In-school Snacking, Breakfast Consumption, and Sleeping Patterns of Normal and Overweight Iranian High School Girls: A Study in Urban and Rural Areas in Guilan, Iran

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ABSTRACT

Objective: To investigate the relationship of snacking during school hours, sleep time, and breakfast consumption by weight status of Iranian high school girls in urban and rural areas in Guilan Province, Iran.

Design: Data were collected by self-administered questionnaire and measure of body weight and height.

Setting: High schools in urban and rural areas in Guilan Province, northern Iran.

Participants: Representative sample of 2302 school girls (1106 in Rasht City and 1196 in rural areas) selected by multistage cluster sampling.

Main Outcome Measures: Breakfast skipping, snacking habits at school, sleep habits, body weight, and height.

Analysis: Differences in the frequency of the measured variables between the urban and rural girls and overweight and normal weight girls were tested using the chi-square test, \( P < .05 \).

Results: Prevalence of obesity was significantly (\( P < .05 \)) lower in urban areas (4.1%) than in rural areas (5.2%). Prevalence of overweight was significantly higher in those who usually skipped breakfast (\( P < .001 \)). Consumption of food items of low nutrient density as snacks during the school day was common in this population, especially in rural areas.

Conclusion and Implications: The school environment may contribute to the high prevalence of overweight/obesity observed among Iranian adolescent females. Students should be encouraged to eat breakfast and choose nutritious snacks during the school day.

Key Words: Iran, adolescent, overweight, obesity, high school, breakfast (J Nutr Educ Behav. 2009;41:27-31.)

INTRODUCTION

Available data show that the prevalence of overweight/obesity is increasing among children and adolescents in many middle-income countries.1,2 Addressing adolescent overweight has become a priority since it is not only associated with increased risk of obesity in adulthood,3 but it is also independently related to morbidity and mortality in adulthood.4,5

The Islamic Republic of Iran is experiencing rapid changes in diet and physical activity,6 and a high prevalence of metabolic syndrome has been documented in adults7 and adolescents.8,9 Recent evidence shows that the number of overweight/obese adolescents in Iran has doubled during the past 2 decades.10 This rapid increase suggests that environmental factors are strongly implicated in this epidemic.

In Western countries, modification of school policies and practices has been used in an attempt to address the overweight epidemic among children and adolescents.11-13 In these countries, children consume about one third of their daily energy at school, mostly from cafeteria food and bag lunches.14 Therefore, schools provide an excellent opportunity for preventing and treating overweight and obesity.

In Iran, high school students usually consume their lunch at home in the afternoon after finishing the school day, around 2:00 PM. Most schools lack a cafeteria; however, students routinely purchase snacks from school buffets, very small shops located within the schools. The nutritional value of snacks sold at school buffets has not been documented.

A very recent study in the city of Rasht showed that the prevalence of overweight and obesity among Iranian school girls is 21.9% and 5.3%, respectively.15 Published data about
the influence of school environments and how they may affect body weight among Iranian children is limited. Based on a hypothesis that skipping breakfast and sleeping time may affect snacking habits of the students during school day, the present study examined the influence of snacking habits at school, sleeping habits, and breakfast consumption patterns of over-weight and obese girls in comparison to their normal weight peers during school hours in urban and rural areas of Guilan province, Iran.

METHODS

This study is part of an epidemiological survey, designed to evaluate the current status of overweight/obesity among high-school girls in urban/ rural areas in Guilan province, Iran in 2005-2006. The study population was 14- to 18-year-old school girls living in Rasht city, the main city of Guilan province, and rural areas in this province. The study counties were not considered to be remote, as they were 30 to 60 kilometers away from Rasht. Ninety and 75% of the girls continue their study in high school in urban and rural areas in Guilan, respectively. Students in rural areas have to come to the nearest high school in the main village. Between December 2005 and March 2006, a random sample of 2302 high school girls in urban and rural areas was selected with no exclusion criteria (1106 in Rasht city and 1296 in rural areas). The schools were selected using a multistage cluster design. Selection of the subjects was initially made by school grade level, and not by age of the adolescents. At each grade, students were randomly selected. Then the girls were classified into 4 age groups (Table 1).

Data on age, breakfast frequency per week, snacking habits in school, and sleep time at night were collected using a self-administrated questionnaire. Breakfast frequency was asked as “How many times during the week do you eat breakfast?” Response categories were never, 1-2 times per week, and 3 times or more per week. Sleep time at night was asked as “What time are you usually asleep at night?” Response categories were before 10 PM, between 10-11 PM, and later than 11 PM. The students were asked about their snacking in school. The responses were categorized as sandwiches, fruit, and less-nutritious snacks that should not be overconsumed (candies, chocolates, soft drinks, cookies, cake, ice cream, potato chips, potato/corn, and corn puffs). The students were also asked whether they bring a snack from home, buy food from the school’s buffet, or purchase food at shops away from school. The students were also asked about the hours of serving food at their school’s buffet.

