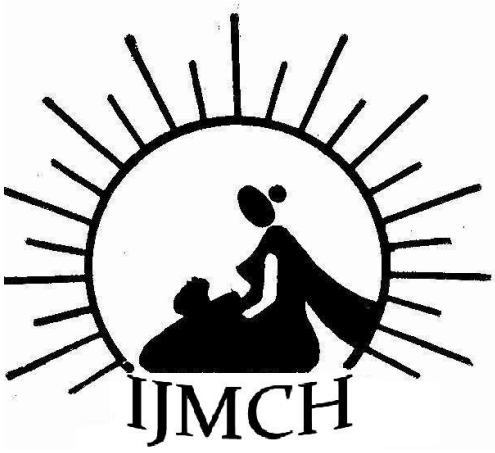

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Present study was conducted on the school students with the objective to assess their nutritional status in terms of Body Mass Index (BMI), PE Ratio, Fat Energy ratio and iron intake and subsequently make recommendations for the improvement.

Assessment of Nutritional status of senior secondary school students of Kanpur

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ABSTRACT

Objective: Present study was conducted on the school students with the objective to assess their nutritional status in terms of Body Mass Index (BMI), PE Ratio, Fat Energy ratio and iron intake and subsequently make recommendations for the improvement.

Material and methods: A cross-sectional survey was done on 126 senior secondary school students in the age group of 18 to 21 years, using a pre designed questionnaire to measure the various attributes related to the nutritional intake.

Results: Dietary mean daily calorie intake in males was found to be 2642.1 kcal while it was 2343.2 kcal in females. None of the students were found to be obtaining the recommended daily intake of iron from their diet.

Conclusions: While the problem of underweight persists among the females, overweight are on the rise amongst males.

Key words: BMI, Protein Energy ratio

INTRODUCTION

The history of a man to a large extent has been a struggle to obtain food. Lately though, food has switched its role from that of a basic necessity to an important factor for the human beings, in health and disease apart from its scrumptious role. The health effects of nutrition on the children below five years of age and among some other vulnerable groups have been studied extensively in our country.(1) On the other hand, the consequences of inadequate nutrition in adolescents have largely been ignored despite the fact that adolescence is a significant period of growth and maturation and serves as a foundation for the health status throughout the life. This is especially relevant in the light of the fact that adolescence with its physical, mental and emotional vulnerability serves as the habit forming years of life, more so when the students are independent to make their food choices in the relative lack of parental supervision and resources. Adolescent anthropometry by measurement of height and weight provides useful means to assess the growth status.(1) While most of the developing countries, including India are struggling with the problems of undernutrition on one side, they are simultaneously haunted by the emergence of another major form of malnutrition i.e. obesity.(2,3)

The number of studies on the health and nutritional status of the adolescents in our country are limited. The present study was therefore undertaken in the senior secondary school students to get an impression of the nutritional status of the adolescents.

MATERIAL AND METHODS

The present cross-sectional study was conducted among 126 students of Class XI and XII in a private school in Kanpur, in the month of October 2010. All the students present in the class at the time of the survey were included in the study. Informed verbal consent was taken from all the students. A pre tested pre designed questionnaire was distributed to the students. They were asked to fill the details of their diets in the space provided in the questionnaire for the next seven consecutive days along with other information such as age, gender etc. The average daily calorie, protein, fat, iron and calcium intake from the diet were calculated and compared with the recommended daily allowance of a light worker considering doctors as light workers.(4) Protein energy ratio and fat energy ratio were also calculated to assess the balanced intake of nutrients. Anthropometric measurements included weight and height. Weight was taken on a weighing scale with standard minimum clothing to the nearest 0.5 kg. Height was measured on a vertical scale with heels, buttocks, occiput against the wall and head in Frankfurt plane, to the nearest 0.5 cm. The measurements were taken by one author only on all the occasions to overcome the interobserver variation. Body Mass Index (BMI) was computed as weight (in kg)/ height2 (in m).(5) The classification of the students with respect to the BMI was done according to the recommendations of WHO.(6) A BMI between 18.50 and 24.99 was considered as Normal while that less than 18.50 was considered as underweight and more than 24.99 as overweight.

Data was compiled and analyzed using Microsoft Excel for Windows. Discrete data was analyzed using Pearson's Chi-square test for non-normal distribution and continuous data was analyzed using Student's t test. Two-tailed p-value less than 0.05 was considered significant.

RESULTS

A total of 126 students of the age group 16-18 years were included in the study. The distribution of males and females in our study group were almost equal (52% males and 48% females). The mean height of boys was 167.1 cm, weight 60.4 kg and BMI 21.7, while that of girls was 154.4 cm, 47.6 kg and 20.3 respectively. 11.1% of students were found to be underweight according to BMI and incidentally all of them were females. 7.9% of the students were found to be pre-obese according to the BMI and all of them were males. Mean calorie intake in males was found to be 2642.1 kcal/day while it was 2343.2 kcal/day in females. While 36.4% of the males were found to have less than the recommended calories intake per day, it was so in only 5% of the females. ICMR recommendation of 1g/kg body weight of protein intake was met by 87.9% of the males and 85% of the females. However, the Protein Energy ratio of 40% of the females was found to be less than the lower limit of the recommended level (10- 15%), whereas it was low in 12.1% of the males. Fat energy ratio was greater than the upper limit of the recommended value (15-30%) in 34.8% male and 70.0% female school students.

