Prevalence of metabolic syndrome in an elderly population of Tabriz, Iran

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Abstract

Objective: This study was conducted to assess the prevalence of the metabolic syndrome (MetS) among elderly people in Tabriz.

Methods: All data were collected in a cross-sectional survey on 350 participants aged 65-90 years. The prevalence of MetS was estimated using the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATPIII).

Results: In total, 55.4% (n=194) of the study population has been diagnosed as MetS. High blood pressure (BP) and waist circumference (WC) both were the criteria for MetS diagnosis with the most prevalent in both genders. In addition women had higher WC (87.0%) and lower high density lipoprotein cholesterol (HDL-C) (54.5%) than men (36.7% and 39.3%, respectively).

Conclusion: MetS was highly prevalent in this elderly people, particularly in women. Appropriate community-based strategies for to prevention of MetS components are necessary for successful aging.

Keywords: Metabolic syndrome; Elderly; NCEP ATPIII; Hypertension; Abdominal obesity

Introduction

MetS is characterized by abdominal obesity, dyslipidemia, hyperglycemia and hypertension [1]. Elderly population is growing worldwide. Nowadays aging and its consequences are considered important challenges in many countries [2]. MetS has been shown to be associated with several geriatric problems [3]. Studies showed that prevalence of MetS increases with aging [4-7]. In Puerto Rico prevalence of this syndrome rose with age, from 12.8% among participants aged 21–29 years to 58.2% for participants aged 70–79 years [5]. The age-related increase in the prevalence of MetS was also found in the Bruneck Study [8]. However, prevalence of MetS in different elderly populations, are not well known. In a study conducted in the Beijing city of China the prevalence of MetS was 30.5% [9]. In a geriatric population in Nigeria, the prevalence of MetS was 89.0% by the NCEP ATPIII criteria [6].

In Iran few studies reported the prevalence of MetS in elderly population [10]. Therefore the present study was aimed to investigate the prevalence of MetS as well as its individual components according to NCEP ATP III criteria among elderly people of Tabriz city, northwest of Iran.

Subjects and Methods

Designs and data collection

This cross-sectional study was conducted on 350 (males: 150, females: 200) elderly people, aged 65 years or older, attending to health centers related to Tabriz university of medical sciences. The study was approved by the Regional Ethical Committee of Tabriz University of Medical Sciences. All subjects signed an informed consent for participation in this study.

Personal and demographic information were obtained. Height, body weight, as well as hip and waist circumferences were measured by wearing light clothing and no shoes. Body mass index (BMI) was calculated as body weight in kilograms divided by the square of height in meters (kg/m^2). BP was measured twice after participants were seated for 15 min using a standard mercury sphygmomanometer (Riester Diplomat-Presameter, Germany) and the mean of two measurements was taken as the BP.

Fasting blood samples were drawn for serum glucose and lipid profile analyses. They were collected between 8:00 and 9:00 from all participants after 10-12 h of overnight fasting and were centrifuged within 30-45 min of collection and serum was stored at -70°C. Serum glucose was measured with an automated glucose oxidase method. All blood lipid analyses were made at Nutritional Research Center laboratory by using an auto-analyzer (Mindray BS-200, China), and kits (Pars Azmon, Inc., Iran). Total cholesterol and triglycerides were measured using enzymatic colorimetric techniques. HDL-C and low density lipoprotein cholesterol (LDL-C) were measured with direct assays.

MetS was defined as in NCEP ATPIII criteria definition requires the presence of at least 3 of the following risk factors: abdominal obesity; WC greater than 102 cm in men or 88 cm in women; high triglyceride (TG) (150 mg/dl or greater); low HDL-C (<40 mg/dl in men or <50 mg/dl in women); high BP (130/85 mmHg or greater); and hyperglycemia (110 mg/dl or greater).

Data analysis

The data were analyzed using statistical software (SPSS version 13.0; SPSS, Chicago, IL). All values were presented as the mean±standard deviation, frequencies, percent and 95% confidence interval. Differences in means between sexes were tested using independent sample t-test. The prevalence of MetS and its components were compared by chi-square test according to gender. A p value of 0.05 or less was considered to indicate a statistically significant difference.

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Results

Data on metabolic variables, BMI and body composition in this group of elderly people (mean ages 72.48±5.7) were analyzed. The prevalence of MetS in the total sample population was 55.4% (men: 44.7% vs. women: 63.5%). The clinical and metabolic characteristics of subjects are presented in (Table 1). As expected, women had higher mean BMI values than men (P <0.001) .Waist to hip ratio (WHR) was higher in men than women (P <0.001), while women had higher mean Hip circumference (HC), total cholesterol, HDL-C and LDL-C than men (P <0.001).

The prevalence of one or more components of the MetS in men and women are summarized in (Table 2). In total population 95% had met at least one criterion of MetS. Significantly more women, have met one to four criteria than men (P <0.05).

The prevalence of MetS and its components according to NCEP ATP III criteria in the study population, stratified by sex, is reported in Figure 1. High BP and Abdominal obesity (large WC) were the most common abnormalities in this sample survey. While abdominal obesity (P <0.001) were higher in women than men, 87% vs. 36.7%, respectively, there is no difference in high BP prevalence between sexes.

