

Original Research Article

Prevalence of Metabolic Syndrome among Health Care Providers

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Abstract

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Metabolic syndrome (MetS) is a cluster of risk factors that happen together and acts as a predictor of diabetes mellitus (DM) and cardiovascular disease (CVD). We wanted to study the prevalence of MetS among health care providers in Erbil City. 314 healthcare providers were recruited in the study. Special questionnaire was designed for the study. History taking and physical examination were performed by well-trained clinician and paramedics. MetS was defined according to IDF classification. 38.5% were male, and the mean age was 37 years. 31.5% were obese. 23.2% were Medical Institute graduates and 37.3% university graduates. 92% were living in urban area. 21.7% have family history of DM and 24% with family history of CVDs. The mean age for MetS was 40 years. Sex, education, occupation, Smoking, fatty food, marriage, family history of DM and CVDs were strongly associated with MetS while residency was not associated with prevalence of MetS. Statistical Processes for Social Sciences (SPSS, version-20) were used for analysis of the data. MetS is highly prevalent in our health care providers due to high prevalence of obesity, smoking and fatty diet, and low education and awareness about the condition.

Keywords: Cardiovascular disease, diabetes mellitus, hyperlipidemia, metabolic syndrome, obesity

List of abbreviation

No	abbreviation	Word
1	Mets	Metabolic syndrome
2	DM	Diabetes mellitus
3	CVD	Cardiovascular disease
4	FH	Family history
5	BP	Blood pressure
6	BMI	Body mass index

INTRODUCTION

Metabolic syndrome (MetS) is a combination of different medical disorders occurring together and predispose to different cardiovascular diseases (CVD) and diabetes mellitus (DM). It is highly prevalent globally e.g. in USA it is about 25% (Ford ES et al. 2002), Iran 33.7% at 2003 (Fereidoun A et al., 2003), Iran 32.1% at 2007 (Zabetian

A. et al., 2007) and in Turkey 33.9% (Kozan O. et al., 2007).

The exact mechanism behind MetS is still unknown. Many risk factors e.g. aging, obesity, sedentary life, stress, endocrine disorders and genetics play a big role in its pathogenesis (Katzmaryk PT et al., 2003), (Poulsen

P. et al., 2001), (Groop, 2000).

Different definitions and classifications were used to define for MetS globally e.g. WHO (Alberti and Zimmet, 1998), International Diabetes Federation (IDF) (Alberti KG, et al., 2005) and the National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP) IV (NECP 2014).

Although each component of MetS carries a higher risk for CVD, a combination of them will augment the risk even further. Early management of MetS may prevent or at least delay the occurrence of DM and CVD in the future (Grundy, 1999), (Lee et al., 2000) and hence decrease their complications (Bouchard G, 1995).

However, DM and CVD once developed require life-long treatment and carry inevitable complications. This causes an increased burden for the health care system. Thus, addressing MetS and its predictors could make a good investment in preventive medicine as a cost effective measure (Pollex RL and Hegele RA et al., 2003).

The study has been approved by both Scientific and Ethics Committee at Medical Research Center, Hawler Medical University. The research participants have been informed about the study in their native language; they had full rights to withdraw from the study at any stage. Both verbal and written consents were taken from the participants.

Our objectives were to investigate the prevalence of MetS among health care personals in both private and public hospitals in Erbil City.

SUBJECTS AND METHODS

This study is a cross sectional study and was performed in Erbil hospitals on health care personals between January – November 2012 in Erbil, Kurdistan Region, Iraq. Special questionnaire has been designed for this study. The questionnaire included all the information regarding demographic data, vital signs, BMI, Waist- hip circumference, lipid profile and fasting blood glucose level.

