

## **Factors Related to Weight Status of the Adult Bahraini Population (A community-based Study)**

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**Factors related to weight status of Bahraini adults were studied. A cross-sectional survey on 514 Bahraini adults aged 30.79 years was carried out using multistage sampling technique. Body mass index was used as an indicator for measuring obesity. The subjects were classified into non-obese ( $BMI < 25$ ), overweight ( $BMI 25-29.9$ ) and obese ( $BMI \geq 30$ ). There was a significant difference in mean BMI between men and women in all factors studied. Younger people (30-49 years), with higher education, non-smokers, those with history of hypertension, and those who watched television daily had higher mean BMI. There was a significant difference between weight status and age ( $p < 0.005$ ), sex ( $p < 0.0001$ ), education ( $p < 0.04$ ), smoking ( $p < 0.0001$ ), hypertension ( $p < 0.001$ ), diabetes ( $p < 0.001$ ), and watching television ( $p < 0.03$ ). The results suggest that the health authority in the country should establish a programme to prevent and control obesity, taking into consideration several social, dietary and health factors.**

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Several studies have been carried out in Bahrain to determine the prevalence of obesity in the population<sup>1-3</sup>. These studies found that obesity is highly prevalent among adolescents and adults, especially among women. As obesity is a risk factor for some chronic diseases<sup>4</sup>, the need to prevent and control it has become an essential measure to prevent chronic non-communicable diseases in the country.

Any programme to prevent obesity would not be effective without understanding the factors that cause overweight and obesity among various age groups. Very few studies have addressed this aspect in Bahrain. Musaiger et al<sup>5</sup> studied socio-demographic and dietary factors associated with obesity among secondary school students (15-20 years) in Bahrain. The findings revealed that 15.6% of boys and

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17.4% of girls were either overweight or obese. Family size, parents' education, and family history of obesity were significantly associated with obesity among boys, while family history was the only socio-economic factor statistically associated with obesity among girls. Another study on women attending physical fitness programmes in Bahrain showed that age, education, employment, marital status, family size and practising exercise have a statistically significant association with obesity, whereas ownership of cars, availability of housemaids, family history of obesity and meal patterns have no significant association<sup>6</sup>.

The objective of this study was to investigate some factors that might be associated with the weight status of Bahraini adults aged 30-79 years, using a community-based survey.

## METHODS

The study population consisted of Bahraini nationals aged 30-79 years. A proportional random sample of 520 households taken from a list of all households in Bahrain released by the Central Statistics Organization<sup>7</sup> was selected using the method for cluster sample surveys described by Bennett et al<sup>8</sup>. In brief, Bahrain is divided administratively into 11 geographical areas, a total of 337 blocks. A random sample of 52 blocks (15%) was selected using random tables. A probability random sample was obtained from lists of households in each of the selected blocks, and 10 households were chosen from each block, yielding a total sample of 520 households.

One person aged 30 to 79 years was selected from each household. This was done by selecting the first person available in the household aged 30 years or above. People were interviewed at home by trained female interviewers using a structured pre-tested questionnaire which included information on socio-demographic backgrounds, lifestyle patterns, and history of diabetes and hypertension. Educational levels of subjects were grouped into three categories, low education, which included illiterate and those who could read or write; middle education which included those who had primary and intermediate education, and high education, which included those who had secondary and university education. Marital status was divided into two groups; currently married and unmarried (including widowed and divorced). Smoking behaviour was classified into two categories, current smokers and current non-smokers (including ex-smokers). Six people were excluded due to incompleteness of some responses to questions, making the total sample of 514 people.

Weight was obtained using a scale with an accuracy of 0.1 Kg, while the height was obtained using a portable stadiometer with an accuracy of 0.1 cm. Body mass index (BMI) [weight (kg) / height (m)<sup>2</sup>] was used to determine obesity among the study population. The subjects were classified into two levels, non-obese, which included those who had BMI less than 25, and obese, which included those who had BMI equal to or more than 25 as described by Garrow<sup>9</sup>.

