



Prevalence of general, abdominal and waist-to-hip ratio obesity among adults in the north of Iran: An ethnical comparative study

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ABSTRACT

Obesity has remained as a main health problem and substantially increased during the last decade. The aim of this study is the comparison of obesity, central obesity and WHR obesity in 15-70 years old between Turkman and non-Turkman ethnic groups in Golestan Province (north of Iran) in 2013. This was a cross-sectional study on 464 cases (Turkman =166 and non-Turkman=298) who were chosen randomly from 23 clusters. Individuals with a BMI (Body Mass Index) of <25, 25.0-29.9, 30-39.9 and ≥ 40 kg/m² were classified as normal, overweight, obese and pathologic obese. Central obesity was defined by waist circumference of WC > 102 cm in men and >88 cm in women. WHR (Waist-to-Hip Ratio) ≥ 0.95 cm and ≥ 0.8 cm was classified as WHR obesity for men and women, respectively. Totally, General obesity and overweight were seen in 30.0% and 28.2% of subjects, respectively. In non-Turkman group, obesity was statistically significant between genders (men=19.4% and women=43.9%)($P=0.001$) whereas it was not significant in Turkman group (men=16.4% vs women=30.0%). Central obesity was common in 40.7% of cases with a significant difference between genders (men=22.9% vs women=54.4%) ($P=0.001$). Compared to Turkman men and women, the prevalence of central obesity was 12% and 19.2% more in non-Turkman group, respectively ($P=0.003$). In the whole, WHR obesity was common in 62.7% and 63.1% of men and women, respectively. Odds ratio for general obesity and central obesity were 2.791 and 4.021 times more in women than in men, respectively. Compared to Turkman women, odds ratio has obtained 1.826($P=0.025$) for general obesity and 2.096 ($P=0.004$) for central obesity in non-Turkman women. Pearson correlation between age and BMI, WC and WHR was seen ($r=0.478$, $P=0.01$), ($r=0.596$, $P=0.01$) and ($r=0.385$, $P=0.01$), respectively. Finally, obesity, central obesity and WHR obesity are the main health problem in the north of Iran and it was common in non-Turkman more than in Turkman groups.

Keywords: Obesity, Central obesity, WHR obesity, Ethnicity, Adult, Iran

INTRODUCTION

Obesity, a cardiovascular risk factor, has remained as a main health problem and substantially increased in recent years [1] and it is well-known as a health problem in Iran [2,3]. Central obesity was common 9.7%-12.9% and 54.5%- 63.7% in Iranian men and women, respectively [4,5] and it is a main health problem in the north of Iran[6].

Among the various methods for the determination and classification of obesity and overweight, BMI (body mass index) is general more than others [7]. The waist circumference (WC) has been proposed as useful index of

abdominal adiposity and has demonstrated good association with waist-hip ratio (WHR)[8] and it is known as a risk factor for cardiovascular disease, stroke and type 2 diabetes [9,10].

Of 1,7 million populations in the Golestan province (north of Iran and southeast of Caspian Sea), 25.6% and 69.3% are living in urban and rural area, respectively. Agriculture is the main job in rural area and different ethnic groups such as Fars-native, Turkman and Sistani are living in this region [11].

Due to the restriction in executing epidemiological projects, this is a few studies on the obesity among ethnic groups in the north of Iran; therefore it was necessary to design a research project to determine the obesity status among ethnic groups in this area. This study was implemented on the Turkman and non-Turkman adult subjects for comparing various obesities in the Golestan province (north of Iran and south east of Caspian Sea).

MATERIALS AND METHODS

This is a cross-sectional study conducted on the 464 subjects aged 15-70 years (Turkman=166 and non-Turkman=298). The required sample size by previous study [12] with estimation of 50% over weight and obesity rate; a confidence level of 95% and a maximum marginal error 0.05, was calculated at least 384 cases. Subjects were chosen randomly from 23 clusters and each cluster comprised 20 cases in two districts (Kordkoy and Kalaleh) in Golestan province (north of Iran and south east of Caspian sea). The clusters were chosen randomly using systematic sampling technique based on postal code. A trained staff recorded the data during three mounts. Pregnant women and those refused to participate in this study were excluded from the study.

The ethnic groups consist of two groups: 1) Turkman: The inter marriage of this ethnic group with others was rare and this group can be distinguished by phenotype. 2) non-Turkman: Included other ethnic groups (except Turkman) that living in this area.