Anthropometric measurements were made in the morning: the girls were lightly dressed and without shoes. Body weight was measured to the nearest 0.1 kg using a balanced-beam scale (Seca, Germany); height was measured to the nearest 0.5 cm with the girls standing with head, back, and buttocks against the height gauge. Body mass index (BMI) was calculated using the following equation: weight (kg)/height (m²). Age- and sex-specific BMI cutoff points proposed by International Obesity Task Force (IOTF) were used to define overweight and obesity. International Obesity Task Force BMI values for overweight and obesity correspond to BMI greater than 25 kg/m² and 30 kg/m² at age 18, respectively. In the study population, 19 students in urban area and 28 students in rural areas had BMI lower than the 3rd percentile of the World Health Organization growth chart. The underweight students were not included in the data analysis. Thus, the final sample used for data analysis included 1087 urban school girls and 1168 rural school girls.

Written consent was obtained from the students’ parents before conducting the baseline measurements. The study protocol was approved by the ethics committee of Guilan University of Medical Sciences and Provincial Bureau for Education.

Statistical Analysis

Differences in mean values and frequency of the measured variables between groups were tested using Student’s t test and chi-square statistics. Values were given as frequency, percentage, mean, and standard deviation or 95% confidence intervals where appropriate. P values less than .05 were considered as the level of significance. Analyses were performed using Statistical Package for Social Science (SPSS 10.01 for Windows, SPSS, Inc., Chicago, IL).

RESULTS

Mean BMI values as a function of age and overall prevalence of overweight/obesity are presented in Table 1. The prevalence of obesity was significantly higher (P < .05) among rural girls (5.2%) than their peers in urban areas (4.1%).

Table 2 shows the usual time asleep at night and frequency of skipping breakfast by weight status and by urban or rural residence of the girls.

<table>
<thead>
<tr>
<th>Table 1. Body Mass Index and Frequency of Overweight and Obesity of Urban and Rural Adolescent Girls in Guilan Province, Iran</th>
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</thead>
<tbody>
<tr>
<td><strong>Mean BMI (95% CI)</strong></td>
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<tr>
<td><strong>Age (y)</strong></td>
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<tr>
<td>14</td>
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<td>16</td>
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<td>17</td>
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<td>18</td>
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</table>

**Overweight**: % (95% CI)

<table>
<thead>
<tr>
<th>Age (y)</th>
<th>Urban (n = 1087)</th>
<th>Rural (n = 1168)</th>
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<tbody>
<tr>
<td>14</td>
<td>18.0 (16.9-23.2)</td>
<td>18.6 (16.1-25.2)</td>
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<tr>
<td>15</td>
<td>16.8 (15.6-21.0)</td>
<td>17.3 (14.6-20.0)</td>
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<tr>
<td>16</td>
<td>17.6 (16.3-20.6)</td>
<td>18.3 (16.0-20.6)</td>
</tr>
<tr>
<td>17</td>
<td>18.1 (16.8-20.3)</td>
<td>18.7 (16.4-20.6)</td>
</tr>
<tr>
<td>18</td>
<td>18.6 (17.3-20.8)</td>
<td>19.2 (17.0-21.4)</td>
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**Obese**% (95% CI)

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<tr>
<th>Age (y)</th>
<th>Urban (n = 1087)</th>
<th>Rural (n = 1168)</th>
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<tr>
<td>14</td>
<td>4.1 (3.8-4.5)</td>
<td>5.2* (4.6-5.7)</td>
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<tr>
<td>15</td>
<td>4.9 (4.4-5.4)</td>
<td>5.7* (5.1-6.2)</td>
</tr>
<tr>
<td>16</td>
<td>5.3 (4.8-5.8)</td>
<td>6.1* (5.3-6.8)</td>
</tr>
<tr>
<td>17</td>
<td>5.7 (5.2-6.2)</td>
<td>6.5* (5.7-7.3)</td>
</tr>
<tr>
<td>18</td>
<td>6.1 (5.7-6.6)</td>
<td>7.0* (6.3-7.6)</td>
</tr>
</tbody>
</table>

BMI indicates body mass index; CI, confidence interval.

*P < .05.

a using International Obesity Task Force definition of overweight.

b using International Obesity Task Force definition of obesity.
Most of the girls reported their usual time asleep was after 11 PM, and few were usually asleep by 10 PM. Sleeping time was significantly related to overweight/obesity, with normal weight girls indicating they usually went to sleep at an earlier hour. Skipping breakfast was more common in overweight/obese girls than the normal-weight girls, especially in rural areas (P < .001).

The types of snack consumed during the school day and the source of snacks consumed while at school are presented in Table 3. The girls frequently consumed energy-dense, less nutritious snacks, especially in rural areas. Sandwiches were rarely used in rural areas, but they were rather common in urban areas. Consumption of fruit as a snack was limited in all groups. Both normal weight and overweight girls, especially in rural areas, most frequently obtained their snacks from school buffets.

