JRHS 2010; 10(2): 116-121

JRHS

Journal of Research in Health Sciences

Original Article

The Prevalence of Obesity and its Related Risk Factor in the North of Iran in 2006

Gholamreza Veghari (MSc)[a]*, Mehdi Sedaghat (MD)[b], Hamidreza Joshaghani (PhD)[c], Ahmad Hoseini (MD)[b], Farhad Niknezhad (PhD)[c], Abdolhamid Angizeh (BSc)[b], Ebrahim Tazik (BSc)[b], Pooneh Moharloei (MD)[b]

[a] *Golestan Cardiovascular Research Center, Department of Biochemistry and Nutrition, School of Medicine, Golstan University of Medical Sciences, Gorgan, Iran*

[b] *Deputy of Health Services, Golestan University of Medical Sciences, Gorgan, Iran*

[c] *Department of Laboratory Sciences, School of Paramedical and Health, Golestan University of Medical Sciences, Gorgan, Iran*

ARTICLE INFORMATION

Article history:

Received: *28 September 2010*

Revised: *3 November 2010*

Accepted: *13 December 2010*

Available online: *18 December 2010*

Keywords:

Obesity

Adults

Socio demographic factors

Iran

**** Correspondence***

Gholamreza Veghari (MSc)

Tel: *+98 171 4421651*

Fax: *+98 171 4440225*

E-mail: *grveghari@yahoo.com*

ABSTRACT

Background: The main objective of this study was to evaluate the prevalence of the obesity and the related risk factors in the north of Iran.

Methods: This was a population-based cross-sectional study that enrolled 2495 subjects (1247 males and 1248 females) using stratified cluster sampling. Interviewers recorded the data using a multidimensional questionnaire including anthropometric indexes. Body mass index equal to or greater than 25 was considered as overweight and that of 30 and 40 as obese and pathologic obese respectively. SPSS 16.0 software was used for statistical data analysis.

Results: Mean age of the subjects was 39.2 [95% CI: 38.6, 39.8] yr. Mean body mass index was 25.3 [95% CI: 25.0, 25.6] kg/m^2 for men and 27.5 [95% CI: 27.2, 27.9] kg/m^2 for women. The prevalence rates of overweight, obesity and pathologic obesity were 29.9% (745/2495), 22.5% (561/2495) and 1.8% (44/2495) respectively. The prevalence of obesity was higher in urban residents than rural ones, 27.3% versus 18.9% respectively (P<0.001). The prevalence rates of obesity and pathologic obesity were much higher in women than men were, 30.3% versus 15.4% and 3.0% versus 0.6% respectively (P=0.001). The odds ratio estimate was 1.68 [95% CI: 1.40, 2.02] for urban area compared to rural area; 2.60 [95% CI: 2.14, 3.15] for females compared to males; 5.95 [95% CI: 3.54, 9.99] for married people compared to single people; 1.89 [95% CI: 1.44, 2.84] for age group of 55-65 years compared to age group of 15-24 years; 1.76 [95% CI: 1.17, 2.64] for illiterate people compared to those who had academic education; 1.98 [95% CI: 1.13, 2.49] for poor people compared to people with high economic level.

Conclusion: The prevalence of obesity and overweight is very high in the north of Iran, hence is a signal of serious health problem, and should be the focus of special attention.

Citation: Veghari GR, Sedaghat M, Joshaghani HR, Hoseini A, Niknezhad F, Angizeh AH, Tazik E, Moharloei P. The prevalence of obesity and its related risk factor in the North of Iran in 2006. *JRHS*. 2010;10(2):116-121.

Introduction

Obesity emerged as a health problem during the past century whereas the prevalence of obesity and numbers of people who are overweight increased rapidly recently in many countries [1].

The cause of obesity is complex and multi-factorial worldwide. There are various risk factors, which are responsible for the weight gain and obesity in human. Both the metabolic and behavioral factors such as leptin and life style can effect on overweight and obesity [2]. Previous studies introduced obesity as a health problem in Iran [3]. Regarding the adverse side effects of obesity which reduce the normal life-span, it seems necessary to conduct a survey to recognize the people at risk as well as the pre-existing risk factors responsible for this serious health problem.