Weight measurement without shoes and clothing was carried out using a balance and recorded nearest the 0.5 kg height, waist and hip measured nearest the 0.5 cm, while the participant were standing on their feet. Waist circumference was measured using a tape measuring over the iliac and lower border of the ribs. Hip circumference was measured at the widest point over the buttocks [13].

BMI was calculated as weight (kg)/height (m²). Those with a BMI of <25, 25.0-29.9, 30-39.9 and ≥ 40 kg/m² were classified as normal, overweight, obese and pathologic obese [1]. WHR (Waist and Hip Ratio) was obtained by dividing the mean waist circumference by mean hip circumference. Abdominal obesity as measured by waist circumference of WC >102 cm in men and >88 cm in women. WHR 0.95 or over and 0.8 or over was classified as WHR obesity for men and women, respectively [13].

SPSS 18.0 software (Chicago II, USA) was used for the statistical analysis using chi-square test and t.test for comparing frequencies and the means, respectively. Logistic regression and Pearson correlation were used to estimate odds ratio and correlation between variables, respectively. P-value < 0.05 considered statistically significant. This study was approved by Ethical Research Committee and consent was received from all participants.

RESULTS

Mean and standard deviation (SD) of age, height, weight, waist circumference (WC), hip circumference (HC), and body mass index (BMI) and waist-to-hip (WHR) ratio based on gender and ethnicity are shown in Table 1. Totally, the mean of height, weight, HC, BMI and WHR significantly difference between tow ethnic groups (P<0.05 for all). In non-Turkman group, significant differences were seen between genders based on height, WHR, HC and BMI (P<0.05 for all) whereas in Turkman group, only height difference was significant among them (P=0.001). Between ethnic groups, statistical differences are shown in men by WHR (P=0.001), WC (P=0.020) and weight (P=0.046) and in women by weight (P=0.002), HC (P=0.001), WC (P=0.003) and BMI (P=0.003).

The prevalence of general obesity, central obesity and WHR obesity are shown in table 2. General obesity and overweight were seen in 30.0% and 28.2% of subjects, respectively. Obesity was statistically significant between genders both in non-Turkman (P=0.001) and in Turkman group (P=0.041). Obesity in women was significant between tow ethnic groups but it was not significant in men. The prevalence of central obesity was seen in 40.7%

with a significant difference between genders (22.9% in men vs 54.4% in women) ($P=0.001$). Compared to Turkman men and women, the prevalence of central obesity was 12% and 19.2% more in non-Turkman group, respectively ($P=0.003$).

Central obesity difference was significant between two-ethnic group women ($P=0.003$). The prevalence of central obesity is 34.7% and 27.5% in women more than men in inter Turkman and non-Turkman groups, respectively ($P=0.001$ for both).

In the whole, WHR obesity was common 62.7% and 63.1% in men and women, respectively. WHR obesity was 15.7% and 7.3% more in non-Turkman men and women than in Turkman men and women, respectively but statistical differences was significant only in men ($P=0.044$).

Odds ratios and 95% Confidence Interval (CI) obtained from logistic regression analysis for general obesity, central obesity and WHR obesity with using Turkman ethnic group as reference categories (Table 3). Odds ratio for obesity, central obesity and WHR obesity was estimated 1.506, 1.842 and 1.566 for non-Turkman people compared to Turkman people, respectively. Odds ratio for general obesity and central obesity were 2.791 and 4.021 times more in women than in men, respectively. Odds ratio for general obesity, in non-Turkman group was more than in Turkman group when women compared to men (3.251 vs 2.182) but this difference was not notable based on central obesity (4.273 vs 4.374). WHR obesity in non-Turkman men was more than in Turkman men ($OR=1.902$, $P=0.035$). Compared to Turkman women, odds ratio for general obesity in non-Turkman women is 1.826 ($P=0.025$) and for central obesity is 2.096 ($P=0.004$).

Pearson correlation of age with BMI, WC and WHR were shown ($r=0.478$, $P=0.01$), ($r=0.596$, $P=0.01$) and ($r=0.385$, $P=0.01$), respectively.

DISCUSSION

General obesity, central obesity and WHR obesity will be discussed based ethnicity and gender differences.

In present study, general obesity was seen in 30.0% of subjects. Previous studies in the north of Iran the prevalence of obesity was 16.4% in rural women in Gorgan [12], 33.3% in rural women in Golestan province[14] and 28.6% among women in whole of Golestan province[15]. The prevalence of obesity among women in Bahrain [16], Lebanon [17] and Eastern Mediterranean region [18] were 21.2%, 18.8% and 35-37%, respectively. However the overall prevalence of obesity is relatively low, but it is almost 20% in some cities in China [19]. Compared with above studies, obesity has an alarming rate and should be consider as a main health problem in the north of Iran.

