Overweight and Obesity Among Urban Sahraoui Women of South Morocco

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Objectives: To estimate the prevalence of obesity in Moroccan Sahraoui women; to describe their distribution of body fat; and to examine the influence of age, calorie intake, physical activity, marital status, education level, and desire to lose weight on obesity.

Design: Randomized samples of adult women who visited the public health centers during a immunization campaign period.

Participants: Data were obtained on 249 non-pregnant urban women aged 15 and older, who live in the city of Laayoune in South Morocco. Only subjects identified as Sahraoui origin were eligible for this investigation.

Main Outcome Measure: The following data were collected: body weight, height, circumference of waist and hip, calorie intake, physical activity, marital status, education level, and desire to lose weight.

Results: The overall prevalence of overweight and obesity was 30% and 49%, respectively, and was found to be very high in younger age groups. The prevalence of abdominal obesity was also high and increased with age. Sixty-eight percent of women had a waist-to-hip ratio (WHR)>0.85 and 76% had a waist circumference (WC)≥88. The calorie intake, the time spent in a walking activity, and the time spent in traditional sedentary occupation were associated with obesity. The prevalence of obesity was higher among married women compare to unmarried women and was not influenced by education level. A very small percentage of the female population expressed a desire to lose weight.

Conclusion: High prevalence of obesity, even in young adult women, needs immediate attention in terms of prevention and health education among the urban Sahraoui women. (*Ethn Dis.*2004;14:542–547)

Key Words: Morocco, Obesity, Sahraoui Ethnic Group, Women

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Introduction

A rising trend in obesity has been observed around the world,[1] including developing countries with previously low prevalence but who are now experiencing a transition in nutrition patterns.[2–4] Also, studies have reported a high prevalence of obesity in some minority populations (eg, Black women,[5] Pima Indians of Arizona,[6] Australian aboriginals[7] and Torres Strait Islander people[8]). Thus, it is important for policymakers to have accurate information on obesity rates at the national level as well as on population levels and how obesity varies across the different populations and vulnerable sub-groups. Morocco, because of its diverse ethnic groups, Berber, Arab and Sahraoui, is indeed a fascinating "laboratory" for research into the causes of obesity. The prevalence of obesity has increased in the last 2 decades.[9] Anthropometric status through 2 Moroccan national surveys (1984–1985 and 1998–1999) shows that the prevalence of obesity among urban women aged 20 years or older was 8.7%[10] in the first study and increased to 19.1% 15 years later.[11] However, no information has been published on comparable patterns of obesity and body fat distribution among Moroccan women of various ethnic and racial backgrounds. In order to collect data that can serve as a baseline for the assessment of the future trends of obesity, to our knowledge, this study is the first one to investigate obesity in a Moroccan ethnic group. The Sahraoui ethnic group, residing in South Morocco, was chosen for this study because it was a traditionally nomadic population which was experiencing a swift process of urbanization accompanied by rapid changes in diet, level of physical activity and possible chronic disease rates. Identifying members of this ethnic group is not difficult and thus selection of study subjects was uncomplicated.

The objectives of this study were: to estimate the prevalence of obesity in Moroccan Sahraoui women living in the city of Laayoune, South Morocco; to describe their distribution of body fat; and to examine the influence of age, calorie intake, physical activity, marital status, education level, and desire to lose weight on obesity.

Methods

The survey was conducted between October 2001 and April 2002 with a sample of 249 urban, non-pregnant women aged 15 years and older who lived in the city of Laayoune in South Morocco. The sample was recruited from women who visited public health centers during an immunization campaign. We identified several ethnic groups (Sahraoui, Arab, and Berber) but only subjects identified as Sahraoui origins and without any previous systemic diseases were eligible for this investigation. A number of strict criteria were used to identify women belonging to the Sahraoui ethnic group: their communication skills in Hassani dialects; their popular traditional clothing; and the history of their family's residence. Indeed, Sahraoui ethnic groups, characterized by the Hassani dialect, have

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been a traditionally nomadic population undergoing a rapid process of urbanization and, from the age of puberty, the Sahraoui women are obliged to wear the traditional clothing. All women were interviewed face-to-face by an interviewer who belonged to this Sahraoui ethnic group. Informed consent was obtained verbally from each participant before they were permitted to participate in the survey. All anthropometric measurements were made in accordance with World Health Organization (WHO) standards.[1,12] For participants wearing light clothing with no shoes, weight and height were measured using a portable scale and a metric tape adhered to a wall. Circumferences of waist (WC) and hip were measured respectively at the horizontal level of the umbilicus and the horizontal level of the maximal protrusion of the gluteal muscles and a waist-to-hip ratio calculated. Body mass index (BMI) was calculated as weight divided by height squared (kg/m^2). The World Health Organization (WHO) defined underweight, normal weight, overweight, and obesity when BMI$<$18.5, 18.5$\leq$BMI$<$25, 25$\leq$BMI$<$30 and BMI$\geq$30, respectively; central obesity was defined as WC$>$88 cm, or as WHR$>$0.85.[1,12,13]

