JKBMS, Vol.4, No.1, P.16-19, 2018 https://doi.org/10.56056/amj.2018.35

Risk Factors of Metabolic Syndrome in Erbil City

Saleem Saaed Qader

Abstract

Background and objectives: Metabolic syndrome is a cluster of risk factors that happens together and acts as a predictor for diabetes mellitus and cardiovascular diseases. This study was designed to identify the risk factors of metabolic syndrome in Erbil City. **Methods:** This is a cross sectional study. It was performed at Consulting Surgical Clinics on patients searching for medical advice between January- August 2012 in Erbil, Kurdistan Region, Iraq.
Two hundred patients were recruited and special questionnaire was designed for the study. History taking and physical examination were performed by a trained clinician and nurses. Metabolic syndrome was defined according to the International Diabetes Federation. **Results:** Thirty two percent were male. The mean age of participants was 42.12 years, 50% were obese, 89% were illiterate or at primary school level and 71.5% were living in urban area. 47.5% had family history of diabetes mellitus and 31.7% had family history of cardiovascular disease. According to the International Diabetes Federation classification 62 (31%) participants had metabolic syndrome. The mean age of those with metabolic syndrome was 46 years. Smoking, eating fatty food, family history of diabetes mellitus and cardiovascular disease were independent risk factors and strongly associated with metabolic syndrome while sex, civil state, education, residency and occupation were not associated with prevalence of metabolic syndrome. **Conclusions:** Metabolic syndrome is highly prevalent in our country. The risk factors for metabolic syndrome are smoking, eating fatty food, obesity and family history of diabetes mellitus and cardiovascular disease.
Keywords: Metabolic syndrome; Diabetes mellitus; Cardiovascular disease; Hyperlipidemia

Introduction

Metabolic syndrome (MetS) is a combination of different medical disorders occurring together and predisposes to different cardiovascular diseases (CVD) and diabetes mellitus (DM). It is highly prevalent e.g. in USA is about 25%[1], while in our country we expect higher prevalence because of high prevalence of obesity and sedentary lifestyle.
The exact mechanism behind MetS is still unknown. Many risk factors e.g. aging, obesity, sedentary life[2], stress, endocrine disorders and genetics[3-6] play a big role in its pathogenesis.
Many names and definitions have been used globally to define MetS by different organizations e.g. World Health Organization (WHO)[7], International Diabetes Federation (IDF)[8] and the National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP) III[9] each used special classification.
Although each component of MetS carries a higher risk for cardiovascular disease (CVD), a combination of them will augment the risk even further. Early management of MetS may prevent or at least delay the occurrence of both DM and CVD in the future[10, 11] and hence decrease any future complications.
Identifying people with MetS may help to prevent DM and CVD and their consequences. However, DM and CVD once developed require life-long treatment and carry inevitable future complications. This causes an increased burden for the health care system of any society.
Addressing MetS and its predictors could make a good investment in preventive medicine as a cost effective measure by both decreasing the prevalence of MetS and avoidance of its complications in the future.
Our objective was to investigate the risk factors of MetS in a sample of population in Erbil City from surgical clinics.

Patients and methods

This is a cross sectional study. It was performed at Consulting Surgical Clinics on patients searching for medical advices between January and August 2012 in Erbil, Kurdistan Region-Iraq.
Two hundred patients were recruited in the study. Randomized selection of patients were applied. MetS has been defined according to IDF definition[12], Central obesity [defined as waist circumference according to NCEP & American Heart Association AHA male≥ 102 cm/40 inches, female≥ 88 cm/35 inches] and any two of the following: raised triglycerides: >150 mg/dl (1.7 mmol/l), or specific treatment for this lipid abnormality, 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, raised blood pressure (BP): systolic BP >130 or diastolic BP >85 mm Hg, or treatment of previously diagnosed hypertension and raised fasting blood glucose (FPG): >100 mg/dl (5.6 mmol/l), or previously diagnosed type 2 diabetes.
If FBG is >5.6 mmol/l (100 mg/dl), an oral Glucose Tolerance Test is strongly recommended, but is not necessary to define presence of MetS.
If BMI is >30 kg/m², central obesity can be assumed and waist circumference does not need to be measured.
A special questionnaire has been designed for this study. The questionnaire included all the information regarding

Consultant General Surgeon, Lecturer, Department of Surgery, Rizgary Teaching Hospital, Erbil, Iraq
Kurdistan Board for Medical Specialties, Erbil, Kurdistan Email: Saleem.Qader@kbms.org

demographic data, vital signs, BMI, waist- hip circumference, lipid profile and fasting blood glucose level.