In our study, 40.7% of individuals have been diagnosed with central obesity. The prevalence of central obesity was seen 39.1% in Gorgan (north of Iran) [12], 21.2% in Ahvaz (south of Iran) [20] and 9.7% in whole of Iran [5]. In a comprehensive study in Iran, the prevalence of central obesity was shown in 9.7%-12.9% and 54.5%-63.7% of adult men and women, respectively [4]. In other countries, the prevalence of central obesity has been reported 36% in Spanish adult [21], 24.1% in Egypt [22], 35% in Canadian adult [23] and 31.5% and 64.4% in Omani male and female, respectively[24]. Compared with above studies, the prevalence of central obesity in the north of Iran was high and it is necessary to establish a preventive program. In our study, we shown the central obesity in women more than in men as like as other studies [25,6] .

In present study WHR obesity was common in 62.9% of individuals. Veghari [12] was reported the WHR obesity 39.1% in Iranian northern women and in Turkman ethnic group more than others in 2004. The prevalence of WHR obesity has been reported in some regions of Iran. It was seen 22% among 15-65 years old women in Gonabad [26], 6.4% in Tehranian girls [27], and 23.9% (men=7.9%, women=40.0%) in Mazandran urban area [28]. Compared with other studies, the prevalence of WHR obesity in our area is remarkable and it is necessary to assessment in a comprehensive study with considering socio-demographic related factors.

The comparison of ethnic groups is another aim of our study. As whole, obesities were common in non-Turkman more than in Turkman ethnic group. Bouchard [29] believed that the genetic factors are response for obesity when they placed in proper situation. The prevalence of metabolic syndrome among ethnic groups is different in some

countries [30, 31, 32]. In US Black and White adults [33], central obesity was more in white women (62% vs 44%) whereas it was not different among men in tow groups.

We didn't measure all of obesity socio-demographic related factors in our study, but obesity and nutrition-behavior differences among ethnic groups in the north of Iran have been approved in previous studies [34,35,36].

In present study, the prevalence of general and central obesity was significantly more in women than in men, whereas this difference was not shown in WHR obesity. This finding reconfirmed that pattern of obesities is not similar in gender. In spite, most of findings revealed obesity in women more than in men, but in Korean adults [37,38] it was vice versa. In Greek [39,40], the prevalence of obesity was seen 20% in males and 15% in females.

Table 1: The mean (\pm SD)of obesity criteria based on ethnicity and gender

Ethnicity	Sex(N)	BMI	Waist	Hip	Waist_to_Hip	Weight	Height
Non-Turkman	Men(134)	26.2(7.1)	90.7(17.9)	95.4(15.7)	0.953(0.13)	72.7(24.5)	164.4(14.4)
	Women(164)	28.8(6.9)	92.3(17.2)	103.0(14.9)	0.896(0.10)	68.7(17.5)	154.2 (8.8)
	Total(298)	27.6(7.1)	91.6(17.5)	99.6(15.7)	0.921(0.12)	70.4(21.0)	158.8(12.7)
	P-Value	0.002	0.433	0.001	0.001	0.113	0.001
Turkman	Men(67)	25.0(7.6)	84.4(18.0)	94.6(19.4)	0.895(0.10)	65.5(21.4)	160.8(19.0)
	Women(99)	26.2(6.9)	85.6(18.2)	96.9(14.4)	0.881(0.12)	61.8(18.4)	153.0(11.3)
	Total(166)	25.7(7.2)	85.1(18.1)	96.0(16.5)	0.887(0.11)	63.3(19.7)	156.2(15.3)
	P-Value	0.317	0.681	0.374	0.412	0.223	0.001
Total	Men(201)	25.8(7.3)	88.6(18.1)	95.2(17.0)	0.933(0.12)	70.2(23.7)	163.2(16.1)
	Women(263)	27.8(7.0)	89.8(17.8)	100.7(15.0)	0.890(0.11)	66.1(18.1)	153.8(9.8)
	Total(464)	26.9(7.2)	89.3(18.0)	98.3(16.1)	0.909(0.12)	67.9(20.8)	157.8(13.7)
	P-Value	0.003	0.487	0.001	0.001	0.030	0.001

The results of Tukey's Post Hoc test are following:

BMI between men in two ethnic groups (P=0.271)

BMI between women in two ethnic groups (P=0.003)

