

Obesity trends of adults in northern Iran (2006-2010)

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Abstract: *Background:* The main aim of study was to determine obesity trends between 2006 to 2010 among adults aged 15-65 years in northern Iran. *Material and Methods:* This was a population-based cross-sectional study that enrolled 6,487 subjects chosen by multi stage cluster random sampling. Subjects were randomly chosen from 325 clusters and each cluster included 20 cases. Weight and height were measured and socio-demographic factors recorded. One-way analysis of variance (ANOVA) and Cochran's test were used to compare the groups and statistical significance was defined as p value < 0.05. Obesity was defined by WHO classification based on Body Mass Index (BMI) criteria. *Results:* Generally, the prevalence of overweight and obesity were seen in 31.5% and 23.0%, respectively. It was significantly common in women more than men (31.8% vs 14.1%) (P=0.001). The mean of BMI significantly decreased 0.079 kg/m² in men (P=0.004) and 0.059 kg/m² in women (P=0.030) in each of years. In urban areas, obesity decreased in men aged group 15-35 year (P=0.016) and women aged 35-50 years (P=0.003), but in rural areas, obesity increased in men aged 50-65 years (P=0.003) and in women 15-35 years (P=0.025). *Conclusion:* Alarming rates of obesity were found in Iranian northern adults and a rising trend was shown in rural area whereas it was contrary in urban area. Associated factors leading to the obesity increase need to be identified and national action are necessary to reduce the adult obesity.

Keywords: Obesity trends, Iran, adults.

Introduction

Obesity, general and abdominal, is one of the greatest public health challenges for the current century and based on World Health Organization report [1], it is being increased in the worldwide. In 2005, the globally numbers of overweight and obese adults were estimated 937 and 396 million respectively [2], and the numbers has doubled in comparison with 20 years ago [3]. The underlying factors, such as metabolic or behavioral influence in overweight and obesity [4]. Previous studies reported the obesity as a health problem in northern Iran [5-6] and in entire of Iran [7].

In Iran, the prevalence of overweight and obesity in 2005 reported 42.8% in men and 57% in women [8]; for 2015, these figures are predicted to be 54% and 74%, respectively [9]. Of 1,600,000 people in Golestan province (northern Iran and south east of Caspian Sea), 43.9% and 56.1% are living in urban and rural area, respectively. Different ethnic groups such as Fars (native), Turkman and Sisstani are living in this

region and most people in villages are farmers [10]. Due to the logistic limitation, no study was conducted yet on the trends of obesity in the north of Iran. Therefore, this study set up to estimate the trend of obesity during five years (from 2006 to 2010) among Iranian northern adult.

Material and Methods

This was a population-based cross-sectional study conducted on 6487 subjects aged from 15 to 65 years, who were chosen by a multi stage random cluster sampling within five steps (2006 =2495, 2007 =996; 2008 =1000; 2009 =996 and 2010 =1000 cases) from 11 districts in Golestan province (northern Iran). Subjects were randomly chosen from 325 clusters and each cluster included 20 cases. Family code of primary health center in rural areas and postal code in urban areas were used for classification, with equal proportion of age and sex. A trained group completed the questionnaires containing demographic factors

and measured weight and height. SPSS 16.0 software was used for the statistical analysis. One-way analysis of variance (ANOVA) and Cochran's test were used to compare the groups and statistical significance was defined as p value < 0.05. This study approved by Ethical Research Committee in and consent was received from all participants.

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 (m²). BMI of 25.0-29.9 kg/m² was classified as overweight, BMI of 30.0 to 39.9 kg/m² was classified as obese, and BMI

equal to or greater than 40 kg/m² was classified as pathologic obese [11].

Results

Generally, the prevalence of overweight and obesity were seen in 31.5% and 23.0% of adults, respectively. That respect was 33.7% and 25.5% in urban area and 29.9% and 21.2% in rural area. Women more than men suffered from obesity (31.8% vs 14.1%) (P=0.001). Overweight differences was significantly shown up 10.8% between genders in urban area (P=0.036) but it was not significant in rural area (0.04) (Table-1).

