

## Dietary habits and nutrient intake in adolescent girls living in Northern Iran

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### ABSTRACT

Rapid changes in lifestyle and industrialization of communities have an important effect on food intake pattern of society. Regarding the lack of enough data about dietary habits and nutrient intake of adolescents in our society, this study was performed in a group of adolescent girls in Lahijan, North of Iran. In this cross-sectional study, 400 high school girls aged 14-17 years selected by random stratified sampling. Nutritional data were collected by 24-hour dietary recall, food habits and food frequency questionnaires for all samples. The mean energy intake was  $2338 \pm 611$  kcal/d. The contributions of carbohydrate, protein and fat to the total energy intake were 59.3, 11.9 and 28.8%, respectively. The daily intake of energy obtained from breakfast, lunch, dinner and snacks were 16.3, 23.5, 25.9 and 34.3%, respectively. The mean intakes of vitamin A, vitamin D, calcium, phosphorous and zinc were below the Recommended Daily Allowances. The consumption of fresh vegetables and fruit was generally low. Twelve percent in total did not drink milk at all. Almost all the subjects had a prepared meal, most often in the evening, at least four times a week. Regarding the undesirable food pattern and proportions of nutrient intakes, it is necessary to development means of motivating adolescents to eat nutritionally rich foods, good for health and well-being.

**Keywords:** Dietary habits; Nutrient intake; Adolescent girls

### INTRODUCTION

Adolescence is often considered a critical period for many psychological and behavioral transitions, including feeding practice [1]. Diet and lifestyle in adolescence have a potential effect in the development of overweight and obesity [2, 3]. Body composition and dietary patterns acquired during this period are likely to be continued as adults [4]. Increasing evidence suggests that adolescence obesity is associated with serious health conditions including coronary heart disease, hypertension, diabetes and certain types of cancer [5-9]. Therefore, it is important for adolescence to lay out the foundation for chronic diseases prevention by the promotion and maintenance of healthful lifestyles [2].

The prevalence of overweight and obesity has been increasing during the last decades, including in Iran [10]. Changing dietary habits and physical activity patterns because of rapid urbanization, modernization and technological transformation, may have contributed to this trend [11]. There is little information on food and nutrient intakes of Iranian adolescents. Such information could guide us to suggest need based changes in the eating habits of adolescents for delaying or preventing the development of chronic diseases. The current study addresses dietary habits and nutrient intake in Iranian adolescent girls.

## MATERIAL AND METHODS

### *Subjects*

In this cross sectional study, 400 adolescent girls, aged between 14-17 years, were randomly selected using stratified sampling from the public and private high schools in Lahijan, North of Iran. Approval for the study was obtained from the Ethics Committee of the Department of Education and Training in Lahijan city, Iranian Ministry of Education and Training.

### *Anthropometric measurements*

Anthropometric measurements were taken with subjects wearing light clothing without shoes. Weight was determined to the nearest 0.5 kg with a portable scale which was calibrated before each use and height was measured by to the nearest 0.5 cm. On the basis of the weight and height data, Body Mass Index (BMI) was then calculated as weight (in kg) over height (in m<sup>2</sup>). All anthropometric measurements were performed by a trained nutritionist.

### *Dietary assessment*

The nutritional data were collected by 24-hour dietary recall, food habits and food frequency questionnaires for all subjects. In an interview with adolescents, frequency and amounts of foods eaten during regular meals as well as between meals (so-called snacks) were collected for a normal school day by a trained nutritionist. The amounts were reported in household measures and common portion sizes. Since it was assumed that subjects do not necessarily know all the details regarding their food consumption, particularly with respect to its preparation, we also developed a questionnaire for the parents about details of several food items consumed by their children, e.g. skimmed or whole milk, kind and quantity of meat. For each subjects all amounts were expressed in g.

The energy and nutrient contents of all foods ingested were determined using modified computerized Iranian food composition table. When it was useful, comparisons have been made with recommended dietary allowances (RDA) of the United States [12] and the World Health Organization (WHO) [13].

The FFQ used in this study was included 106 different kinds of foods. The subject was instructed to indicate the specified number of times per day, week or month the food was consumed. All amounts were converted to number of times per

week. For analysis of the data, the different foods were combined into food groups, namely cereals, dairy products, meat/ fish / eggs, vegetables, fruit, fat and oils, snacks and sweets. In addition to, the interview covered a questionnaire comprising 39 questions concerning food habits.

