Original Article

High prevalence of overweight and obesity in women of Islamshahr, Iran

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This study determined the prevalence of overweight, overall and central obesity in female adolescents and women and their possible association with marital status, occupation, literacy, parity, daily meal and snack consumption. The study was a cross-sectional, random survey of households. Rural and urban areas of Islamshahr district in Iran were selected and 1003 female adolescents and women aged 10-65 years were studied. The frequency of overweight and obesity were similar in rural and urban areas. On the basis of body mass index (BMI), more than 19% of adolescents were overweight or at risk of it and 66.8% of adult females were overweight or obese. Frequency of central obesity [waist to hip ratio (WHR) ≥0.85] was 35.7% in all females. The mean BMI was significantly higher in married women and in women with less than 8 years of formal education. The mean WHR was significantly higher in women with less than 8 years of education or with more than 6 parity female adults. In addition, the mean BMIs and WHRs were significantly higher in women without any daily snack consumption. Overweight and obesity was very common in adult females of Islam shahr thus prevention of overweight and obesity through a healthy diet and increased physical activity should now be an important priority area.

Key Words: obesity, overweight, women, BMI, WHR, Islamshahr, Iran

Introduction

According to a report by Iranian Ministry of Health, in 2001, coronary heart disease (CHD) comprised 35% of total mortality rates in Iran.[1] Overweight and obesity increase the risk of morbidity due to CHD, hypertension, dyslipidemia and type 2 diabetes mellitus.[2] Women, in particular, have a high prevalence of obesity.[3] Risk factors for heart disease occur with increased frequency in overweight children and adolescents compared to children with a healthy weight. Obesity is closely linked with type 2 diabetes in children and adolescents.[4] The purpose of this study was to determine the prevalence of overweight, overall and central obesity in female adolescents and women and their possible association with some variables in Islamshar district in Iran.

Methods

Subjects

The study was approved by Research Undersecretary of Tehran University of Medical Science's Ethics committee for Medical Sciences Research. In a cross-sectional study in the year 2003, 340 households in each rural and urban areas of Islamshahr district were randomly selected. In each household, female adolescents and women aged 10-65 years old were studied. Non-Iranian, pregnant and/or lactating women were excluded from the study. In rural and urban areas 502 and 501 females participated, respectively. A questionnaire enquiring about socio-economic situation and eating behaviour was completed by each subject. The eating behaviour questions were adapted from lifestyle modification strategies.[5]

Anthropometric measurements

Height was measured without shoes against a wall-fixed tape and weight with light clothing and without shoes on a platform scale with a 1.0kg subtraction to correct for the weight of the clothing. Waist circumference was measured midway between the lower rib margin and iliac crest. Hip circumference was measured at the largest circumference (with undergarments).[6] The body mass index (BMI) was calculated as weight/height (kg/m^2) and the WHR as the ratio between the waist and the hip circumference. For female adults overweight and overall obesity were defined as $25 \leq BMI < 30$ and $BMI \geq 30$ respectively. Female adolescents with BMIs between 85^{th} and 95^{th} percentiles were defined as at risk of overweight and those with BMIs $>95^{th}$ percentile as overweight.[7] Central obesity was defined as $WHR \geq 0.85$.

Statistical analysis

Data were analyzed using SPSS for windows. X^2 test was

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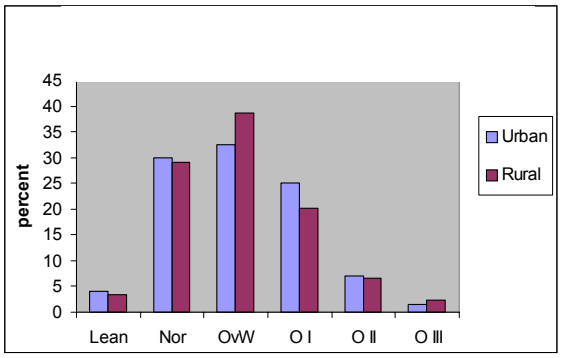

Figure 1. Body mass index distribution in adult females in Islamshahr in relation to residential areas.
Nor = Normal; OvW =overweight; O I = obesity grade I; O II = Obesity grade II; O III = Obesity grade III

used for the relationship between variables. Mean concentrations were compared by the student t test and one-way analysis of variance (ANOVA). Analysis of covariance (ANCOVA) was used for the between group comparison where correction for age was indicated.

Results

The distributions of BMI in adult women by residential areas is presented in Fig 1. The frequency of overweight and obesity were similar in urban and rural areas. In addition, BMI distributions in adolescent women and WHR distributions in all women were not significantly different between two areas. The distributions of BMI and WHR by age in adolescents and adults are presented in Tables 1-3. More than 16% of adolescent women were overweight or at risk of overweight (Table 1). A high frequency of overweight and obesity were observed in adult women. The highest percentage was noted in the 50-59 year old age group (Table 2). Frequency of overweight or obesity was increased by age in adolescents and adults. Moreover, WHR distributions in adolescents and adult women showed a similar trend by age (Table 3). The relationship between BMI and WHR distributions and age were not significant.