Discussion

MetS, a cluster of metabolic abnormalities, has been recognized as predictor of type 2 diabetes and cardiovascular diseases [11]. In this elderly population prevalence of MetS by NCEP ATPIII criteria was 55.4%. The prevalence of MetS has shown wide variation in different studies depending on the population sample and the diagnostic criteria used [2,7,12-15]. In Japan the prevalence of MetS according to NCEP ATPIII criteria was 21.4% in men and 26.8% in women aged 65-79
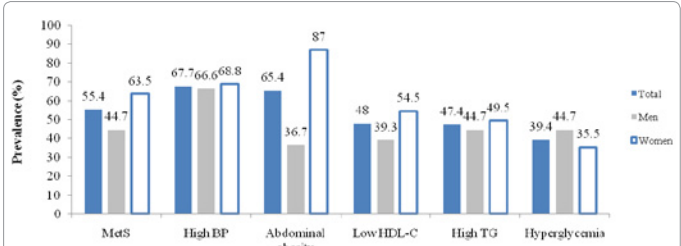

Figure 1: Prevalence of MetS components according to NCEP ATP III criteria.

years [13]. In another study overall MetS prevalence in elderly was 50.1% [12].

In several studies elderly women were more likely than men to have MetS [2,12,14,16]. Tehran Lipid and Glucose Study examined the prevalence of MetS in 1214 subjects aged 60-69 years and showed a prevalence of 22% in men and 26% in women [10]. Kozan et al. [17] have determined the MetS in 4259 adults aged 20-90 years using NCEP ATPIII criteria and they reported the prevalence of MetS increased with age and aged over 60 years old prevalence is 47.4% in men and 72.7% in women.

Similarly in present study the prevalence of MetS was found higher in women than men (63.5%, 44.7%, respectively). There were significantly more women who met MetS components (Table 2). The gender difference is mainly attributable to the higher prevalence of MetS and its components in women, as compared to men [12].

In different geriatric population high BP and abdominal obesity were the most common of MetS components [11,13,14,16]. In a study, it was found that the most component of MetS in the elderly being hypertension (68.3%) followed by abdominal obesity (27.2%) [14]. Arai et al. [13] found that, hypertension was the most common of metabolic abnormalities in total sample (men: 85.3%, women: 76.8%).

Similar to these results in our study, high BP is the most common component of MetS in whole population (men: 66.6%, women: 68.8%). Age associated changes probably is responsible for this result. The second most common single risk factor was abdominal obesity and its frequencies were higher in women than men, 87% vs. 36.7% respectively. Our results are higher than that previously published [2,9,18,19]. He et al. [9] found that, abdominal obesity was 8.6% in men and 43.7% in women. In another study Abolfotouh et al. [18] reported 17.1% and 37.5% abdominal obesity in men and women respectively.

In our study, 48.0% and 47.4% of population sample had low HDL-C and high TG respectively, which is more than what had previously been reported from Norway [4], Sweden [14], USA [20] and China [9]. This could be attributed to industrialization of the country, modification of the life style, unhealthy diet, decreased physical activity and increased prevalence of obesity [10]. While these factors might play an important role in the low HDL-C level, we assume that in this population, genetic and environmental factors are responsible for low HDL-C.

In conclusion the results of this study indicate a high prevalence of MetS according to NCEP ATPIII criteria among this elderly population. The identification and treatment of individuals with MetS would be an important approach to reduce morbidity and mortality in the elderly. The importance of educational and interventional programs should be acknowledged, particularly in cases of middle-aged people, to prevent the MetS components, especially hypertension and abdominal obesity.

	Total	Males	Females	p
Number	350	150	200	
Age (years)	72.4±5.7	73.15±5.59	71.95±5.74	0.051
Weight (kg)	71.47±12.15	74.78±11.60	68.98±11.98	<0.001
Height (cm)	158.39±9.43	166.08±7.55	152.62±5.93	<0.001
BMI (kg/m²)	28.50±4.39	27.07±3.52	29.58±4.66	<0.001
WC (cm)	100.19±10.54	99.36±9.92	100.80±10.95	0.205
HC (cm)	105.39±8.86	103.30±6.40	106.95±10.06	<0.001
WHR	0.95±0.07	0.96±0.06	0.94±0.7	<0.001
FBS (mg/dl)	125.40±63.06	128.83±66.26	122.82±60.58	0.378
SBP (mmHg)	134.85±20.26	135.97±18.20	134.01±21.69	0.372
DBP (mmHg)	81.26±10.82	81.93±11.07	80.75±10.63	0.312
TC (mg/dl)	187.91±39.29	175.91±34.45	196.91±38.30	<0.001
HDL-C (mg/dl)	48.00±12.45	44.40±11.39	50.70±12.55	<0.001
LDL-C (mg/dl)	113.70±33.46	103.40±29.34	121.43±34.34	<0.001
TG (mg/dl)	162.37±80.80	162.21±92.65	162.48±70.85	0.976

Table 1: Descriptive statistics of the study population, mean±SD.

Metabolic abnormalities according to NCEP ATP III	total n = 350	Men n = 150	Women n = 200	p
≥ 1	95.1 (91.64-98.55)	92 (87.65-96.34)	97.5 (95.00-99.99)	0.018
≥ 2	80.3 (73.93-86.66)	70.7 (63.41-77.98)	87.5 (82.20-92.79)	0.001 >
≥ 3	55.4 (47.44-63.35)	44.7 (36.74-52.65)	63.5 (55.79-71.20)	0.001 >
≥ 4	29.4 (22.10-36.69)	18.7 (12.46-24.93)	37.5 (29.75-45.24)	0.001 >
5	7.7 (3.43-11.96)	6.0 (2.19-9.80)	9.0 (4.42-13.57)	0.298

Data are percent (95% CI) or frequencies

Table 2: Prevalence of one or more MetS components in total population by sex.

Acknowledgment

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