Smoking habit were classified into smokers (who smokes cigarettes or cigar regularly) and non- smokers. Passive smoking and x-smokers were not recorded.

Taking more than 2-3 fatty meals per week or daily consumers was regarded as fat consumers. Less than that regarded as non- fat consumers.

Participants 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 status denotes: house wife, governmental employment, retired (more sedentary life) and unemployed (free work).

Venous blood samples from cubital vein were taken by well-trained nurses from subjects at the day of consultation. Blood samples were centrifuged directly after collection and the serum immediately analyzed in the private laboratories or in the main official hospitals laboratory. 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).

The physical examination was performed by a consultant physician. 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.

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 $\leq$0.05 was regarded as statistically significant. A Bonferroni correction was applied for multiple comparisons. Calculations were performed using the computer-based software program of the Statistical Package for the Social Sciences (SPSS version 20) (SPSS Inc, Chicago, Illinois, USA) for analysis of the data.

The study has been approved by both Scientific and Ethics Committee at Medical Research Centre, Hawler Medical University. Patients have been informed about the study, they had full rights to withdraw from the study at any stage. Both verbal and written consents was taken from the participants.

Results

Two hundred subjects have been recruited in this study, 63 (31.5%) male and 137 (68.5%) female. Their ages ranged from 20-80 years (mean 42.12). One hundred eighty eight (94%) persons were married and the rest 12 (6%) were either single or widow. Most of them 179 (89%) were either illiterate or at the primary school level, 12 (6%) at the secondary school level and those with university education were only 9 (4.5%). One hundred seventy one (71.5%) were living in the major cities while only 57 (28.5%) from rural area. One hundred thirty three (66.5%) were house wife (women), 28 (13.5%) were employed in governmental jobs, 9 (4.5%) were retired and 30 (15%) were self-employed. 50% of the participants were obese having BMI $\geq$30 kg/m2. 95 (47.5%) had family history of diabetes mellitus and 62 (31.7%) had history of cardiovascular disease, Table 1.

Table (1): Frequency distribution of patients' demography.

Demography		No.	%
Age	Mean/ years	42.12	20- 80 years*
Sex	Male	63	31.5
	Female	137	68.5
BMI	<30 kg/m^2	100	50%
	≥30 kg/m^2	100	50%
Marrital status	Married	188	94
	Single/widow	12	6
Education	Illitrate/Primary	179	89
	Secondary	12	6
	University	9	4.5
Residency	Urban	143	71.5
	Rural	57	28.5
Occupation	Housewife	133	66.5
	Employed	28	13.5
	Retired	9	4.5
	Self-employed	30	15
Smoking	Yes	89	44.5
	No	111	55.5
Fatty food	Yes	101	50.5
	No	99	49.5
Family history of DM	Yes	95	47.5
	No	104	52.5
Family history of CVD	Yes	62	31.5
	No	135	68.5

According to IDF classification of MetS, 62 (31%) had MetS, (Table 2).

Table (2): Prevalence of Metabolic syndrome

Metabolic syndrome	No.	%
Yes	62	31
No	138	69

The mean age for those with MetS was 45.9 years (P value 0.005), 44/89 (49.44%) of smokers had MetS, but only 18/111 (16.23%) of non-smokers had MetS (P value <0.001). History of taking fatty food was also highly significant 58/101 (57.43%) of fat consumers have MetS (P value <0.001). Family history of DM had a strong relation with the prevalence of MetS, 57/95 (60%) had family history of DM with MetS and only 5/100 of negative family history had MetS (P value <0.001). Those with family history of CVD were about 46/60 (76%) had MetS (P value <0.001), but only 16/119 (13.45%) had MetS with no history of CVD (P value <0.001), Table 3.

Table (3): Prevalence of Metabolic Syndrome in relation to the demographic data

Demographic data		MetS +	MetS-	Total	P value
Age		45.86	40.44		0.005
Sex	Male	14 (7%)	49 (25%)	63 (100)	0.069
	Female	48 (24%)	89 (45%)	137 (100)	
Civil State	Married	60 (30%)	128 (64%)		0.268
	Unmarried	2 (1%)	10 (5%)		
Residency	Urban	47 (23.5%)	96 (48%)		0.482
	Rural	15 (7.5%)	42 (21%)		
Education	Illiterate/Primary	55 (27.5%)	124 (62%)		0.830
	Secondary	4 (2%)	8 (4%)		
	University	2 (1%)	6 (3%)		
Occupation	Housewife	45 (22.5%)	88 (44%)		0.57
	Employed	8 (4%)	20 (10%)		
	Retired	2 (1%)	7 (3.5%)		
	Free work	7 (3.5%)	23 (11.5%)		
Smoking	Yes	44 (22%)	45 (22.5%)		<0.001
	No	18 (9%)	93 (46.5%)		
Fatty food	Yes	58 (29%)	43 (21.5%)		<0.001
	No	4 (2%)	95 (47.5%)		
Family history of DM	Yes	57 (28.5)	38 (19%)		<0.001
	No	5 (2.5%)	95 (47.5%)		
Family history of CVD	Yes	46 (23%)	16 (8%)		<0.001
	No	16 (8%)	119 (59.5%)		