Table-1: The distribution of body mass index [mean (SD)] by WHO classification in northern Iranian adults

Characteristics		No	BMI (kg/m ²)					Chi-2 P-value
			<18.5	18.5-24.9	25-29.9	30-39.9	40≤	
Urban	Men	1358	64(4.7)	579(42.6)	484(42.6)	223(16.4)	8(0.6)	0.0001
	Women	1345	56(4.2)	402(29.9)	428(31.8)	418(31.1)	41(3.0)	
Rural	Men	1888	119(6.3)	973(51.5)	568(30.1)	217(11.5)	11(0.6)	0.0001
	Women	1898	90(4.7)	672(35.4)	563(29.7)	526(27.7)	47(2.5)	
Urban		2703	120(4.4)	981(36.3)	912(33.7)	641(23.7)	49(1.8)	0.009
Rural		3786	209(5.5)	1645(43.4)	1131(29.9)	743(19.6)	58(1.5)	
Total		6489	329(5.1)	2626(40.5)	2043(31.5)	1384(21.3)	107(1.6)	

Table-2: Body mass index [mean (SD)] in northern Iranian urban adults

Year	No	Men				No	Women			
		Age group (year)			Total		Age group (year)			Total
		15-35	35-50	50-65			15-35	35-50	50-65	
2006	580	24.8(4.6)	27.1(5.0)	27.0(4.8)	26.1(4.9)	581	25.3(5.4)	31.0(6.1)	29.8(5.7)	28.3(6.2)
2007	227	24.9(4.5)	26.2(3.)	26.6(4.6)	25.8(4.4)	230	25.0(5.1)	30.3(5.6)	29.6(5.8)	28.0(6.0)
2008	180	23.8(4.4)	24.3(3.6)	25.3(4.7)	24.5(4.3)	181	24.1(5.7)	29.2(6.1)	28.2(5.9)	26.8(6.2)
2009	187	23.7(4.4)	26.4(4.0)	26.6(4.4)	25.3(4.5)	192	24.5(5.6)	28.7(4.5)	30.9(5.3)	27.5(5.8)
2010	184	23.9(4.9)	26.9(4.8)	26.0(4.8)	25.4(5.0)	161	24.5(5.0)	29.3(5.3)	29.9(4.9)	27.5(5.6)
P value	1358	0.016	0.226	0.150	0.003	1345	0.104	0.003	0.761	0.029

The mean and standard deviation of BMI in urban adult during five-year study present in Table-2. The mean of BMI significantly decreased in both men and women and averagely decreased 0.079 kg/m² in men (P=0.004) and 0.059 kg/m² in women (P=0.030) in each of years. There was a positive correlation between BMI and age both in men (P=0.001, r=0.253) and women (P=0.001, r=0.386). Decreasing trend was significant in men

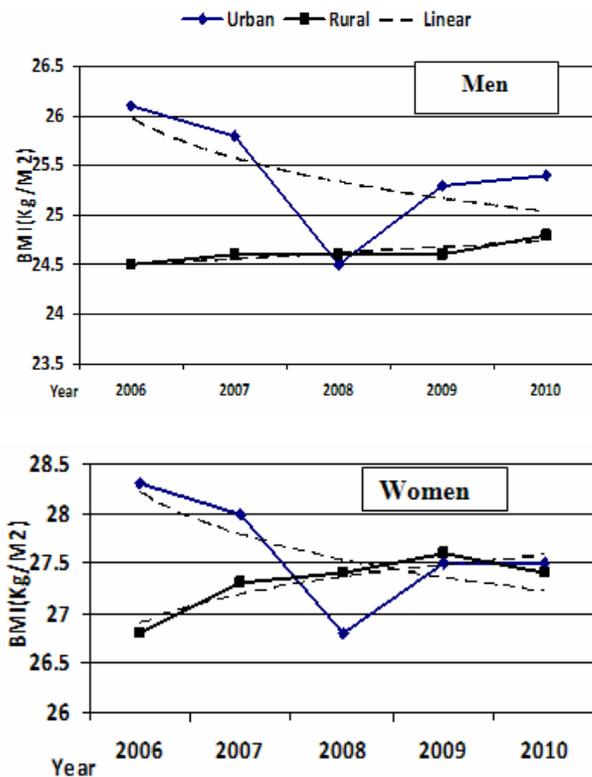
aged group 15-35 year (P=0.016) and women aged group 35-50 year (P=0.003).

