

Prevalence of metabolic syndrome among Type 2 diabetic Libyan patients

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Abstract: To estimate the prevalence of metabolic syndrome and its characters among the admitted adult diabetic patients as defined by the third report of the national cholesterol education program expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (Adult Treatment Panel III [ATP III]) of North America. **Methods:** A cross sectional study was conducted in diabetic center, involved 122 aged ≥ 40 years type 2 diabetic patients admitted to the ward, (male, female) from Jan. – Feb., 2012 living in the city of Tripoli, Libya. The patients were interviewed after getting a verbal consent, every patient was examined and overnight fasting blood sample was taken for blood lipid profile measurement, metabolic syndrome was diagnosed according to NCEP ATP III criteria. **Results:** About 77% of the patients had been diagnosed as the metabolic syndrome according to NCEP ATP III criteria, women aged between 50-59 years were more affected than men at the same age group associated with more significant obesity and abnormal waist circumference, and statistical significant difference was observed between the two gender regarding HDL level, and triglyceride level. The most common and the most important component of metabolic syndrome in the study group were central obesity, hyperglycemia, and low HDL. **Conclusion:** metabolic syndrome is common among type 2 diabetics, with females are significantly more affected than males, the most significant predictor of metabolic syndrome in type 2 diabetic patients in Tripoli is central obesity and low HDL.

Keywords: Metabolic syndrome, Hypertension, Dyslipidemia.

Introduction

Metabolic syndrome is a collection of major and emerging risk factors for atherosclerosis that tend to occur together. This syndrome has various names, including Reaven's syndrome, the deadly quartet, syndrome X, insulin resistance syndrome, as well as metabolic syndrome (1). Its characterized by elevated plasma glucose, abdominal obesity, Atherogenic dyslipidemia, and hypertension (2). Insulin resistance underlines many of the metabolic abnormalities, although the pathogenesis of the syndrome is not completely understood (3).

The important causes are genetics factors, sedentary lifestyle, aging, and endocrine disorders such as polycystic ovary (4-6). The metabolic syndrome has been shown to be an indicator of macro and micro-vascular complication of Diabetes Mellitus and a risk factor for fatty liver, snoring, sleep apnea respiratory disorders, depression, and several cancers (2). In the prevention of metabolic syndrome, these include increased physical activity (such as walking 30 minutes every day), (7) and a healthy, reduced calorie diet (8). Several pervious epidemiological studies have shown the

high prevalence of metabolic syndrome 92% in Libya (2), 21% in Omani (9), 39.3% in Saudi Arabia (10), and 25% in USA (11), as defined by the adult treatment panel (ATP) III in 2001(12). We used the same definition to estimate the prevalence of metabolic syndrome in type 2 diabetes among Libyan by age and gender.

Patients and methods

The study was conducted in Tripoli diabetic center; it was a cross sectional study involved 122 type 2 diabetic patients admitted to unit B (male-female) from Jan. – Feb., 2012. The patients were interviewed after taken verbal consent and taken over night fasting sugar and lipid profile, the blood sample was collected at 6 am, and sample for fasting blood sugar collected in a sodium fluoride potassium oxalate tubes (for glucose) and plane tube for lipid profile, all sample were centrifuged for 10 min, then plasma sugar was measured by automatic (Bios Enc. Lin E Diagnostic method).

HDL cholesterol and triglycerides were measured by using (Roche integra 400 pulses) in the hospital laboratory, when the reagent was available. Blood pressure was measured three consecutive times in sitting position from the right arm; the mean of three-reading was taken. Waist circumference was measured with subject wearing light clothing at a level midway between the lower rib margin and iliac crest using a plastic, tailors measuring tape. In addition, weight and height were also measured, and BMI was calculated (weight divided by height in meter squared). The Values above the cut off points for each parameter were regarded as abnormal.

Definition of metabolic syndrome:

Subjects were considered to have metabolic syndrome if they had any Three or more of the following criteria according to National Cholesterol Education Program (NCEP) Adult treatment panel III (2001).

Central obesity: waist circumference \geq 102 cm or 40 inches (male), \geq 88 cm or 36 inches (female).

Dyslipidemia: TG \geq 1.7 mmol/l (150 mg/dl) or on treatment.

Dyslipidemia: HDL-C $<$ 40 mg/dL (male), $<$ 50 mg/dl (female) or on lipid lowering treatment.

Blood pressure \geq 130/85 mmHg or on and hypertension treatment.

Fasting plasma glucose \geq 6.1 mmol/l (110 mg/dl).

Statistical analysis

Data were analyzed by using the Statistical package for the social sciences (SPSS) version 10. The prevalence rate was given as percentages. Relations among the categorical parameters were Statistical tested by Chi-square test, and independent sample t-test for quantitative parameters. Data were considered statically significant when the p-value was $<$ 0.05.