Table 1. Body mass index (BMI) distributions in 10-19 year old females in Islamshahr, by age

Age(year)	10-14	15-19
	%	%
Normal	83.3	78.5
At Risk of Overweigh	11.7	15.8
Overweight	5.0	5.7
Total (No.)	120	158

Table 2. Body mass index (BMI) distributions in female adults in Islamshahr, by age

BMI (kg/m^2)	%	%	%	%	%
<18.5	10.2	0	0	0	5.6
18.5-24.9	50.2	22.9	17.0	3.3	27.8
25-29.9	24.7	39.3	43.2	44.3	38.9
30-34.9	12.2	25.2	31.8	32.8	16.7
35-39.9	2.4	11.2	5.7	13.1	5.6
40≤	0.4	1.4	2.3	6.6	5.6
Total *N* =	255	214	179	61	18

Table 3. Waist to hip ratio (WHR) distributions in female adolescents and adults in Islamshahr, by age

WHR	≥0.85	Total
Age(year)	%	N
10-14	15.8	120
15-19	10.8	158
20-29	23.5	255
30-39	40.5	215
40-49	63.2	174
50-59	82.0	61
60-65	77.8	18

Variations in BMI and waist to hip ratio of adult women in relation to social and demographic variables adjusted for age is presented in Table 4. The mean BMIs were significantly higher in married or less educated women. WHRs were significantly higher in less educated women or those with high parity. Women consuming fewer daily meals had significantly higher BMIs (Table 5). In addition, BMI and WHR were significantly higher in wo-men without any daily snack consumption (Table 5).

Table 4. Variations in body mass index (BMI) and waist to hip ratio (WHR) of adult women in relation to social and demographic variables adjusted for age (mean and SD)

Variables		BMI	WHR
	N	Mean (SD)	Mean (SD)
Marital status			
Single	64	23.6 (8.0) [c]	0. 78 (0.08)
Married	627	27.9 (5.5)	0.85 (0.1)
Occupation			
Housewife	662	27.8 (5.7)	0.85 (0.1)
Student	39	27.8 (9.0)	0.81 (0.09)
Employed	23	23 (4.7)	0.77 (0.07)
Literacy (year)			
0-3	166	30 (6.0) [a]	0.91 (0.1) [a]
4-7	288	28.4 (5.7)	0.85 (0.08)
8≤	268	25.3 (5.4)	0.8 (0.09)
Parity			
<4	427	26.1 (5.9)	0.81 (0.09) [b]
4-6	191	29.3 (4.4)	0.87 (0.08)
6<	106	30.6 (6.5)	0.92 (0.1)

a = P <0.001 , b = P <0.002 , c = P <0.007

Table 5. Variations in body mass index (BMI) and waist to hip ratio (WHR) of adult women in relation to daily meal and snack consumption

Variables		BMI	WHR
	N	Mean (SD)	Mean (SD)
Meal per day (time)			
1-2	96	29.5 (6.1) [b]	0.83 (0.08)
2<	628	27.3 (5.8)	0.85 (0.1)
Snack per day (time)			
0	134	29 (6.1) [b]	0.89 (0.1) [a]
1	360	27.5 (5.5)	0.84 (0.09)
2	173	26.7 (6.6)	0.83 (0.09)
2<	57	28.2 (5.8)	0.84 (0.08)

a = P <0.001, b = P <0.007

Discussion

The results indicate that overweight and obesity are a major public health problem in adult women of Islamshahr. The prevalence of overweight and obesity in these women are much higher than Malaysian, American, Canadian, Chinese and Japanese women.[8-12] In addition, Islamshahr women had more central obesity than Greek women.[13] The highest prevalence of overweight and obesity has been reported in women aged 55-65 and in low-income countries.[14,15] A similar pattern was seen in Islamshahr. However, adolescent Islamshahr women, in comparison to Therani, American and Mexican[16-18] adolescent women, have lower prevalence of overweight (14% of them are at risk of overweight). Obesity in adolescence predicts obesity in adulthood. Elevated blood pressure, dyslipidemia, and a higher prevalence of factors associated with insulin resistance and type 2 diabetes appear in the overweight and obese children.[19] The prevalence of obesity in rural and urban areas of Islamshahr does not show significant difference. This may be due to the same lifestyle in both areas since the distance separating them is only a few kilometers.

In the present study, married women had a higher mean BMI. The association of marital status and obesity has been shown in Tehrani women.[20] The higher mean BMI in married women may be due to their higher parity or dietary habits. Women with higher parity have higher mean BMI and WHR, although the difference is not significant for BMI. The relationship between obesity and parity has been shown in another study[21] but weight change associated with reproduction has been shown to be highly dependent on BMI previous to pregnancy and the effects of parity and lactation were small.[22]

More literate Islamshahr women had a lower mean BMI and WHR. This may be due to their higher nutriational knowledge. Higher educational level has been associated with healthier dietary patterns and decreased prevalence of obesity.[23,24] However, in a study on Therani women, educational level was not associated with overweight or obesity.[20]

Islamshahr women with a lower daily frequency of meal consumption or without snack intake had a higher mean BMI and WHR. High eating frequency has been reported to have a negative relationship with energy intake and weight gain.[25] However, one study of Saudi Arabian women showed more frequent snacking in the obese compare to control women.[26] The relationship of overweight and obesity with dietary intake, physical activity and coronary heart disease risk factors need to be studied in this population.

The prevention of overweight and obesity through a healthy diet and increased physical activity should now be an important priority area.

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