None of the students were found to have the recommended daily intake of Iron, (reference), which is 30 gm/day for females and 28 gm/day for males. Only 5.5% of the students were found to have less than the recommended daily intake of calcium (400mg/day).

The differences observed between males and female students with respect to the mean values of height, weight, BMI, Calories, Fat protein and iron intake per day were found to be significant. Significant differences were also observed between males and females with respect to the lower Protein energy ratio and excess Fat energy ratio. Underweight was clearly in excess in females while males were evidently more overweight.

Table I: Mean value of anthropometric measurements and average daily intake of nutrients in male and female students

	Male (66)		Female (60)		Test statistic t	P value
	Mean	SD	Mean	SD		
Height (cm)	167.1	6.2	154.4	9.2	-9.159	< 0.0001
Weight (kg)	60.4	5.4	47.6	8.1	-10.523	< 0.0001
BMI (kg/m^2)	21.7	2.2	20.3	2.1	-3.645	0.0004
Calorie Intake/day	2642.1	376.1	2343.2	333.9	-4.698	< 0.0001
Fat Intake/day	57.2	23.6	66.7	27.4	2.090	0.0386
Protein intake /day (g)	74.3	11.2	64.8	14.0	-4.223	< 0.0001
Iron Intake/day (mg)	16.9	3.5	15.1	2.3	-3.375	0.0010
Calcium Intake/day (mg)	701.5	234.5	709.1	169.8	0.207	0.8367

Figures in parentheses indicate number of students

P value <0.05 are significant

Table 2: Distribution of malnutrition in study group

	Male (66)		Female(60)			
	No.	Percentage	No.	Percentage	Chi-square	Significance level
Normal	56	84.8	46	76.7	0.863	0.3528
Underweight (BMI < 18.5)	0	0	14	23.3	15.016	0.0001
Overweight (BMI : 25.00-29.99)	10	15.1	0	0	7.874	0.005
PE Ratio <10%	8	12.1	24	40	11.485	0.0007
FE Ratio >30%	6	9.1	21	35	11.029	0.0009

Figures in parentheses indicate number of students

P value <0.05 are significant

DISCUSSION

In our study it was found that about 63% of the males had more than the recommended daily calorie intake and 15% were already overweight. About 5% of the females in our study had less than the recommended daily calorie intake while 23% were underweight, which may be a reflection of their longstanding under nourishment. NFHS-3 also reveals that more than one-third (36%) of women age 15-49 in India have a BMI below 18.5 indicating chronic nutritional deficiency, including 16 percent who are moderately to severely thin. Obesity, the other side of malnutrition, is a substantial problem in both developed and developing countries and is affecting children as well as adults. In India, it is more common in urban women, well-educated women, women from households with a high standard of living, and among Sikhs. It is known that women have higher rate of obesity (BMI≥ 30.00) than men, although men may have higher rate of overweight (BMI – 25.00 – 29.99).

Overall, the prevalence of underweight and overweight was 11.1% and 8% respectively, which was lower as compared to another study done on school students joining a school college in Delhi which reported a prevalence of 13.4% underweight and 13.8% overweight.[7] The lower prevalence in our study group could be because the study in Delhi was done on the students 'joining' the college while we included the 11 and 12th class students in our study.

The protein energy ratio of 40% of the females was less than the lower limit of the recommended value, which seemed to be compensated in the form of increased fat intake. The balanced intake of nutrients was better in males. NFHS-3 reveals similar findings and states that women's food consumption is less balanced than that of men in general. One reason for the difference may be the food fads, which is usually more among females or the difference in the eating habits.

A significant finding of our study was that none of the students were found to be taking the recommended amount of iron. This finding is a matter of concern, more so in the light of the fact that anaemia is a major health problem for adults as well as children in our country (NFHS-3). The deficiency in the adolescence paves the way for the ensuing vicious cycle of deficiency states throughout life and through subsequent generation as stated in NFHS-3 report which reveals that women who are undernourished themselves are also much more likely than other women to have children who are undernourished. This necessitates a search for the cause of lower intake and necessary measures for improvements.

CONCLUSION

Significant differences were observed between the height, weight, BMI and nutrient intake between males and females. Malnutrition in males and females was in the form of overweight and underweight respectively, which is a matter of concern since further disorder in the lifestyle of doctors is inevitable and the malnutrition states may be compounded further. Measures to correct the imbalance at the onset will be the most fruitful of all the interventions.

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