Subjects

Three hundred fourteen persons were recruited in the study. MetS has been defined according to IDF definition (IDF 2006), Central obesity (defined as waist circumference) and any two of the following:

1. Raised triglycerides: > 150 mg/dL (1.7 mmol/L), or specific treatment for this lipid abnormality
2. Reduced HDL cholesterol: < 40 mg/dL (1.03 mmol/L) in males, < 50 mg/dL (1.29 mmol/L) in females, or specific treatment for this lipid abnormality

3. Raised blood pressure (BP): systolic BP > 130 or diastolic BP >85 mm Hg, or treatment of previously diagnosed hypertension

4. Raised fasting plasma glucose (FPG): >100 mg/dL (5.6 mmol/L), or previously diagnosed type 2 diabetes
If FPG is >5.6 mmol/L or 100 mg/dL, an oral glucose tolerance test is strongly recommended, but is not necessary to define presence of the MetS.

If BMI is >30 kg/m², central obesity can be assumed and waist circumference does not need to be measured.

Smoking Habits

Smoking habits were classified into smokers and nonsmokers. Passive and x-smokers were not recorded.

Fatty Food

Taking more than 2-3 fatty meals per week or daily consumers regarded as fat consumers. Less than that not regarded as fat consumers.

Exclusion Criteria

Participants (medical staffs) with any acute, chronic diseases, malignant diseases or those who are on regular medication during the study were excluded from the study. Pregnant ladies and those operated upon recently were excluded from the study, too.

Working State

Working status denotes: physicians, dentists, pharmacists, paramedics, ambulance drivers, clerk, assistant, laboratory workers, reception, managing personals inside the hospitals.

Blood Collection

Venous blood samples from cubital vein were taken by well-trained paramedics from subjects at the day of consultation. Precautions about sterilization and application of local anesthetics to the site were taken to avoid any discomfort or complications in the future.

Blood Analysis

Blood samples were centrifuged directly after collection and the serum immediately analyzed in the private labor-

Table 1. Demography of participants

Gender	Frequency	Percent
Male	121	38.5
Female	193	61.5
Marital State		
Married	216	68.8
Unmarried	98	31.2
Residence		
Urban	290	92
Rural	24	8
Obesity		
BMI ≥ 30 kg/m ²	99	31.5
BMI < 30 kg/m ²	215	68.5
Education State		
Illiterate/Primary	58	18.5
Secondary	66	21
Institute	73	23.2
University/postgraduate	117	37.3
Occupation		
Paramedics	131	41.7
Physician	39	18.8
Others	144	39.5
Total	314	100.0

atories or in the governmental hospitals.

High density lipoprotein cholesterol (HDL-C), triglycerides (TG) and serum glucose were measured using the commercially available kits (Enzymatic colorimetric method used according to Trinder Method).

Physical Examination

The examination included measurements of body weight, height, body mass index (BMI), waist circumference, systolic and diastolic blood pressure, pulse rate, respiratory rate, fasting blood glucose and lipid profile. The average of two blood pressure recordings in the seated position after 15 minutes rest was taken. A mercury sphygmomanometer was used with a cuff size adjusted to the circumference of the arm. The average of two recordings, measured to the nearest 2 mmHg, was the blood pressure used for statistical calculations.

Ethical considerations

Approval was taken from the ethics committee of the Medical Research Centre, Hawler Medical University. Participants were fully informed about the methods and objectives of the study.

Statistical Analysis

Differences between groups in continuous variables

were analyzed using one-way ANOVA and independent Student's t-test in variables regarded as normally distributed. Kruskal-Wallis and Mann-Whitney U-test were applied for variables, which were not normally distributed. A P-value ≤ 0.05 was regarded as statistically significant. A Bonferroni correction was applied for multiple comparisons. Calculations were performed using the computer-based software program SPSS version 20.0 (SPSS Inc, Chicago, Illinois, USA).

RESULTS

Three hundred and fourteen subjects have been recruited in this study, 121 (38.5%) male and 193 (61.5%) female. Their ages ranged from 20-61 years (mean 37). 216 (68.8%) married and the rest 98 (31.2%) were unmarried (single, divorced or widow). Regarding their education: 117 (37.3%) at university level, 73 (23.2%) at institutional level, 66 (21%) at the secondary school level and those with primary education or illiterate only 58 (18.5%). 290 (92%) were living in major cities while only 24 (8%) in rural area. 131 (41.7%) paramedics, 59 (18.8%) physicians and 144 (39.5) having other jobs in the hospitals. 99 (31.5%) of the participants were obese having BMI ≥ 30 kg/m² (Table 1).