In both urban and rural areas, all school buffets offered processed fruit juices, cookies, cakes, and ice cream. Most schools in rural areas and some schools in urban areas also offered potato chips, corn puffs, and some other energy-dense food items in their buffets. The business hours for the school buffets were from the first break in the morning to the end of the school day, when the students were leaving to go home.

### DISCUSSION

These results showed that (1) a high percentage of the study students, especially the overweight/obese ones, skipped breakfast both in urban and rural areas; (2) consuming energy-dense, low-nutrient-density snack food was highly common during school hours, in both overweight/obese and normal weight girls, especially in rural areas; and (3) school buffets provided most of the food consumed during the school day, especially in rural areas.

The higher prevalence of overweight/obesity and higher consumption of high-calorie, low-nutrient-density (junk) food among the rural high school girls than the urban students suggests that the differences in lifestyle between urban and rural residents are becoming blurred in Iran. A higher prevalence of overweight/obesity in rural than urban residents has been previously reported in some developed countries. This is the first study that showed the girls in rural areas in Guilan province are not behind their counterparts in urban areas regarding prevalence of obesity and consumption of high-calorie snacks. In a previous study, Kelishadi et al showed that in central Iran, obesity and its associated risk factors are more common in urban than rural areas. The cultural and economic status of rural residents in northern Iran is different than those in other parts of the country, since rural residents in northern Iran are better educated and economically in a better situation than residents of other parts of the country.

Skipping breakfast has been associated with overweight/obesity in children, but research on the subject remains inconclusive. The current study showed that the overweight/obese girls ate breakfast less frequently than their counterparts in urban areas. Skipping breakfast was reported to be relatively prevalent in the United States (10% to 30%), but however, skipping breakfast was much more common among the Iranian adolescents than American teens. Skipping breakfast may be
related to higher intake of energy-dense food during school hours in the adolescents in this study. More studies are needed to clarify this matter.

The girls who participated in the study begin school classes at 7:45 AM, yet the majority reported that they usually were not asleep until after 11 PM. A short sleep duration was even more common among the overweight/obese girls than normal weight girls in this population. Previous studies have also indicated that short sleeping duration is associated with overweight in adolescents.\(^{26,29}\)

School buffets continued to offer food for sale during school hours, even when the students were leaving school to go home to have lunch. Fruit consumption during school hours was low, both in normal weight and overweight girls. The risk of micronutrient deficiencies by such a dietary habit is a concern in this population. Available data suggest that iron, zinc, vitamin A, and vitamin D deficiencies are prevalent among children and adolescents in Iran.\(^{30}\) Studies are needed to clarify the association between micronutrient deficiency and between-meal snacking habits among school girls in Iran.

The Iranian Ministry of Education has instructed schools not to sell junk food (high-calorie, low-nutrient-density food)—namely potato chips, corn puffs, and chocolate candy—in their buffets. However, many schools continue to provide energy-dense, less nutritious snack food in buffets. Advertisements of junk food in the media and the relatively low nutritional literacy among Iranian families are likely factors that influence the students’ decision to purchase junk food in schools. Indeed, on Iranian TV channels, snack food advertisements were ranked third (10%) among all advertisements,\(^{31}\) and the ads were most frequently for junk food (42%).\(^{32}\) In Iranian society it is quite challenging to control the food companies that advertise their products. There are no school nurses in most Iranian high schools, and health education in schools is limited. Other ways to lessen the effects of such advertisements are needed.

In the 1970s, the Iranian government distributed milk, nuts, and fruit as “charge-free snacks” during the school day to improve students’ nutritional status. However, students must now pay for any food that they obtain at school. In some countries, parliaments have passed legislation regarding nutrient quality of food served or sold at schools,\(^{33}\) however, there is no established or well-organized supervision of food items sold in Iranian schools. School employees are poorly paid, and many are economically dependent on the proceeds from food sold at school buffets. In some schools, the staff claimed that school buffets are also a financial resource for school expenses.

**IMPLICATIONS FOR RESEARCH AND PRACTICE**

Preventing obesity in children and adolescents should be regarded as an important public health priority in Iran. That said, modifying the current “obesogenic” school environment is crucial for combating this epidemic. It has been shown that school-based interventions for combating obesity epidemic as the only approach were not enough.\(^{34}\) Therefore, advocacy to promote the importance of holistic preventive approaches and devising or proposing preventive activities or approaches is needed. The Iranian parliament could pass legislation to restrict the sale of junk food and encourage the sale of nutrient-dense food in school buffets.

In conclusion, the present findings showed that students in rural areas were more overweight and consumed more junk food during the school day than their peers in urban areas. The primary source of food for both rural and urban girls was from the school buffets. Students should therefore be encouraged to eat breakfast at home and take a nutritionally valuable snack from home to eat during school hours. School buffets should be encouraged to offer food of higher nutrient density. More research addressing this topic is strongly recommended.

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