Data on the socio-demographic characteristics, medical history, dietary intake, physical activity, and weight loss desire were collected using a questionnaire. Dietary intake estimates were based on 24-hour recall interviews. Mean daily dietary intake and composition were estimated by a Bilnut program completed with some Moroccan dishes. Physical activity was determined based on the subjects' responses to a questionnaire asking about activities during the previous one-year period. A list of activities was developed and detailed information about the frequency and duration of each activity was collected.

Marital status was categorized as married women (including divorced and widow) and single women (never married); education level was categorized as never attended school, attended primary school, and attended secondary school. Also, participants were asked if they had a desire to lose weight.

The protocol was approved by the Moroccan Ministry of Health.

Statistical Analysis

Statistical analysis was completed using SPSS version 11. Tukey's test was used for means comparisons of anthropometric variables according to the age groups. General Linear Model (GLM) was used for means comparisons of calorie intake, the time spent walking, the time spent drinking tea, and the time spent sleeping in the afternoon and according to the BMI categories after adjustment by age. Multiple comparisons were performed with Bonferroni's corrections. Associations between different variables were assessed by Spearman's correlation. Statistical significance was set at $P<.05$.

RESULTS

The sample size and mean and standard deviation (SD) for anthropometric parameters in the sample population according to the age are presented in Table 1. The average of all anthropometric parameters increased with age, the maximum values were observed at 55 years of age. After this age, there was a trend of BMI to decrease and a trend of WHR and WC to increase, but not statistically significant.

Table 1. Means and standard deviation (SD) of anthropometric variables for adult Sahraoui women according to the age group

Age (years)	Sample Size	Height (m)	Weight (kg)	WC (cm)	Hip (cm)	BMI (kg/m^2)	WHR
All	249	1,58 (0,06)	73,69 (14,03)	97,80 (14,63)	108,98 (14,77)	29,63 (5,34)	0,90 (0,09)
<25 (a)	42	1,57 (0,05)	63,13 (12,62)	85,20 (11,09)	102,46 (10,75)	25,47 (4,81)	0,83 (0,07)
25–34.9 (b)	71	1,59 (0,06)	72,74 (14,25)	94,87 (13,63)	106,88 (16,75)	28,83 (5,15)	0,90 (0,09)
35–44.9 (c)	76	1,58 (0.06)	78,65 (13,03)	102,13 (15,24)	111,17 (15,75)	31,65 (5,21)	0,93 (0,11)
45–54.9 (d)	33	1,57 (0.06)	78,00 (12,79)	103,61 (10,85)	114,36 (11,94)	31,51 (4,64)	0,91 (0.08)
>55 (e)	27	1,56 (0,05)	73,41 (10,54)	105,78 (9,39)	111,85 (10,61)	30,20 (3,54)	0,95 (0,07)
P value	a vs b	ns	<.01	<.01	ns	<.01	<.01
	b vs c	ns	ns	<.01	ns	<.01	ns
	c vs d	ns	ns	ns	ns	ns	ns
	d vs e	ns	ns	ns	ns	ns	ns

BMI=body mass index; WHR=waist: hip ratio; WC=waist circumference; ns=not statically significant.
Means are tested for significance with Tukey's test.

Table 2. Obesity prevalence according to the age group

Age (years)	Sample Size	Categories of Body Mass Index (BMI)			
		<18.5	18.5–24.9	25–29.9	≥30
<25	72	2,4	40,5	45,2	11,9
25–34.9	71	2,8	29,6	18,3	49,3
35–44.9	76	1,3	9,2	30,3	59,2
45–54.9	33	0	9,1	18,2	72,7
>55	27	0	0	51,9	48,1
All	249	1,6	19,3	30,1	49,0

Table 2 shows that while 1.6% of women were underweight, the situation is more alarming with regard to overweight and obesity. Indeed, 30% of women in the sample were overweight and 49% were obese. In all age groups, the prevalence of women with normal BMI was below 50% and more than half of the study group was classified as overweight or obese. A high prevalence of overweight (45%) was seen in the younger age groups (<25 years); after 25 years of age the prevalence of obesity exceeded the prevalence of overweight. Among this survey population, 68% had a WHR>0.85 and 76% had a WC≥88 cm (Table 3). Also, high WC (≥88 cm) and high WHR (>0.85) were seen in the younger women (<25 years), and at least 35% of these women had central obesity, suggesting that fat accumulation had begun at a younger age. In addition, a progressive development of abdominal obesity with age was observed (Table 3) and still prevailed after 55 years of age, despite a reduction in total body fat. Indeed after 55 years of age the overall obesity appeared to decline from 73% to 48% in age groups 45 to 54.9 years and ≥55 years, respectively, while high WC (more than 90% in both age groups) was maintained.