The mean and standard deviation of BMI in rural adult during five-year study has been shown in Table-3. As whole, the mean of BMI increased both in men (0.017 kg/m²) and in women (0.043 kg/m²) in each of years so that statistical differences were not significant.

There was a positive correlation between BMI and age both in men (P=0.001, r=0.250) and in women (P=0.001, r=0.273). Increasing trend was significant in men aged group 50-65 year (P=0.003) and in women aged group 15-35 year

(P=0.025). The trend of obesity during five-year in urban and rural area was not similar. There was rising trend in villages, whereas it was contrary in urban areas. Trend by rural women was notable (Graph 1).

Year	No	Men				No	Women			
		Age group (year)			Total		Age group (year)			Total
		15-35	35-50	50-65			15-35	35-50	50-65	
2006	667	23.5(4.9)	25.5(4.2)	25.1(4.5)	24.5(4.7)	667	24.6(5.3)	29.0(6.0)	27.5(6.1)	26.8(6.0)
2007	270	23.2(3.9)	26.0(6.3)	25.0(4.1)	24.6(5.0)	269	25.5(4.8)	28.9(5.9)	28.2(5.5)	27.3(5.5)
2008	320	23.3(4.5)	25.7(4.8)	25.2(4.7)	24.6(4.8)	319	26.0(5.6)	27.9(5.1)	28.8(5.7)	27.4(5.6)
2009	313	23.2(4.0)	24.8(4.4)	26.4(4.7)	24.6(4.5)	304	26.1(7.8)	29.5(8.5)	27.7(5.1)	27.6(7.5)
2010	317	23.6(4.8)	24.9(5.0)	26.7(6.0)	24.8(5.4)	338	25.4(5.3)	29.0(6.9)	28.2(5.3)	27.4(6.1)
P value	1887	0.935	0.151	0.003	0.450	1897	0.025	0.948	0.334	0.064



Graph-1: The trends mean of BMI during five-years study in urban and rural area

Discussion

The main findings of this study were the increasing trends of BMI in rural area and decreasing trends of it in urban area in both genders during 2006-2010 with a high tend to

more weight gain in lower age women and in higher age men in rural area. The prevalence of obesity unchanged in the Swedish adult population between 2000/01 and 2004/05 [12] whereas in other countries as Spain [13], Canada [14], Denmark [15] and Portugal [16], the prevalence of obesity increased in both men and women during the 1900s and the 2000s. In spite of in the U.S.A and Canada, serious media and governmental attention has been paid to the problem of obesity [17] but, it has been continued to rising in many population groups [18-20]. Compared to large cities, obesity was common more in small cities and villages in Swedish adult [12].

Iran is in the nutritional transition phase and life style and food behavior has being changed during last decade [21]. On the other hand new technology in agriculture section in recent years has caused to less physical activities in rural area. Also, women more than men effort to their health care [22]. Consequently, probably these are the underlying factors for more prevalence obesity in rural men during five-year study in northern Iran and should be considered in future study. In the present study, 31.5% and 23% were overweight and obese respectively, and they were prevalent more in women than men and more in urban than rural area. The prevalence of obesity and overweight reported

18.1% and 32.0% in Iranian population, respectively [8]. In another study in Iran [23], the overweight, obesity, and pathologic obesity among adults were 28.6%, 10.8%, and 3.4%, respectively. The prevalence of obesity considerably varies in different countries. It was observed from as low as $\leq 5\%$ in China, Japan, and some regions in Africa to as high as $\geq 75\%$ 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 [24]. The prevalence of obesity was 23.5% in the USA [25]; 40.6% in Spain [26]; 18% in Irish [27]; and 32.8% in Brazil [28]. Compared with other studies, the prevalence of obesity was high in northern Iran.

Conclusion

There was an alarming rate of obesity in northern Iran and it was more in women than men. The

trend of obesity in urban and rural area was not similar. In spite, it was decreased in urban area but tended to rise was shown in rural area. A high tend to more weight gain in lower age women and in higher age men was shown in rural area. Associated factors resulted to this situation need to be considering in future studies and national action are needed to reduce the obesity.

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