ORIGINAL ARTICLE

Prevalence of Metabolic Syndrome in an Adult Urban Population in The South of Iran

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ABSTRACT

OBJECTIVE: We determine the prevalence of the metabolic syndrome in an urban population of Jahrom, a city located in the south of Iran.

MATERIALS AND METHODS: Randomly selected subjects ≥30 years-old were studied using stratified sampling. Target study sample was 892 (405 men and 487 women). Metabolic syndrome was diagnosed using modified Adult Treatment Panel guidelines when any three of the following were present: central obesity, raised triglyceride ≥150 mg/dl, low high-density lipoprotein (HDL) cholesterol (<40mg/dl in men and <50mg/dl in women), blood pressure ≥ 130/85mm Hg, and diabetes or fasting plasma glucose (FPG) ≥ 100 mg/dl. We used body mass index instead of central obesity.

RESULTS: Metabolic syndrome was present in 257 (28.8%; CI 95%: %) subjects, 24.7% in men and 32.2% in women (P= 0.013). This prevalence increased with age in both men and women (p<0.05). The most common component of metabolic syndrome was high blood pressure (51.2%) and low HDL cholesterol (51.3%) in men and women, respectively.

CONCLUSION: There is a high prevalence of metabolic syndrome in this urban population. Method of cardiovascular prevention should be focused on this issue

KEY WORDS: Metabolic syndrome, Sex, Modified NCEP III.

INTRODUCTION

The metabolic syndrome (Met.S) is a cluster of conditions such as dyslipidemia, high blood pressure, impaired glucose tolerance and abdominal fat accumulation (1); obesity and hyperglycemia are the cardinal elements (2-3). Metabolic syndrome is a public health problem because of its increasing prevalence and poor prognosis (4-5). This condition is associated with increased risk of heart disease, type 2 diabetes mellitus, cardiovascular mortality, stroke and chronic renal diseases (6-8). Nilsson et al reported the hazard ratio for coronary vascular disease event of 1.59 (95% CI; 1.25-2.03) (9).

The prevalence of metabolic syndrome has been gradually increasing over the past decades and it is now estimated to affect at least a quarter of the US population (10). In the study conducted by Weng et al in China, the prevalence of metabolic syndrome was 12.7% in urban men and 10.1% in urban women (11). Prevalence of Met.S in Gulf Cooperation Council Countries ranged from 20.7% to 37.2% for men and from 32.1% to 42.7% for women (12). Also, the prevalence of metabolic syndrome was 22.7% among Japanese subjects, aged 38-62 years (13). Abdominal obesity is the most prevalent manifestation of the metabolic syndrome and

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affects 36% of men and 52% of women, according to the 1999–2000 US National Health and Nutrition Examination Study (10). While the pathogenic mechanism of Met.S is poorly understood, insulin resistance and adipose tissue has been identified as an important underlying mechanism (14-15). In Iran some studies were reported the high prevalence of metabolic syndrome from 23.7-42.3% (16-18).

The main objective of this study was to determine the prevalence rate of metabolic syndrome in urban population of Jahrom, Iran.

MATERIALS AND METHODS

This study analyzed data from a cross-sectional study, conducted between 2008 and 2009 in Jahrom. Subjects aged 30 years or more were selected by stratified, multistage random sampling. Informed consent was obtained from all participants. This study was approved by research ethics committee of Jahrom University of Medical Sciences. Subjects completed a questionnaire including sex, age, past medical history and the history of consumption of drugs that decreased blood pressure and blood glucose.

The exclusion criteria consisted of pregnancy, less than 6 months after delivery and disability.

All subjects received verbal information about the study and gave their written consent. The study was approved by the Ethical Committee of Jahrom University of medical sciences.

In the original study, weight was measured to the nearest 100 gram and height to the nearest millimeter by inflexible tape. Body mass index (BM) was calculated as weight (in kilograms) divided by height (in meters) to the power of two.

Blood pressure was measured in the sitting position by a mercury sphygmomanometer (Riester, Germany). Systolic (Korotkoff phase I) and diastolic (Korotkoff phase V) blood pressure was measured twice at five minute intervals on the right arm and the average was used for analysis.

