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Trends in Waist Circumference and Central Obesity in Adults, Northern Iran

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Abstract

Objectives: The main aim of this study is to determine the central obesity trends during the period from 2006 to 2010 among 15-65 years old people in Northern Iran.

Methods: This was a population-based cross-sectional study conducted on 6466 subjects who had been chosen by a multi stage cluster random sampling within five steps. The subjects were randomly chosen from 325 clusters and each cluster included 20 cases. Central obesity was defined as waist circumference ≥102 cm and ≥88 cm in men and women, respectively.

Results: Compared to 2010, the mean waist circumference in 2006 changed from 87.2 cm to 88.1 cm in men (p=0.237), and from 90.3 cm to 88.6 cm in women (p=0.045). The comparison between 2006 and 2010 revealed that the prevalence of central obesity slightly decreased, 6.8% and 2.4% in urban women and men, respectively. Generally, the mean of waist circumference significantly decreased in urban women (by 0.069 cm in each year; p=0.020); however, the decrease of waist circumference in urban men was not significant (0.006 cm decrease each year; p=0.915).

Conclusion: The prevalence of central obesity declined among both males and females in the urban area; however, there was an attenuated increasing trend in the rural area. The disparity of trends between the two regions should be considered for further study.

Keywords: Central obesity; Waist circumference; Trend; Adult; Iran.

Introduction

Obesity, general and abdominal, is one of the greatest public health challenges for the current century with particularly alarming trends in several parts of the world.[1] In 2005, the estimated total number of worldwide obese and overweight adults were 396 million and 937 million, respectively.[1] The numbers have doubled from 20 years ago.[2] There are various risk factors which cause weight gain and obesity in humans. The metabolic factors such as leptin, and lifestyle such as low physical activity, have a significant effect on overweight and obesity.[3] The World Health Organization (WHO) reported that obesity is increasing in the world,[4] and it is also an established health problem in Iran[5]

The prevalence of overweight and obesity in Iran was common among 42.8% of men and in 57% of women in 2005,[6] and these figures are predicted to reach 54% and 74% by 2015, respectively.[7] Studies have shown that abdominal obesity is prevalent between 9.7-12.9% and 54.5-63.7% in Iranian men and women, respectively,[6,8] and it is a major health problem in northern Iran.[9,10] Using waist circumference (WC) for central obesity classification,[11,12] WC has been known to be a risk factor for cardiovascular disease, stroke and type 2 diabetes.[13,14] This study was conducted in the Golestan province (northern Iran and south east of Caspian the Sea), where agriculture is the main occupation in the rural area, which is home to 1,600,000 people.[15]

Central obesity is a major health problem in Iran, yet no study has been performed to examine its trends in northern Iran. Thereby, the present study was conducted over five years (2006-2010) to assess the trends of central obesity in northern Iran.

Methods

This was a population-based cross-sectional study conducted on 6,466 subjects aged between 15 and 65 years, who were chosen by a multi stage random cluster sampling within five steps (2006 = 2471; 2007 = 999; 2008 = 1000; 2009 = 997; and 2010 = 999 cases), from 11 districts of the Golestan province (northern Iran). The 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 the waist circumferences.

SPSS 16.0 software was used for statistical data analysis. One-way analysis of variance (ANOVA) and Cochran's test were used to compare the groups and statistical significance was defined as p<0.05. Waist circumference was measured to the nearest 0.5 cm at the superior border of the iliac crest, and central obesity was defined based on WHO criteria: waist circumference ≥102 cm and ≥88 cm in men and women, respectively.[16]

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Results

For the most part, the mean and standard deviation of age was 39.2±14.6 years. In this study, 50.3% of the study participants were males and 47.9% were females. While, 41.7% of the study participants lived in urban areas and 58.3% lived in rural areas, (Table 1). In the urban area; the mean WC significantly decreased by 0.069 cm each year amongst the urban females (p=0.020); however, there was no significant decrease in WC amongst males (0.006 cm decrease each year; p=0.915). On the other hand; in the rural areas, WC increased by 0.036 cm each year in males (p=0.075), but there was a decrease in WC by 0.034 cm each year in females (p=0.190). However, the change in WC in the rural area was not significant.

Table 1: Distribution of baseline characteristics of gender and location in the five years study. N(%)

Year	Men			Women		
	No.	Urban	Rural	No.	Urban	Rural
2006	1250	582(46.6)	668(53.4)	1221	567(46.4)	654(53.6)
2007	500	230(46.0)	270(54.0)	499	230(46.1)	269(53.9)
2008	500	180(36.0)	320(64.0)	500	181(36.2)	319(63.8)
2009	499	187(37.5)	312(62.5)	496	192(38.7)	304(61.3)
2010	501	184(36.7)	317(63.3)	498	161(32.3)	337(67.7)
Total	3250	1363(42.9)	1887(58.1)	3214	1331(41.4)	1883(58.6)

The means and standard deviation of WC based on gender and location during the five years study are presented in Table 2. In comparison of 2006 with 2010, the mean WC in males changed from 87.2 cm to 88.1 cm in rural areas (p=0.237), and from 90.3 cm to 88.6 cm (p=0.045) among females. While, in urban areas; WC changed from 90.7 cm to 89.5 cm (p=0.197) in males and from 87.0 cm to 87.8 cm in females (p=0.295).