Data were stored on a D-Base file and the SPSS software package was used for data management and analysis.

## RESULTS

Means and standard deviations of BMI according to social and lifestyle factors of adult Bahrainis are shown in Table 1. There was a significant difference in mean BMI between men and women in all factors studied, and women had a higher mean BMI than men. This finding suggests that women were heavier than men. When the mean BMI was compared within each sex, a significant difference was found in mean BMI with age, education, smoking, history of hypertension and watching television. The mean BMI for currently married men was lower than that for unmarried men (26.3 and 27.8, respectively). However, this trend was not observed among women, as the mean BMI was almost equal in both groups (30.1 and 30.0, respectively). Women with diabetes had a higher mean BMI (31.7) than non-diabetic women (29.9) and the difference was statistically significant. Among men, the mean BMI was similar for both diabetics and non-diabetics (26.4 and 26.1, respectively).

**Table 1. Social and lifestyle factors of Bahraini adults (30-79 years) by mean and standard deviation (SD) of body mass index**

Factors	Men		Women	
	No.	(Mean $\pm$ SD)	No.	(Mean $\pm$ SD)
<b><u>Age (years)</u></b>				
<50	125	27.3 $\pm$ 4.7	121	30.2 $\pm$ 6.9
$\geq$ 50	173	25.6 $\pm$ 4.3	95	29.8 $\pm$ 6.1
<b><u>Education</u></b>				
Low*	221	25.2 $\pm$ 4.1	183	29.7 $\pm$ 6.3
High	77	27.3 $\pm$ 4.7	33	31.1 $\pm$ 7.3
<b><u>Marital Status</u></b>				
Currently married	289	26.3 $\pm$ 4.5	188	30.1 $\pm$ 6.5
Currently unmarried	10	27.8 $\pm$ 4.8	28	30.0 $\pm$ 7.3
<b><u>Smoking</u></b>				
Non-smoker	164	27.0 $\pm$ 4.3	66	30.7 $\pm$ 6.5
Smoker	134	25.0 $\pm$ 4.7	150	27.9 $\pm$ 6.7
<b><u>History of hypertension</u></b>				
No	271	26.2 $\pm$ 4.5	180	29.5 $\pm$ 6.6

Yes	27	$27.1 \pm 4.9$	36	$33.3 \pm 5.8$
<b><u>History of diabetes</u></b>				
No	279	$26.3 \pm 4.6$	189	$29.9 \pm 6.9$
Yes	19	$26.0 \pm 4.7$	27	$31.7 \pm 4.3$
<b><u>Watching television</u></b>				
Rarely or occasionally	68	$24.7 \pm 4.4$	45	$29.3 \pm 6.2$
Daily	230	$26.8 \pm 4.5$	171	$30.4 \pm 6.7$

\* Low education included low and middle education (see method section).

The relationship between the weight status of Bahraini adults and social, lifestyle and health factors is given in Table 2. Obesity was more prevalent among younger adults (<50 years), female, unmarried, non-smokers, hypertensive, diabetic and those who watched television daily. With the exception of marital status, the association between weight status and these factors was statistically significant. Overweight was more prevalent among high education subjects (44.4%), compared to low (29.8%) and middle education (34.2%) subjects. However, the proportion of obesity among the three education groups was almost the same. The association between education and weight status was statistically significant ( $p=0.040$ ).