Results

A total of 122 type 2 diabetic patients (22 men, 100 women) participated in the study, 38.5% in the age group 50-59 year with mean age 55 ± 10.9 years, and seventy seven percent (n = 94) of subjects were diagnosed as having metabolic syndrome by ATP III, (23%) 28 diagnosed as not having the metabolic syndrome as in figure (1).

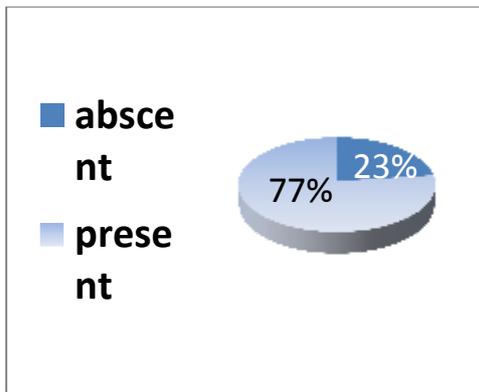


Figure 1: The prevalence of metabolic syndrome among admitted patients in diabetic center 2012.

Figure 2: distribution of metabolic syndrome characteristic according ATP III among type 2 diabetic by gender in diabetic center 2012.

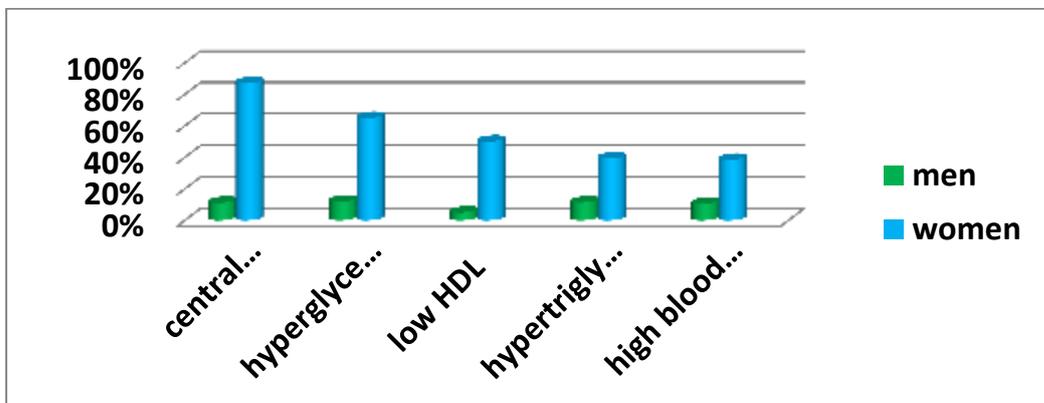


Table 1: frequency of the individual component of metabolic syndrome by gender

variable	mean± SD	women	Men	P value
N %		100(82%)	22(18%)	
Age 50-59years	55.5±10.6	44(36%)	3(2.4%)	
Abnormal Waist circumference(men.102;women.88cm)	105±13.7	95(87.1%)	14(11.4)	P= 0.000
FpG(≥110mg/dl) of medication use	211±107	79(65%)	15(12%)	p=0.005
LowHDL cholesterol(men< 40; women <50 mg/dl)	41.9±15	61(50%)	6(5%)	P=0.000
Hypertriglycerideamia(≥150 mg/dl)	183.1±228	48(39.3%)	14(11.4%)	P=0.818
Abnormal Blood pressure≥130/85mmHg or medication use		47(38.5%)	13(10.6%)	P=0.4000
Systolic blood pressure	134±17			
Diastolic blood pressure	81.9±10			

Table 2: Frequency of the individual component of metabolic syndrome by age

Character	40-49 years	50-59 years	60-69 years	70-79 years	p.value
Men	11(9%)	3(2.4%)	5(4%)	3(2.4%)	
Women	17(14%)	44(36%)	32(26.2%)	7(6%)	
Abnormal Waist circumference (men.102; women.88cm)	23(18.8%)	45(36.8%)	33(27%)	8(6.5%)	P=0.000
FpG (≥ 110 mg/dl) of medication use	21(22.3%)	38(40.3%)	29(30.9%)	6(6.4%)	P=0.000
Low HDL cholesterol (men < 40; women < 50 mg/dl)	15(12.2%)	25(20.4%)	22(18%)	5(4%)	P=0.000
Hypertriglyceridemia (≥ 150 mg/dl)	16(13.1%)	23(18.8%)	18(14.7%)	5(4%)	P=0.581
Abnormal blood pressure $\geq 130/85$ mmHg or medication use	10(8.1%)	30(24.5%)	16(13.1%)	4(3.2%)	P=0.000