Table 3 presents the prevalence of central obesity based on gender and location during the five-year study. The results showed that central obesity was prevalent in 35.4% of adults, and it was more prevalent in urban areas than rural areas (38.9% *vs.* 32.9%). The findings also conveyed that central obesity was more prevalent in females than males (55.7% *vs.*15.4%). The Chi-square test was significant between gender (p=0.001), and between location (p=0.001). Additionally, in the rural area; central obesity was prevalent in 11.7% and 54.3% of men and women, respectively.

The comparison of 2006 with 2010 indicated that the prevalence of central obesity decreased slightly in men (6.8%) and women (2.4%) in the urban area; however, the prevalence of central obesity increased in the rural area, in the same order.

Discussion

This is the first study to investigate the prevalence of central obesity longitudinally in northern Iran. The findings showed that the mean WC decreased in both males and females in the urban

Table 2: Mean waist circumference among adults in northern Iran.

Year	No.	Men			No.	Women		
		Urban	Rural	Total		Urban	Rural	Total
2006	1250	89.8(14.2)	84.8(12.9)	87.2(13.7)	1221	91.5(16.1)	89.2(15.4)	90.3(15.8)
2007	500	89.9(14.0)	86.4(12.2)	88.0(13.1)	499	90.1(16.0)	90.5(15.4)	90.3(15.7)
2008	500	88.5(12.6)	86.4(13.0)	87.1(12.9)	500	89.4(15.0)	90.2(15.2)	89.9(15.1)
2009	500	90.4(15.4)	84.8(14.7)	86.9(15.1)	497	88.9(15.9)	88.0(17.0)	88.3(16.6)
2010	501	89.7(14.9)	87.1(14.6)	88.1(14.8)	498	89.2(14.9)	88.4(15.1)	88.6(15.0)
Total	3251	89.718(14.2)	85.704(13.4)	87.4(13.9)	3215	90.303(15.8)	89.225(15.6)	89.7(15.7)
p value		0.915	0.075	0.507		0.020 *	0.190	0.072

* *Statistically significant. Overall, t test was significant between gender, (p=0.001).*

Table 3: Comparison of central obesity prevalence among adults in the five-year study.

Year	No.	Men			No.	Women		
		Urban	Rural	Total		Urban	Rural	Total
2006	1250	128(22)	69(10.3)	197(15.8)	1221	342(60.2)	352(53.8)	694(56.8)
2007	500	46(20)	32(11.9)	78(15.6)	499	131 (57)	142(52.8)	273(54.7)
2008	500	23(12.8)	43(13.4)	66(13.2)	500	100(55.2)	183(57.4)	283(56.6)
2009	499	46(24.6)	31(9.9)	77(15.4)	496	109(56.8)	166(54.6)	275(55.4)
2010	501	36(19.6)	45(14.2)	81(16.2)	498	86(53.4)	179(53.1)	265(53.2)
Total	3250	279(20.5)	220(11.7)	499(15.4)	3214	768(57.7)	1022(54.3)	1790(55.7)
p value		0.576	0.183	0.926		0.095	0.925	0.245

Five-year trends in urban areas decreased and increased in rural areas, but there was no statistical significance based on Cochran's test.

areas, but WC only increased amongst males in the rural areas. Consistent with many other studies, trends in central obesity increased especially amongst males in rural areas, but declined in urban areas. Increasing trends of central obesity have been reported in some studies, but the decreasing trend observed in the current study has not been reported in other studies; therefore, it is a considerable finding.

Trends in central obesity among adults in Tehran increased during 1998-1999 and 2001-2002.[17] In Finland, WC significantly increased from 1987 to 1997 in both males and females.[18] However, during five years in Germany (1989/90-1994/95), the increase in WC was not significant both in males and females.[19] Yet, the mean of waist to hip ratio, subscupular and triceps skin fold thickness increased substantially in Swedish women.[20]

From 1988 to 1994; the prevalence of central obesity in U.S. significantly increased among all age groups except men aged 30-59 years and women aged 40-59 years.[21] While in another study, an increased abdominal obesity was reported in adults after a period of 15 years.[22] Furthermore, it was reported in a 6-year period in the U.S. that body weight increased in children, adolescents and men, while it remained unchanged in women.[23]

Iran is considered to be a country in a nutrition transition phase, since lifestyle and food behavior have been changing in recent years.[24] Most of the rural people are farmers and the new agricultural technology has resulted into low physical activity amongst them. Besides, several studies are in agreement that women make more of an effort and take better care of their health compared to men.[25-27] Consequently, these factors probably relate to the increasing trends of central obesity in men compared to women in the rural areas of the current study.

In this study, central obesity was common in 35.4% of the study participants and it was more prevalent in females and urban areas. The prevalence of central obesity in Gorgan (northern Iran) was 39.1%,[28] and 21.2% in Ahvaz (south of Iran),[29] while it was reported to be 9.7% in the whole of Iran.[30] In another study conducted in Iran, central obesity was reported among 12.9% and 54.5% of adult men and women, respectively.[6] The prevalence of central obesity was reported to be 39.2% in Rio de Janeiro[31]; 24.1% in Egypt[32]; 30.5% in Australian adults[33]; 2% in Croatia[34]; and it was also reported to be 31.5% and 64.4% among Omani males and females, respectively.[35] Similarly in this study; central obesity was especially common in females in northern Iran.

Conclusion

In summary, central obesity has been recognized as a major health problem in northern Iran, and the recent trend based on the study findings show a decline of central obesity in urban areas, but an increase was observed in rural areas, particularly amongst males. It is therefore necessary to plan health programs to control and manage this health problem. Also, we advocate that the issue of increasing trends of central obesity among males in rural areas be studied further.

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