Waist circumference (WC) between men in two ethnic groups (P=0.020)

Waist circumference (WC) between women in two ethnic groups (P=0.003)

Hip between men in two ethnic groups (P=0.761)

Hip between women in two ethnic groups (P=0.001)

WHR between men in two ethnic groups (P=0.001)

WHR between women in two ethnic groups (P=0.298)

Weight between men in two ethnic groups (P=0.046)

Weight between women in two ethnic groups (P=0.002)

Height between men in two ethnic groups (P=0.144)

Height between women in two ethnic groups (P=0.367)

Table 2: Prevalence of obesity among ethnic groups based on gender. N(%)

Ethnicity	Gender(N)	BMI(kg/m ²)#			Central Obesity		WHR Obesity	
		>25	25-29.9	30=<	No	Yes	No	Yes
Non-Turkman	Men(134)	57(42.5)	51(38.1)	26(19.4)	98(73.1)	36(26.9)	43(32.1)	91(67.9)
	Women(164)	49(29.9)	43(26.2)	72(43.9)	63(38.4)	101(61.6)	56(34.1)	108(65.9)
	Total(298)	106(35.6)	94(31.5)	98(32.9)	161(54.0)	137(46.0)	99(33.2)	199(66.8)
	P-Value		0.001			0.001		0.401
Turkman	Men(67)	40(59.7)	16(23.9)	11(16.4)	57(85.1)	10(14.9)	32(47.8)	35(52.2)
	Women(99)	48(48.5)	21(21.2)	30(30.3)	57(57.6)	42(42.4)	41(41.4)	58(58.6)
	Total(166)	88(53.0)	37(22.3)	41(24.7)	114(68.7)	52(31.3)	98(59.0)	68(41.0)
	P-Value		0.042			0.001		0.285
Total	Men(201)	97(48.3)	67(33.3)	37(18.4)	155(77.1)	46(22.9)	75(37.3)	126(62.7)
	Women(263)	97(36.9)	64(24.3)	102(38.8)	120(45.6)	143(54.4)	97(36.9)	166(63.1)
	Total(464)	194(41.8)	131(28.2)	139(30.0)	275(59.3)	189(40.7)	172(37.1)	292(62.9)
	P-Value		0.001			0.001		0.924

The results of Chi-2 test are following:

BMI<30 and BMI 30≤ has been compared.

General obesity between men in two ethnic groups (P=0.701)

General obesity between women in two ethnic groups (P=0.027)

Central obesity between men in two ethnic groups (P=0.074)

Central obesity between women in two ethnic groups (P=0.003)

WHR obesity between men in two ethnic groups (P=0.044)

WHR obesity between women in two ethnic groups (P=0.239)

Table 3: The estimated odds ratio of obesity, central obesity and WHR obesity with ethnicity and genders using logistic regression (CI 95%)

		General Obesity#		Central Obesity		WHR Obesity	
		P- value	OR (Lower-Upper)	P- value	OR (Lower-Upper)	P- value	OR (Lower-Upper)
Ethnicity	Turkman	-	1	-	1	-	1
	Non-Turkman	0.060	1.506(0.982-2.309)	0.002	1.844(1.241-2.740)	0.023	1.566(1.063-2.306)
Gender	Men	-	1	-	1	-	1
	Women	0.001	2.791(1.808-4.309)	0.001	4.021(2.676-6.042)	0.976	0.994(0.681-1.451)
Non-Turkman	Men	-	1	-	1	-	1
	Women	0.001	3.251(1.918-5.510)	0.001	4.273(2.611-6.993)	0.649	0.894(0.551-1.449)
Turkman	Men	-	1	-	1	-	1
	Women	0.001	2.182(1.005-4.736)	0.001	4.374(2.010-9.520)	0.482	1.249(0.672-2.319)
Men	Turkman	-	1	-	1	-	1
	Non-Turkman	0.061	1.226(0.564-2.661)	0.052	2.145(0.992-4.639)	0.035	1.902(1.046-3.459)
Women	Turkman	-	1	-	1	-	1
	Non-Turkman	0.025	1.836(1.078-3.094)	0.004	2.096(1.268-3.465)	0.235	1.361(0.818-2.265)

BMI≥30 has considered as obesity

CONCLUSION

General obesity, central obesity and WHR obesity are the main health problem in the north of Iran and it was in non-Turkman more than in Turkman groups. We did not assess the food intake, food behavior and economic status besides the sample size was not estimated by ethnic proportion. In addition the statistical power will be increased if we used the design effect. These are limiting factors for our study.

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