### *Statistical Analysis*

SPSS for Windows was used for all statistical procedures. Results are expressed as means and standard deviations. The degree of significance of differences between means was calculated using One-Way ANOVA. The 0.05 level of probability was considered as statistically significant.

## RESULTS

### *Subjects*

Table 1 shows the anthropometric data of the subjects. The mean BMI was 21.9 kg/m<sup>2</sup> with a range of between 15 and 35.6 kg/m<sup>2</sup>. Significant differences in weight, height and BMI were found between age groups (P<0.0001).

### *Frequency of food consumption and dietary habits*

According to the questionnaire data, the consumption of fresh vegetables and fruit was generally low. The adolescent girls ate dairy products 2.5 times per day. Twelve percent in total did not drink milk at all. Around 87% of the subjects consumed sweet foods e.g. confectionary, Sugar, jam and soft drinks every day. One-tenth of girls reported that they never had breakfast. Almost all the subjects had a prepared meal, most often in the evening, at least four times a week.

### *Energy and Nutrient Intake*

The mean energy and nutrient intakes of Iranian adolescent girls, calculated from the 24-hour dietary recall, are shown in table 2. Protein contributed about 11.9%, to the energy intake, fat 28.8% and carbohydrates 59.3%. The E% from saturated fat was 7.5%. The mean intakes of vitamin A, vitamin D, calcium, phosphorous and zinc were below the RDA of the National Academy of Sciences in the USA [12]. When the intakes were considered in relation to WHO recommended values [13], only mean vitamins A and D intakes were found to be low. The diet was characterized by high contents of protein, iron and vitamins B and C.

Table 3 shows the mean energy intake from meals and snacks. Around 35% of daily energy intake

was derived from snacks. Snacks contained large amounts of sucrose.

**Table 1.** Anthropometrical data for Iranian adolescent girls (mean values and standard deviations)

Age (years)	Weight (kg)*	Height (cm)*	BMI (kg/m <sup>2</sup> )*
14 (n=136)	52.2 (9.1)	157.7 (5.9)	20.9 (3.1)
15 (n=100)	56.4 (9.5)	159.6 (5.5)	22.1 (3.6)
16 (n=164)	57.5 (9.8)	160.0 (6.5)	22.5 (3.6)
Total (n=400)	55.3 (9.8)	158.9 (6.1)	21.9 (3.5)

\*Significantly different between age groups, P<0.0001 (ANOVA test)

**Table 2.** Daily intakes of energy and nutrient in Iranian adolescent girls

	Mean (SD)	% RDA Mean (SD)	% WHO Mean (SD)
Energy (kcal)	2338 (611)	106.3 (27.8)	108.8 (28.4)
Protein (g)	69.6 (60.6)	165.4 (132.3)	154.7 (12.9)
Carbohydrate (g)	346.6 (104.3)	-	-
Fat (g)	74.8 (53.9)	-	-
SFA (g)	19.6 (9.2)	-	-
Cholesterol (mg)	277.1 (181.6)	-	-
Fiber (g)	8.4 (5.3)	-	-
Thiamin (mg)	2.4 (3.6)	221.2 (332.2)	279.6 (420.0)
Riboflavin (mg)	1.4 (0.6)	104.5 (49.3)	98.4 (46.4)
Pyridoxine (mg)	2.3 (1.8)	151.4 (119.2)	-
Niacin (mg)	22.3 (24.9)	148.4 (166.0)	190.2 (218.8)
Folacin (µg)	161.6 (78.8)	95.6 (46.1)	95.1 (46.4)
Vitamin B <sub>12</sub> (µg)	4.4 (10.0)	218.4 (500.1)	436.8 (1000.2)
Vitamin C (mg)	154.3 (100.7)	206.6 (137.5)	514.3 (335.7)
Vitamin A (µg)	492.6 (519.1)	61.6 (64.9)	92.2 (97.2)
Vitamin D (µg)	0.5 (0.6)	5.1 (5.7)	20.2 (22.6)
Calcium (mg)	843.1 (429.1)	70.3 (35.8)	144.4 (73.5)
Phosphorous (mg)	897.7 (465.4)	74.8 (38.8)	-
Iron (mg)	24.6 (14.7)	164.1 (97.8)	164.3 (97.9)
Zinc (mg)	7.5 (8.0)	62.5 (66.5)	127.7 (135.9)