For the data in Tables 4–7, the underweight women were excluded from analysis.

Table 4 presents the means and standard deviations of calorie intake, the time spent walking, the time spent drinking tea, and the time spent sleeping in the afternoon according to the BMI categories. Mean daily caloric intake was 1823 kcal and statistically (P=.03) higher in obese (1867 kcal) than in normal women (1689 kcal), but this difference disappeared after adjustment by age. Also, it was observed that the time spent walking was significantly higher in women with normal weight and the time spent drinking tea or sleeping in the afternoon were significantly higher in obese women even after adjusting for age. Using correlation coefficients (Table 5), BMI was found positively correlated with the calorie intake (r=0.15, P<.05) and the time spent both drinking tea (r=0.35, P<.001) and sleeping in the afternoon (r=0.19, P<.05), whereas BMI was negatively correlated with walking activity (r=−0.42, P<.001). In addition to the lifestyle activity (tea consumption, afternoon sleeping and walking activity), marriage, but not education, appeared to play a great role in the development of obesity (Table 6). Obesity was higher in married women (59.4%) than in single women (10.4%), whereas overweight was high both in single (37.5%) and married women (28.9%). In contrast to the significant positive association of marriage with BMI (r=0.427, P<.0001), education was negatively associated with BMI but this association was not significant (r=−0.105, P=.102) and, despite education levels, overweight and obesity were highly prevalent in these women.

The majority of women in this survey appreciated their body weight and thus refused to lose it. Only 2.7% of overweight women and 4.9% of obese women desired to lose weight. Even after stratification by education level, age, and marital status (Table 7), accepting to lose weight remained very low, the maximum values were observed in primary education level (8.6%), in under-25 age group (12.5%) and in single women (17%).

Table 3. Central obesity prevalence according to the age group

Age (years)	Sample Size	Categories of Waist : Hip Ratio (WHR)		Categories of Waist Circumference (WC)	
		WHR ≤0.85	WHR >0.85	WC <88 cm	WC ≥88 cm
<25	42	64,3	35,7	64,3	35,7
25–34.9	71	36,6	63,4	28,2	71,8
35–44.9	76	15,8	84,2	10,5	89,5
45–54.9	33	33,3	66,7	9,1	90,9
>55	27	14,8	85,2	7,4	92,6
All	249	32,1	67,9	24,1	75,9

DISCUSSION

This study of women of Sahraoui ethnicity found a prevalence of obesity (49%) that is 3 times higher than the national figure. Results from the last national survey on Standards of Living conducted in 1998–1999 showed that 18.3% of urban women were obese.[9] The high prevalence of obesity among Sahraoui women is similar to those reported in some Arabic populations especially in the Gulf countries[14–18] and in some minorities.[19]

Among Sahraoui women, there ap-

Table 4. Means and standard deviations of calorie intake and lifestyle activity (walking, tea consumption, afternoon sleeping) according to the BMI categories

			Lifestyle Activity		
		Calorie Intake ± SD kcal/day	Walking (hour/week)	Tea Consumption (hour/day)	Afternoon Sleeping (hour/day)
All		1823 ± 428	3.71 ± 3.08	3.33 ± 1.8	1.47 ± 1.11
Normal weight (a)		1689 ± 368	6.9 ± 3.5	2.24 ± 1.65	1.04 ± 0.76
Over weight (b)		1822 ± 401	3.45 ± 2.37	3.09 ± 1.79	1.31 ± 0.92
Obese (c)		1876 ± 457	3.67 ± 2.46	3.87 ± 1.79	1.71 ± 1.24
P value	a vs b	ns	<.001	ns	ns
	a vs c	ns	<.001	<.001	<.05
	b vs c	ns	ns	<.05	ns

pears to be an age effect in the development of obesity, which was prevalent in 12% of women before age 25 and reached 73% at 45 to 55 years of age, after which obesity prevalence decreased to 48%. These results, compared to other studies,[20] revealed a relative high prevalence of overweight (45%) before age 25, which would predict an incremental incidence of obesity in women after this age.