Table 2. **Social, health and lifestyle factors associated with weight status of adult Bahraini adults**

Factors	Non-obese		Overweight		Obese		P-value
	No.	%	No.	%	No.	%	
<b><u>Age (years)</u></b>							
<50	66	26.8	92	37.4	88	35.8	0.0055
$\geq 50$	108	40.1	82	30.5	78	29.4	
<b><u>Sex</u></b>							
Male	130	43.6	106	35.6	62	20.8	0.0001
Female	44	20.3	68	31.3	104	48.4	
<b><u>Education</u></b>							
Low	112	30.4	87	29.8	93	31.8	0.0400
Middle	36	31.6	39	34.2	39	34.2	
High	26	24.1	48	44.4	34	31.5	

<u>Marital status</u>							
Married	163	34.2	165	34.7	148	31.1	0.1184
Unmarried	11	28.9	9	23.7	18	47.4	
<u>Smoking</u>							
Non-smoker	113	30.0	127	33.8	136	36.2	0.0001
Smoker	61	44.2	47	34.1	30	21.7	
<u>Hypertension</u>							
No	163	36.1	154	34.2	134	29.7	0.001
Yes	11	17.5	20	31.7	32	50.8	
<u>Diabetes</u>							
No	165	35.2	159	34.0	144	30.8	0.0015
Yes	9	19.6	15	32.6	22	47.8	
<u>Watching T.V</u>							
Daily	127	31.4	138	34.1	140	34.5	0.0364
Rarely or occasionally	47	43.1	36	33.0	26	23.9	

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## DISCUSSION

Two important findings were obtained from this study. First, the weight status of adult Bahraini is highly associated with social, lifestyle and health factors, which indicates that the causes of obesity are multi-factorial. Second, women showed a higher BMI than men, with the result that obesity is more prevalent in adult females than males. The prevalence of overweight was slightly higher among men (35.5%) than women (31.3%). In contrast, women showed about double the proportion of obesity compared to men (48.4% and 21%). These data supported those reported in other Gulf countries, as obesity was determined by several factors and women were more prone to be obese than men<sup>10,11</sup>.

Older people ( $\geq 50$  years) showed a lower proportion of obesity than younger people ( $< 50$  years). The phenomena that obesity increased with age until the age of 50 or 60 years was demonstrated by other investigators in the Gulf region<sup>11,12</sup>. The age-related increase in obesity during young adulthood and middle age is not only a consequence of slowly accumulating excess of fat, it is also likely to be promoted by the fact that most people reduce the frequency, duration and intensity of physical activity very considerably as they age<sup>13</sup>.

Interestingly, high education level had a higher percentage of overweight compared to other education groups. This result is in line with that found in the United Arab

Emirates, as overweight and obesity were more prevalent among university educated than non-university educated men<sup>14</sup>. In contrast, Khashoggi et al<sup>15</sup> showed that obesity was lower among high education Saudi women followed by low and middle education, respectively. Education, is mostly linked with age, and probably in our study older people were also low educated, and this may explain the lower prevalence of obesity among the low education subjects.

A significant difference in obesity was observed between smokers and non-smokers, as the latter group were more susceptible to obesity. Studies on the relationship between smoking and obesity were inconclusive. However, a number of studies have shown that cigarette smokers weigh less than non-smokers and are less likely to be overweight than non-smokers. In a multiple regression analysis that adjusted for age, alcohol consumption and physical activity, both male and female smokers had a lower mean BMI than people who had never smoked<sup>13</sup>.

Hypertension and diabetes were highly statistically associated with weight status in our subjects. The main cause of excess mortality among obese people is heart disease and hypertension. In women, obesity (following age and blood pressure) is the third most powerful predictor of heart disease. In epidemiological studies the prevalence of diabetes increases with increasing severity as well as duration of obesity. However, diabetes is not directly the cause of most of the excess mortality among obese people. The metabolic defect underlying non-insulin diabetes mellitus is clearly the result of obesity, which itself predisposes to hypertension and heart disease<sup>13</sup>.