Fasting levels of blood sugar (FBS), triglyceride, total cholesterol, high density lipoprotein cholesterol (HDL) and low density lipoprotein cholesterol (LDL) of all participants were measured. Total cholesterol and triglyceride levels were measured by enzymatic techniques using a Selectra E biochromatic analyzer. HDL and LDL levels were measured after precipitation of the other lipoproteins with heparin and manganese chloride. Plasma glucose levels were measured by the glucose oxidase method.

In this study, subjects with three or more of the following five risk factors of the criteria of the modified NCEP III definition (19) were defined as having metabolic syndrome: (1) triglyceride ≥150 mg/dl, (2) HDL cholesterol < 40 mg/dl in men and <50 mg/dl in women, (3) systolic blood pressure ≥130mmHg or diastolic blood pressure ≥85mmHg, (4) fasting plasma glucose ≥100 mg/dl and (5) waist circumference ≥102 cm for men, ≥88 cm for women. But we used Body Mass Index (BMI) as substitute of waist circumference. Subjects with a history of current consumption of medications that improves blood pressure or serum concentration of glucose and lipids were considered to have the risk factor, in spite of the biochemical or clinical values.

The data are presented as frequencies, percentages, and 95% confidence intervals. The prevalence of different abnormalities was compared using chi square test and for association of metabolic syndrome with factors we used logistic regression analysis. The analysis was performed by SPSS ver. 11.5. P value of < 0.05 was considered statistically significant.

RESULTS

Eight hundred and ninety two subjects aged 30 years or over participated in our study (405 men and 487 women). Characteristics of the participants are shown in Table 1. Men were older than women and their education level was similar to women.

Table 1- characteristics of participants in two genders

Sex		men (n: 405)		women (n: 487)		P value
Variables		number	percent	number	percent	
Age(year)	30-39	91	22.4	138	28.3	0.008
	40-49	108	26.7	150	30.8	
	50-59	98	24.2	111	22.8	
	≥60	108	26.7	88	18.1	
Education	Illiterate	68	16.8	101	20.7	0.053
	Elementary	106	26.2	122	25.1	
	Secondary	68	16.8	81	16.7	
	High school	85	21.0	121	24.8	
	College	78	19.2	62	12.7	

Table 2- Prevalence of the metabolic syndrome according to gender, age group and education

Sex		Men		women		P value
Variables		number	Percent	number	percent	
Sex		100	24.7	157	32.2	0.000
Age(year)	30-39	12	13.2	24	17.4	>0.05
	40-49	27	25.0	40	26.7	>0.05
	50-59	27	27.6	47	42.3	0.026
	≥60	34	31.5	46	52.3	0.003
P for trend		0.022		0.000		
Education	Illiterate	22	32.4	42	41.6	>0.05
	Elementary	28	26.4	54	44.3	0.007
	Secondary	17	25.0	17	21.0	>0.05
	High school	18	21.2	34	28.1	>0.05
	College	15	19.2	10	16.1	>0.05
P for trend		0.388		0.000		
Hypercholesterolemia		11	28.9	33	50.8	0.031
High LDL-C		5	19.2	27	56.3	0.002

Table 3- Prevalence of the metabolic syndrome components according to gender

variable	Men		Women		p
	No. (405)	%	No. (487)	%	
Obesity	40	9.9	121	24.8	0.000
High FBS	116	28.6	128	26.3	>0.05
High triglyceride	161	39.8	195	40.0	>0.05
Low HDL cholesterol	131	32.3	250	51.3	0.000
High blood Pressure	207	51.2	238	48.9	>0.05

No; number

The overall prevalence of metabolic syndrome was 28.8% (CI 95%: 27.3-30.5%). The prevalence of Met.S in men was lower than women **(**24.7% vs. 32.2%; p=0.013) (table 2). The prevalence was significantly related to age in women and men (p< 0.05); the prevalence peaked in both men and women aged ≥60 years (31.5 and 52.3%). The prevalence of

metabolic syndrome decreased in women with increased education level from 41.6% in illiterate level to 16.1% in college level (p=0.000). Although this syndrome decreased with increased education in men but there was no statistically significant difference (p>0.05).