The third national surveillance of risk factors of non-communicable disease in Iran [4] reported the overall prevalence of obesity up to 22.3%. This survey reported that obesity was much more common in females and urban residents. Due to the logistic limitation, no study was conducted yet on the obesity in the north of Iran. Therefore, the present study was planned and performed to determine the obesity status and its related risk factors in this area.

Materials and Methods

This was a population-based cross-sectional study conducted in 2006 in Golestan Province, the north of Iran. We enrolled 2495 subjects (1247 males and 1248 females) using stratified cluster sampling. In this study, 125 clusters of 20 people were randomly selected from 11 districts using family code of primary health center in rural areas and postal code in urban areas with equal proportion of age group and sex. From each district, one team had been trained to complete the questionnaire and measuring anthropometric indexes. The questionnaire included demographic characteristics, residential area, marital status, economic status, educational level, and physical activity.

All family members in blocks who were in 15-65 years age were included in the clusters. Pregnant women and those who were unwilling to participate in this survey were excluded from the study. Data on physical activity and socio-economic parameters were collected using a predefined questionnaire. Weight was measured with low clothing without shoes. Height was measured in standing upright position. Body mass index (BMI) was calculated as weight (kg) /height (m^2). BMI of 25.0-29.9 kg/m^2 was classified as overweight, BMI of 30.0 to 39.9 kg/m^2 was classified as obese, and BMI equal to or greater than 40 kg/m^2 was classified as pathologic obese [5].

The economic status was categorized based on the home ownership, number of the rooms in the house, owning of the private car, structure of the house, and the number of the family members specifying one score to each one. Accordingly, the economic status of study population was classified as low (1score), moderate (2-3 score), and high (≥4 score). Physical activity was categorized into five categories based on daily work and activity including no physical activities (without moving from a place to another place), low physical activity (activity that requires extension of the muscular-skeletal system and moving from a place to another place), moderate physical activity (activity that requires sometimes increased respiratory rate like cleanliness, gardening, building painter, etc.), high physical activity (activity that requires very increased reparatory rate like manual labor, building labor, porter, etc.), and very high activity (a combination of above activities) [6].

SPSS 16.0 software was used for the statistical analysis using chi-square test for comparing frequencies and *t*-test and ANOVA for comparing the means. Logistic regression analysis was applied in order to estimate the odds ratio (OR) of obesity considering the socio-demographic factors at 95% significant level.

Results

Mean age of the subjects was 39.2 [95% CI: 38.6, 39.8] yr. About 53.5% of subjects were living in rural area. The results of anthropometric measurements are shown in Table 1. The prevalence rates of overweight, obesity, and pathologic obesity were 30.34%, 22.48%, and 1.76%, respectively. The prevalence of overweight, obesity was higher in urban areas compared to rural areas, in women than men, and among married people compared to single people (P<0.001).

Pearson's correlation coefficient showed a positive correlation between BMI and age (r=0.271, P=0.01) and BMI and economic status (r=0.061, P=0.01). Pearson's correlation coefficient was negative for BMI and physical activity (r=-0.065, P=0.01) and for BMI and education level (r= -0.143, P=0.01). Linear regression analysis revealed that BMI increases 0.271 unit for one year increase in age (P=0.001) (Table 1).

Multiple logistic regressions were used to identify variables that contribute to obesity. The odds ratio estimate was 1.68 [95% CI: 1.40, 2.02] for urban area compared to rural area; 2.60 [95% CI: 2.14, 3.15] for females compared to males; 5.95 [95% CI: 3.54, 9.99] for married people compared to single people; 1.89 [95% CI: 1.44, 2.84] for age group of 55-65 yr compared to age group of 15-24 yr; 1.76 [95% CI: 1.17, 2.64] for illiterate people compared to those who have academic education; 1.98 [95% CI: 1.13, 2.49] for poor people compared to people with high economic level (Table 2).