Waist circumference 25 (8.2%) was abnormal among males, while 102 (32.4%) was abnormal among females (P value < 0.0001) (Table 2).

According to IDF classification of MetS, 100 (31.8%) have MetS with significant sex difference (Table 3).

Table 2. Waist circumference frequency by gender

Waist category		Frequency	Percent	P-value
Male	Waist (Up to 102 cm)	96	30.3	<0.001
	Waist (> 102 cm)	25	8.2	
	Total	121	38.5	
Female	Waist (Up to 88 cm)	91	28.1	
	Waist (> 88 cm)	102	32.4	
	Total	193	61.5	
Total		314	100.0	

Table 3. Prevalence of MetS with sex

Sex		No MetS	MetS	Total	P-value
Male	Frequency	80	31	121	<0.01
	% within sex	81.7%	18.3%	100.0%	
Female	Frequency	124	69	193	
	% within sex	57.3%	43.7%	100.0%	
Total	Frequency	214	100	314	
	% within sex	68.2%	31.8%	100.0%	

Table 4. Age groups by Mets

Age Category		No MetS	MetS	Total	P-value
<20	Frequency	20	8	28	<0.007
	% within age category	70.4%	29.6%	100.0%	
20-40	Frequency	137	50	187	
	% within age category	72.1%	27.9%	100.0%	
>40	Frequency	57	42	99	
	% within age category	57.6%	42.4%	100.0%	
Total	Frequency	214	100	314	
	% within age category	68.2%	31.8%	100.0%	

Table 5. Prevalence of MetS and occupation

Occupation		No MetS	MetS	Total	P-value
Paramedics	Frequency	101	30	131	<0.02
	% within Occupation	77%	23%	100.0%	
Physician	Frequency	36	23	59	
	% within Occupation	60%	40%	100.0%	
Total	Frequency	137	53	190	
	% within Occupation	68.2%	31.8%	100.0%	

The mean age for MetS was 40 years, as the age growing the prevalence of MetS significantly increasing statistically (P value <0.007) (Table 4).

MetS is more common among physicians than paramedics. (P value <0.02) (Table 5).

As education grow the prevalence of MetS increases (P value <0.04). MetS is more common among married persons (P value <0.003).smokers 15/29 (51.7%) (P value <0.01) and fatty food consumers 89/161 (55%) (P value <0.001) (Table 6).

Family history of DM and CVD have a strong relations with MetS; 21.7% have family history of DM, of those

85.2% have both family history of DM and MetS (P value <0.0001).24% have family history of CVD of those 65.3% have both family history of CVD and MetS (P value <0.0001) (Table 7).

DISCUSSION

The prevalence of MetS, DM and CVD are increasing in our country as we notice from our daily clinical practice. This change is due to urbanization, economic growth, westernization of our diet, non-physical activity, irregular

Table 6. Demography by Mets

Variables			No Mets	Mets	Total	P-value
Education	Illiterate/Primary	Frequency	33	25	58	<0.04
		% within education	56.9%	43.1%	100.0%	
	Secondary	Frequency	47	19	66	
		% within education	72.3%	27.7%	100.0%	
	Institute	Frequency	55	18	73	
		% within education	71.7%	28.3%	100.0%	
	University	Frequency	79	38	117	
% within education		81.3%	18.7%	100.0%		
Total	Frequency	214	100	314		
		% within education	68.2%	31.8%	100.0%	
Marital status	Married	Frequency	139	77	216	<0.003
		% within marital state	62.7%	37.3%	100.0%	
	Unmarried	Frequency	75	23	98	
		% within marital state	81.3%	18.7%	100.0%	
	Total	Frequency	214	100	314	
		% within marital state	68.2%	31.8%	100.0%	
Residence	Urban	Frequency	201	89	290	<0.2
		% within residence	61.2%	38.8%	100.0%	
	Rural	Frequency	13	11	24	
		% within residence	54.5%	45.5%	100.0%	
	Total	Frequency	214	100	314	
		% within residence	68.2%	31.8%	100.0%	
Cigarette smoking	Non smoker	Frequency	200	85	285	<0.011
		% within Smoking	70.2%	29.8%	100.0%	
	Smoker	Frequency	14	15	29	
		% within Smoking	48.3%	51.7%	100.0%	
Total	Frequency	214	100	314		
		% within Smoking	68.2%	31.8%	100.0%	
Fatty diet	No	Frequency	142	11	153	<0.001
		% within Smoking	92.9%	7.1%	100.0%	
	yes	Frequency	72	89	161	
		% within Smoking	44.7%	55.3%	100.0%	
Total	Frequency	214	100	314		
		% within Smoking	68.2%	31.8%	100.0%	