The prevalence of metabolic syndrome increased with age ($p \leq 0.001$) and the prevalence is 21% in age 40-49 years, 30% in 50-59 years, 25% in age group 60-69 years, and 5% in patients between 70-79 years. But the increase was steeper in women $p \leq 0.003$, the prevalence of metabolic syndrome were 85% in women, and 14% in men, on other hand no significant relation with duration of diabetes, ($p \leq 0.87$). The relative frequency of individual components of the metabolic syndrome by age and sex are shown in Tables 1, 2. 91% of the patients had abnormal BMI ($< 30 \text{ kg/m}^2$) with mean ($35.3 \pm 6.3 \text{ kg/m}^2$), significantly more frequent among female ($p \leq 0.003$), the frequency of metabolic syndrome increased in patients with obesity ($p \leq 0.001$). The most common compound of MS according to ATP III is central obesity was found in 89.3% of patients, increased with age ($p \leq 0.001$), and more statically significant among women ($p \leq 0.001$). The major of the patients had hyperglycemia 76.4% with mean FBS 211 ± 107 mg

%, the prevalence higher in the women (65%), $p \leq 0.005$ and increased with the age $p \leq 0.001$.

The low HDL-C was 3 the common component of the syndrome, 55% was low HDL-c, with mean \pm SD (41.7 ± 15.3 mg/dl), the low HDL level increased with age ($p \leq 0.001$), and the women had higher prevalence of low HDL than men ($p \leq 0.001$). On other hand, hypertriglyceridemia was 51%, its higher in women than male but no significant relation ($p = 0.818$), and also with the age ($p = 0.581$). The prevalence of hypertension in study 49.2%, with mean systolic blood pressure 134 ± 17 , and diastolic blood pressure 81.9 ± 10 , increased with the age $p \leq 0.001$, but the women had higher prevalence than men, and no relation $p = 0.4000$, with the age. The women aged 50-59 years had higher prevalence of abdominal obesity, low HDL, hyperglycemia, hypertriglyceridemia, and hypertension than men.

Discussion

The metabolic syndrome and its complication are hazardous due to the abdominal obesity high blood pressure, high fasting blood sugar, high serum triglyceride and low HDL-C level (13). The Adult Treatment Panel III (ATPIII) (12) criteria of the national cholesterol education program were used in this study. The report provides the prevalence of the metabolic syndrome among type 2 diabetic patients, we show that MS is more common among Libyan type 2 diabetic patients; actually this prevalence is also high in the world (15-19).

In sight the sample is small size and the number of admitted women in that period more than men, and refuses to, and to find out reliable and clear comparison between patients characteristic, we need larger sample to confirm that. The high prevalence in our sample could be due to, lack of exercise, and high caloric diet, even uncontrolled diabetes, Additionally the Arab world prevalence of the MS is high, as in Abdul-Rahim et al. (14) among Palestinians of the west Bank and, using WHO criteria, while in Omanis study 2003 (9), Alnozha et al. (10) in Saudi Arabia, Yamen study (13), by same criteria, as well in Benghazi (2) by ATPIII, IDF criteria. In our study, the women aged 50-59 with high prevalence of general and abdominal obesity were significantly more affected by MS than men, because of higher frequency of obesity than men, as the body size is changed especially in the women after menopause, Same as in other previous studies Yamani (13), Saudi Arabia (10), Benghazi (2), Omanina (9), Iranian study (20), but conversely in Abdul-Rahim et al. (14) and French study (20), it was more high among

men, may relate to similar life style factors. The atherogenic dyslipidemia (high triglyceride level, and low HDL), appears most frequent and mainly component of metabolic syndrome in our women patients aged 50-59 years, this may have several causes including obesity, overweight, diabetes, physical inactivity, which may associated with insulin resistance (12), alcohol consumption is known to increase HDL (21) but is rare in Islamic country, as has been reported in other parts of the world (19), as well reported in Arab pervious study in (10-13), in the other hand, in Abdul-Rahim et al. (14), among Palestinians of the west Bank controversially reported men more than women. The causes in their was not recognized, however, whether this similarity due to genetic predisposing, or life style factors. The athergenic lipoprotein profile characterized by high triglyceride and low HDL is more powerful predictor of insulin resistance than obesity, elevated blood pressure, or FBG and in the presence of obesity, greatly increases the risk of coronary heart disease (22).

Study limitation: Our study sample was large enough to fulfill our aims, but a larger sample would be more suitable for detecting small differences between means. Moreover, the measurement of HDL and TRG some time not available in our hospital in the period of study and may possibly affect on the result of HDL, and TRG level. Despite these limitations, but this study was able to reveal important aspects of this clinical syndrome among diabetic patients in Tripoli Libya, as see in each day in our practices.

Conclusion: The prevalence of MS is high among women with central obesity, high triglyceride, low HDL, and diabetes.

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