Table 1: The distribution of BMI based on demographic characteristics and lifestyle-related factors in the north of Iran

Characteristics	Level	N	Mean (95% CI)	P-value	BMI (kg/m2)					
					<18.5 N (%)	18.5-24.9 N (%)	25-29.9 N (%)	30-39.9 N (%)	≥40 N (%)	P-value
Gender	Men	1247	25.3 (25.0, 25.6)	0.001	64 (5.2)	568 (46.0)	407 (32.9)	190 (15.4)	7 (0.6)	0.001
	Women	1248	27.5 (27.2, 27.9)		54 (4.4)	413 (33.7)	350 (28.6)	371 (30.3)	37 (3.0)	
Age group	15-25	499	22.8 (22.3, 23.4)	0.001	60 (12.2)	314 (63.7)	94 (19.1)	23 (4.7)	2 (0.4)	0.001
	25-35	499	26.1 (25.5, 26.5)		18 (3.7)	209 (42.6)	157 (32.0)	102 (20.8)	5 (1.0)	
	35-45	499	27.7 (27.0, 28.2)		11 (2.2)	166 (33.5)	156 (31.5)	146 (29.5)	16 (3.2)	
	45-55	498	28.4 (27.7, 29.0)		13 (2.7)	130 (26.6)	157 (32.1)	177 (36.2)	12 (2.5)	
	55-65	500	27.1 (26.5, 27.7)		16 (3.2)	162 (32.9)	193(39.1)	113(22.9)	9(1.8)	
Region	Urban	1161	27. 7 (26.9, 27.6)	0.001	39 (3.4)	397 (34.6)	370 (32.3)	313 (27.3)	28 (2.4)	0.001
	Rural	1334	25.7 (24.4, 26.0)		79 (6.0)	584 (44.4)	387 (29.5)	248 (18.9)	16 (1.2)	
Marital status	Married	1965	27.3 (26.9, 27.5)	0.001	55 (3.0)	618 (33.6)	637 (34.7)	494 (26.9)	34 (1.8)	0.001
	Single	531	23.1 (22.5, 23.6)		58 (11.0)	329 (62.5)	96 (18.3)	40 (7.6)	3 (0.6)	
Economic status	Poor	264	25.6 (26.1, 27.2)	0.008	13 (5.0)	118 (45.4)	85 (32.7)	41 (15.8)	3 (1.2)	0.041
	Moderate	2144	26.5 (25.9, 26.6)		104 (4.9)	834 (39.4)	642 (30.3)	497 (23.5)	39 (1.8)	
	Good	87	27.7 (26.2, 28.1)		1 (1.2)	29 (34.1)	30 (35.3)	23 (27.1)	2 (2.4)	
Educational level	Illiterate	740	27.3 (27.1, 28.0)	0.001	26 (3.6)	248 (34.2)	235 (32.4)	198 (27.3)	19 (2.6)	0.004
	≤Diploma	1606	25.9 (25.7, 26.2)		91 (5.7)	673 (42.4)	459 (28.9)	340 (21.4)	24 (1.5)	
	Academic	149	26.2 (25.5, 26.9)		1 (0.7)	60 (40.5)	63 (42.6)	23 (15.5)	1 (0.7)	
Physical activity	Low	637	26.9 (26.4, 27.4)	0.034	28 (4.5)	229 (36.5)	196 (31.2)	158 (25.2)	17 (2.7)	0.192
	Moderate	1077	26.3 (25.9, 26.7)		62 (5.8)	433 (40.7)	319 (30.0)	235 (22.1)	16 (1.5)	
	Severe	104	25.7 (24.8, 26.6)		4 (4.0)	48 (47.5)	29 (28.7)	19 (18.8)	1 (1.0)	
	Combine	125	25.6 (24.7, 26.6)		5 (4.0)	57 (45.6)	40 (32.0)	22 (17.6)	1 (0.8)	
Total	-	2495	26.4 (26.2, 26.7)		118 (4.7)	981 (39.3)	757 (30.3)	561 (22.5)	44 (1.8)	-

Discussion

The prevalence rates of overweight; obesity and pathologic obesity were 30.3%, 22.5%, and 1.8%, respectively. The prevalence of obesity and overweight reported 18.1% and 32.0% for Iranian general population respectively [7]. In another study [8], the prevalence of overweight, obesity, and pathologic obesity among adults was reported 28.6%, 10.8%, and 3.4% respectively. A third study [9] estimated the prevalence of overweight and obesity 34.2% and 28% respectively. Two studies which were conducted in Babol County, the north of Iran reported the prevalence of overweight and obesity 22.7% and 18.8% respectively [10, 11].