The prevalence of Met.S was significantly different between two genders among who had hypercholesterolemia and high LDL cholesterol. 50.8% of women with hypercholesterolemia, had metabolic syndrome, in contrast to 28.9% among men (p=0.031). Women with high LDL-C had higher prevalence of metabolic syndrome than men (56.3% vs. 19.2%; p=0.002).

The prevalence of five entity components of the metabolic syndrome is shown in Table 3. In men, high blood pressure (51.2%) was the most common component of metabolic syndrome but in women (51.3%) low HDL level was the most common one. The second common metabolic abnormality was high TG level (39.8%) in men and high blood pressure (48.9%) in women. Compared with men, women had a significantly (p<0.001) higher prevalence of elevated BMI and reduced HDL cholesterol level.

Only 19.3% of men and 12.3% of women had no abnormalities in any of the components of the metabolic syndrome, 31.1, 24.9, 18.5, 5.7 and 0.5% of men and 29.6, 25.9, 20.5, 10.1 and 1.6% of women had one, two, three, four and five abnormalities, respectively.

DISCUSSION

The main findings suggest that the prevalence of metabolic syndrome was higher in women. Also the prevalence of this syndrome increased with age in both genders and decreased with increased level of education in women.

Nearly, twenty nine percent of the studied populations had metabolic syndrome. Women (32.25%) were more affected than men (24.7%). The prevalence of Met.S varies greatly worldwide due to varied definitions of metabolic syndrome. The frequency of Met.S in our study was higher than that reported for a sample of Russian population (15.9%) (20). Also, in another study in Russia, 17.6% of study population had metabolic syndrome (21). The metabolic syndrome in subjects aged 40-75 years without hypertension in a rural area in China was 4.1% (22). The prevalence of the metabolic syndrome in this study was lower than that reported from Mexico (23), Puerto Rico (24), India (25-26) and Filipino (27). In Iran, the prevalence of metabolic syndrome was 42.3% according to the ATP III/AHA/NHLBI criteria (18) and in Zanjan it was 23.7% (17).

Similar to our result, other researchers suggested the higher prevalence of metabolic syndrome in females than in males (12, 18, 20-21, 23, 28). But some studies have reported higher prevalence of metabolic syndrome in men than in women (11, 24, 29-30). In Iran, the prevalence of metabolic syndrome was the same in women and men among a population aged 20-69 years in Zanjan (17)

In analysis, we found a lower prevalence of Met.S in women with university education and a higher prevalence of it in both women and men with advanced age. In Russia and Mexico as well the metabolic syndrome was related to education (20, 23). In Iran and Mexico a positive effect of age on the prevalence of the syndrome was detected (17-18, 23).

The concept of Met.S could be used as a diagnostic framework for cases with chronic non-communicable diseases. Met.S is present in 28.9% and 50.8% of hpercholesterolemic men and women and 19.2% and 56.3% of men and women with low HDL-C. These results provide a gross estimate of the contribution of Met.S to the outcomes mentioned above and justify the screening of Met.S components in persons with those conditions.

Considerable variations were found between men and women on the prevalence of the individual components of the metabolic syndrome. Women had a greater prevalence of obesity and reduced HDL cholesterol level, whereas other components were similar in both genders. Variations in the sex-specific prevalence of the individual components of the metabolic syndrome were observed among Puerto Rico adults aged >20years (24). Also in

Mexico, the prevalence of central obesity and low HDL-C was higher in women than men, but men had more hypertriglyceridemia and high blood pressure than women (23). In first nationwide study of the metabolic syndrome, the prevalence of obesity was higher in women than men (18).

In our study, the single most common abnormality of Met.S was high blood pressure (overall near 51%) in men and low HDL cholesterol in women. Whereas in Iran and Mexico, low HDL-C was the most common metabolic abnormality in both genders (17-18, 23).

CONCLUSION

Age, education, gender, and hypercholesterolemia and low HDL cholesterol were related to Met.S.

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