Table 7. Family history of DM and CVD by MetS

		Family history	No MetS	MetS	Total	P-value
FH DM	YES	Frequency	10	58	68(21.7%)	<0.001
		% within FH DM	14.8%	85.2%	100.0%	
	NO	Frequency	204	42	246	
		% within FH DM	83%	17%	100.0%	
	Total	Frequency	214	100	314	
		% within FH DM	68.2%	31.8%	100.0%	
FH CVD	YES	Frequency	26	49	75(24%)	<0.001
		% within FH CVD	34.7%	65.3%	100.0%	
	NO	Frequency	188	51	239	
		% within FH CVD	78.7%	21.3%	100.0%	
	Total	Frequency	214	100	314	
		% within FH CVD	68.2%	31.8%	100.0%	

FH denotes to family history, DM: diabetes mellitus, CVD: cardiovascular diseases. Pvalue equal or less than 5% is statistically significant.

meal time and increased stress, which have been blamed as risk factors for MetS (Misra A. et al. 2007)¹⁵.

Obesity is a terrible factor in our country, e.g. 31.5% of the participants were obese having BMI ≥ 30 kg/m². The

prevalence of MetS is 31.8% which is similar to Iran 32.1% (Zabetian A. et al. 2007) but higher than that in USA 25% and much lower than Saudi Arabia 39.3% (Waleed I A. 2011). This may be due to differences in the prevalence of obesity, sedentary lifestyle, physical activity and consumption of more fatty foods.

The mean age for MetS was 40 years, which was this was similar to others (Ervin RB. et al. 2009) and it increases with age (P value <0.007). There is an argue surrounding the etiology and pathogenesis of MetS, a single uniform mechanism needed to be discovered (Ferrannini E. et al. 2007) however, multiple factors e.g. hormonal, genetic and environmental (nutrition, body composition and stress hormones) factors play a key role in this contest (Campion et al., 2009).

We showed that MetS was strongly related to smoking 51.7% (P value <0.01), fat consumption 55.3% (P value <0.001), family history of DM 85.2% (P value <0.0001) and family history of CVD 65.3% (P value <0.0001).

Our finding was in concordance with others, and INTERHEART Study showed that smoking 59.9% related to MetS in South Asia (Danny et al., 2009).

Marital state showed significant association with MetS, 37.3% (P value <0.03) for married people, which was similar to (Thomas GN, et al 2005) and this may be due to more social relations and more commitment to the family.

Demographic data e.g. sex (P value <0.01), education (P value <0.04) and occupation (P value <0.02) were significantly related to prevalence of MetS (Lee J. 2007) and (Park SH. et al 2007) have reported these factors as risk factors for MetS. Residency show insignificant relation to MetS, This may be due to small sample size of our study.

CONCLUSION

MetS is highly prevalent in both health care providers and other population. Health care providers should be more educated about the consequences of MetS in order to have a positive impact on the society. Aging, sex, education, occupation, smoking, fatty diet, marriage, family history of DM and CVD are the main risk factors for MetS. People with these risk factors should be assessed for MetS and educated about the risks and possible consequences in the future.

ACKNOWLEDGMENTS

The study was sponsored by Hawler Medical University.

Thanks to the participants in the study.

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