Hours of watching television had a significant association with weight status ( $p=0.0364$ ). The percentage of obesity among people who watched television daily (34.5%) was higher than those who rarely or occasionally watched television (23.9%), but the proportion of overweight was the same in both groups (34.1% and 33.0%, respectively). Studies on the association of television with obesity are not consistent<sup>16,17</sup>. Some researchers suggested that the food eaten during watching television may be a confounding factor for obesity, as most of these foods are high in fat and energy. Further investigations on the relationship between watching television and obesity are needed, especially in our region where the television plays an important role in leisure time activity in both children and adults.

## CONCLUSION

**In conclusion, the present study confirmed the findings of other studies in the region as well as in western countries, that obesity is highly prevalent in the community and is caused by several social and lifestyle factors. Dietary patterns, although not studied, is another contributing factor. These findings suggest that the health authority in the country should establish a programme to prevent and control obesity as it is one of the main factors linked with occurrence of chronic**

**non-communicable diseases. To be effective, such a programme should take into consideration the socio-economic status, dietary habits, and cultural factors that are associated with obesity in the Bahraini community.**

## REFERENCES

1. Musaiger AO, Al-Ansari M. Factors associated with obesity among women in Bahrain. *Int Quart Common Hlth Educ* 1992;12:129-136.
2. Musaiger AO, Gregory WB. Height, weight, Arm Circumference and Skinfold Thickness of Bahraini Children aged 6-18 years. Arab Nutrition Society, Al-Ain: United Arab Emirates, 1997.
3. Musaiger AO, Al-Sayyad J. Nutritional Status of Mothers and Preschool Children in Bahrain. Bahrain Center for Studies and Research: Bahrain, 1999.
4. World Health Organization. Diet, Nutrition and the Prevention of Chronic Diseases. Technical Report Series No. 797:Geneva, 1990.
5. Musaiger AO, Mattar AM, Alekri SA, Mahdi AE. Obesity among secondary school students in Bahrain. *Nutr Health* 1993;9: 25-32.
6. Musaiger AO, Al-Ansari M. Factors associated with obesity among women in Bahrain. *Int Quart Community Health Educ*, 1992; 12(2): 129-136.
7. Central Statistics Organization. Statistical Abstract 1992. Council of Ministries: Bahrain,1991.
8. Bennett S, Woods T, Liyanage WM, et al. A Simplified general method for cluster-sample surveys of health in developing counties. *Wld Hlth Statist Quart* 1991; 44: 98-105.
9. Garrow JS. Obesity and Related Diseases. Churchill Livingstone: Edinburgh, 1988.
10. Al-Nuaim AR, Bamgboye EA, Al-Rubaan KA, et al. Overweight and obesity in Saudi Arabia adult population, role of socio-demographic variables. *J Community Health* 1997;22:211-23.
11. Al-Isa AN. Body mass index and prevalence of obesity changes among Kuwaitis. *Eur J Clin Nutr* 1997;51:743-9.
12. Al-Nuaim AR, Al-Rubaan K, Al-Mazrou Y, et al. High prevalence of overweight and obesity in Saudi Arabia. *Int J Obese Relat Metab Discord* 1996; 20:547-52.
13. British Nutrition Foundation. Obesity. Blackwell Sciences: London, 1999.
14. Hossain HH, Pugh RNH, Malik M. Prevalence and correlates of diabetes,

- obesity and hyperlipidemia in the United Arab Emirates (UAE). *Bahrain Med Bull* 1998;20:119-22.
15. Khashoggi RH, Madani KA, Ghaznawy HI, Ali MA. Socioeconomic factors affecting the prevalence of obesity among female patients attending primary health centers in Jeddah, Saudi Arabia. *Ecol Food Nutr*, 1994;31:277-83.
16. Gortmaker SL, Dietz WH, Cheung LWY. Inactivity, diet and the fattening of America. *J Am Diet Assoc* 1990;90:1247-52.
17. Robinson TN, Hammer LD, Killen JD, et al. Does television viewing increase obesity and reduce physical activity? Cross-sectional and longitudinal analysis among adolescent girls. *Pediatrics* 1993;91:273-80.