In this survey, WC and WHR were used to determine body fat distribution. No reference data for these indicators are available for the Moroccan population. In the population studied, the proportion of women with WC and WHR exceeding the recommended upper limit was higher than the proportion of women with general obesity, indicating that this population manifests central obesity. Fat begins to accumulate early in the young Sahraoui women and, with increasing age, it is redistributed to the abdominal cavity. Despite a reduction in total body fat after 54 years of age, the development of abdominal obesity still prevails and suggests a high health risk for these women.

Urbanization is a phenomenon that has recently received considerable attention. It was highly associated with several dietary and behavioral risk factors not only for chronic disease, but also for obesity.[1,3,21,22] Overweight and obesity are frequently observed in Western Samoans and in the Pima Indians of Arizona, as lifestyles become more modernized.[6,23]

Diet and physical activity are important in the maintenance of healthy body weight. National data on food consumption have revealed that calorie intake of obese and overweight women in Morocco was higher than recommended calorie intake levels in the United States.[9] Our results showed that independent of body weight, calorie intake for Sahraoui women was not higher than recommended; however, it was higher in obese compared to normal weight women. Physical activity appears to play a critical role in the development of body fat. Indeed, most Sahraoui women tend to be involved in the traditional sedentary occupation of drinking tea and sleeping in the afternoon. These habits occupied a considerable part of the day and the time spent in these sedentary occupations was higher among obese women. Compared with normal weight women, obese Sahraoui women tended to spend less energy (walking activity). The absence of women's participation in sports activities may be explained by cultural and physical barriers that have been noted and are in relation to the very high prevalence of obesity among adult women in Saudi Arabia.[24]

Marriage has been also associated

Table 5. Spearman correlation between BMI and educational level, marital status, desire to lose weight, calorie intake, time spent in walking, the time spent in tea consumption and the time spent in afternoon sleeping.

	Body Mass Index (BMI)	
	r	*P*
Education level		
Marital status	−0.105	.102
Desire to lose weight	0.427	.0001
Calorie intake (Kcal/day)	0.058	.36
	0.15	.019
Walking	−0.42	.0001
Tea consumption	0.35	.0001
Afternoon sleeping	0.189	.01

Statistical significance was set at $P<.05$; *r*: correlation coefficient.

Table 6. Distribution of obesity prevalence according to the marital status, educational levels, and the desire to lose weight

		Body Mass Index (BMI) Categories		
		Normal	Overweight	Obese
Marital status	Single	52.1	37.5	10.4
	Married	11.7	28.9	59.4
Educational level	Never attended school	15.9	30.5	53.6
	Primary	23.9	19.6	56.5
	Secondary	27.1	41.7	31.3
Desire to lose weight		0	2.7	4.9

Table 7. Percentage of overweight and obese women desiring to lose weight according to the educational level, marital status and age group

		% of Women Who Desired Losing Weight
Educational level	Never attended school	2.4
	Primary	8.6
	Secondary	5.9
Marital status	Single	17.4
	Married	2.3
Age group	<25	12.5
	25–34.9	10.6
	35–44.9	0
	45–54.9	0
	>55	0

with weight gain.[25] In this survey, 80% of women in this study were married and many of them had had multiple pregnancies. The prevalence of overweight was higher among the single women and would likely develop into obesity after marriage. The possible explanation for the high prevalence of overweight among single women could be the perception that ample body weight is considered attractive in this ethnic group. Indeed, being in a marriage-like relationship is a desirable state for most women and fatness increases attractiveness to potential partners. The same behavior was reported in Mauritanian women where obesity was culturally valorized,[26] in Indian society where fatness had an effect on getting alliances or finding a marriage partner, and in the Cameroonians who considered fatness prestigious.[27]

In a previous national survey, women low levels of education were unable to recognize the risks and health consequences associated with overweight and obesity.[9] In contrast, in the Sahraoui ethnic group, the prevalence of overweight and obesity were not greatly affected by the level of education. Also, the desire to lose weight by overweight and obese Sahraoui women was very low (4.1%) and this desire was not affected by the education level. These results show that Sahraoui women are less concerned about their weight and they tend to have less pressure to be slim. As in all Arab and African countries, Sahraoui women considered fatness as a beauty criterion.

Among Sahraoui women, there appears to be an age effect in the development of obesity, which was prevalent in 12% of women before age 25 and reached 73% at 45 to 55 years of age . . .

Our study demonstrated a high prevalence of obesity, explained by the combination of urban living and cultural preference of body fatness, among the Moroccan women of the Sahraoui ethnic group. The study stresses the need to begin preventive measures early in life to avoid overweight and eventually obesity. The results emphasize the necessity to educate the public about health issues related to overweight and obesity and to promote healthy lifestyle behaviors, including healthy diet, increased level of physical activity (such as walking), and reduction in sedentary behavior.

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