**Table 3.** Daily intakes of energy from meals and snacks in Iranian adolescent girls

	Mean (SD)*	% Energy
Breakfast	382 (186)	16.3
Morning snack	355 (251)	15.2
Lunch	550 (170)	23.5
Evening snack	283 (215)	12.1
Dinner	605 (214)	25.9
Snack before bedtime	163 (129)	7.0

\* kcal/d

## DISCUSSION

The present study was carried out to determine the dietary habits and nutrient intake in adolescent girls. The mean energy intakes of Iranian adolescents were higher than the RDA and WHO standards [12, 13] as well as values reported from the US [14] and some European countries such as

Switzerland, France and Scotland [15] and some Asian countries such as Greece [16], Bangladesh [17] and Bahrain [18]. Mean energy intake of Iranian adolescents is comparable to data of Chinese adolescents [19]. High intake of energy by the Iranian students is a cause of serious concern.

The mean E% of macronutrients among Iranian girls were close to the dietary recommendations set by the National Academy of Sciences in the USA [12] and WHO [13] and comparable with values of E% in the diet of Chinese adolescents (59.1% carbohydrate, 28.6% fat, 12.3% protein) [19]. The contribution of fat to the total energy of Iranian adolescents were lower than American adolescents (38%) [20] and Greece adolescents (40.25%) [16].

It was encouraging to note that the average E% of saturated fat among Iranian adolescent girls was lower than the recommended values of the National Academy of Sciences in the USA [12] and WHO [13]. Mean values of E% for saturated fat among Iranian students were also lower than the US mean values of 12% (NHANES III) for children aged 2 to 19 years [14] and UK mean values of 14% for children aged 7 to 18 years [21].

Dietary fiber has important health benefits in childhood, especially in promoting normal laxation. It may be useful in preventing and treating obesity and also in lowering blood cholesterol levels, both of which may help reduce the risk of future cardiovascular disease [22]. Fiber intake by the Iranian adolescents was lower the recommendations as well as values reported from the Bahrain adolescents [18] and may be considered inadequate for optimal health promotion and chronic disease prevention [22]. This is apparently due to low consumption of fresh fruits and vegetables as observed in the food frequency data of the students and possibly due to insufficient quantities of other sources of fiber such as whole grains, legumes, and high fiber cereals.

According to the dietary recommendations set by the National Academy of Sciences in the USA [12], adolescent girls in this study had lower intakes of vitamin A, vitamin D, calcium, phosphorous and zinc. In accordance with this finding, in European countries, adolescents' intakes of calcium, iron and zinc have been observed to be lower than recommended [16, 23, 24]. But, when the intakes were considered in relation to WHO recommended values [13], only mean vitamins A and D intakes were found to be low. Adequate vitamin D intake is essential during puberty for

reaching the maximum peak bone mass [25]. Therefore, strategies to improve vitamin D levels by fortification or supplementation have been proposed.

In the present study, 10.5% of girls did not eat breakfast. Among Swedish adolescents, skipping main meals was found to be associated with poorer nutrient intake [26]. As seen in this study, the consumption of sweet foods as snacks that contribute to a high intake of sucrose occurs frequently in the diet of Iranian adolescents. High sucrose intake has generally been associated with poor quality of diet [27] and suggesting an increased risk of dental caries, obesity and its related health problems in Iranian adolescents. More energy derived from light and snacks than from ordinary meals seems to be part of the modern life-styles.

## CONCLUSION

The results of the present study showed the undesirable dietary habits and proportions of nutrient intake in Iranian adolescents. Regarding the dietary habits are established early in life and show long-term stability [28], it is important to development means of motivating adolescents to eat nutritionally rich foods, good for health and well-being. Nutrition interventions should be targeted not only to the adolescents themselves and their parents, but also to the school authorities, school health services and food industries. Food industries should provide healthier food choices and introduce attractive ways to market these new choices to appeal to the children.

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