The prevalence and pattern of obesity vary substantially between countries. The prevalence rate of obesity ranges from as low as ≤5% in

China, Japan, and some region in Africa to as high as ≥75% in urban Samoa. However, even in countries where the overall prevalence of obesity is relatively low, such as China, the prevalence of obesity is almost 20% in some cities [12]. Obesity is common in countries with high economical states like New Zealand, USA, and Australia. Obesity is also common in Arabic countries that consuming oil-rich nutrition like United Arab Emirates, Saudi Arabia and Kuwait. The prevalence of obesity is 23.5% in the USA [13]; 40.6% in Spain [14]; 18% in Irish [15]; and 32.8% in Brazil [16].

Table 2: The results of multiple logistic regression analysis of association between obesity (BMI≥30 kg/m^2) and its related risk factors among adults population in the north of Iran

Risk factor	Level	OR (95% CI)	*P* value
Gender	Men (Ref)	1.00	0.001
	Women	2.60 (2.14, 3.15)	
Age group (year)	15-25 (Ref)	1.00	
	25-35	0.16 (0.10, 0.26)	0.001
	35-45	0.83 (0.62, 1.12)	0.228
	45-55	1.47 (1.12, 1.94)	0.006
	55-65	1.89 (1.44, 2.84)	0.001
Residential area	Rural (Ref)	1.00	
	Urban	1.68 (1.40, 2.02)	0.001
Marital status	Single (Ref)	1.00	
	Married	5.95 (3.54, 10.0)	0.001
Economic status	Good (Ref)	1.00	
	Moderate	1.20 (0.75, 1.93)	0.453
	Poor	1.98 (1.13, 3.50)	0.017
Educational level	College (Ref)	1.00	
	Illiterate	1.76 (1.17, 2.67)	0.006
	Primary to high school	1.51 (0.96, 2.38)	0.074
Physical activity	Combine (Ref)	1.00	
	Low	0.60 (0.37, 0.97)	0.037
	Moderate	0.75 (0.47, 1.20)	0.229
	Severe	0.95 (0.49, 1.84)	0.873

According to the results of present study, overweight was more common in women than men. Furthermore, the prevalence of obesity in women was two times more than that of men. This finding was confirmed by another study in Iran [8]. Similar results are reported by the studies conducted in a number of Middle East countries. The prevalence of obesity is in women compared to men is 48.7% versus 21.2% in Bahrain [17]; 26.6% versus 17.8% in Saudi Arabia [18]; and 18.8% versus 14.3 in Lebanon [19]. In the Eastern Mediterranean Region, the prevalence of obesity was higher in women (35%-75%) than men were (30%-60%) [20]. A study reported that 27% of women and 35% of men in Canada have BMI equal to or greater than 27 [21]. The higher prevalence of obesity in women compared to men in our study can be explained by marital status in early age, especially in Turkmen ethnic group. This ethnic group live only in the north of Iran and their social behavior is very deferent from other ethnic groups. BMI is inversely related to sex hormone binding globulin concentration in women both in pre- and post-menopausal period [22].

We indicated that the prevalence of obesity and overweigh is significantly higher in urban area compared to rural area. Rashidi et al. [3] reported the prevalence of obesity 40% and 26% in urban and rural area respectively. Changing in lifestyle may lead to low physical activities in urban population compared to that of rural.

In our study, the pattern of obesity showed and increasing trend with age. Similar results were reported in other studies in Iran [23, 24]. In addition, age was considered as a predictor factor for obesity in some of studies [17-19, 25].

The association between socio-demographic factors and obesity that was shown in our study was also approved by other studies [26, 18-20]. The association between low physical activity and obesity was shown in a study from Iran [23] as well as in other countries [27, 28]. The inverse association between educational level and obesity has been approved in other studies in Iran [23, 28-29].

Conclusion

We concluded that prevalence rate of overweight and obesity was very high in the northern population of Iran. Urbanization, marriage, high economic status, illiteracy, and elderly are among the most common risk factors of obesity especially in women. Therefore, obesity is an important and common risk factor in northern population of Iran and should be focus of especial attention by policy makers those who plan educational programs.

Acknowledgments

The authors would like to thank the medical and administrative staff in the Primary Health Care Centers of Golestan University of Medical Sciences for their valuable assistance during the fieldwork.

Conflict of interest statement

The authors declare that they have no conflicts of interest.

Funding

This survey was supported by Health Office of Golestan University of Medical Sciences and justified for publication based on official document number 258888.

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