MetS+: Have metabolic syndrome; MetS-: Have no metabolic syndrome

Discussion

Metabolic Syndrome, diabetes mellitus and CVD are increasing in our country as we notice daily from our practice as physicians. This change in prevalence due to urbanization, economic growth, westernization of our diet, irregular meal time and increased stress due to new lifestyle which has been blamed as risk factors for MetS elsewhere[13, 14]. Obesity is a big issue in our country, e.g. 50% of the participants were obese having BMI $\geq$30 kg/m2. This problem is growing unfortunately both in adults and even in children in our society, which is due to modernization of our life and the invasion of our life with new technologies in every aspect of our life both inside and outside our home.

The prevalence of MetS is 31.5% which is close to Iran's prevalence of 32.1%[15] but higher than that in USA 25% and much lower than Saudi Arabia's 39.3%[16] and 39.8[17]. This difference may be due to differences in the prevalence of obesity, sedentary lifestyle and consumption of more fatty foods; in addition, keeping in mind that the genetic predisposition for this health issue may play a role in the prevalence of metabolic syndrome globally. The genes that affect fat and glucose metabolism can probably together with the environmental factors increase the liability to the syndrome and will increase the prevalence of MetS in certain families in the society. Among these genes β3-adrenergic receptor, hormone-sensitive lipase, lipoprotein lipase, IRS-1, PC-1, skeletal muscle glycogen synthase, etc. are likely to increase the risk of MetS[5].

The mean age for MetS was 42 years; this was similar to others[18], and it increases with age although we could not show this which may be due to limited number of the participants in our study.

There is a debate surrounding the etiology and pathogenesis of MetS, a single uniform mechanism need to be discovered[19] however, multiple factors e.g. hormonal, genetic and environmental (nutrition, body composition and stress hormones) factors play key role in this debate[20].

We showed that MetS was strongly related to smoking 49.4% (P value <0.001), fat consumption 57.4% (P value <0.001), family history of diabetes mellitus 60% (P value <0.001) and family history of CVD 76.7% (P value <0.001). Our finding was in concordance with others; in addition to that INTERHEART Study showed that smoking is 59.9% related to MetS in South Asia[21]. This could be explained by the fact that smokers consume more sugar than the non-smokers which in turn causes more obesity.

Demographic data e.g. sex, civil status, education, residency and occupation were not significantly related to prevalence of MetS although other studies[17, 22-24] have reported these factors as risk factors for MetS. This difference may be due to small sample size of our study or other confounding factors which may contribute to this difference and needs to be addressed in a large cohort study.

Conclusions

Metabolic syndrome is highly prevalent in our society. Aging, smoking, fatty diet, family history of diabetes mellitus and CVD disease are the main risk factors for metabolic syndrome. People with these risk factors should be assessed for metabolic syndrome and treated accordingly to reduce the future sequences of this syndrome and to decrease the health burden on the society.

Acknowledgments

This study was sponsored by Hawler Medical University. Thanks to the participants in the study. Thanks to Dr. Yasameen A. Shakir for her assistance regarding statistical analysis. Thanks to Dr. Halgurd Fathulla and Bashdar Mahmud for their assistance.

References

Ford ES, Giles WH, Dietz WH. Prevalence of metabolic syndrome among US adults: findings from the third National Health and Nutrition Examination Survey. JAMA 2002; 287 (3): 356–359.

1.Katzmaryk PT, Leon AS, Wilmore JH, Skinner JS, Rao DC, Rankinen T, Bouchard C. Targeting the Metabolic Syndrome with Exercise: Evidence from the HERITAGE Family Study. Med. Sci. Sports Exerc 2003; 35 (10): 1703–1709.

2.Pollex RL, Hegele RA. Genetic determinants of the metabolic syndrome. Nat Clin Pract Cardiovasc Med 2006;3 (9): 482–9.

3.Poulsen P, Vaag A, Kyvik K, Beck-nielsen H. Genetic versus environmental aetiology of the metabolic syndrome among male and female twins. Diabetologia 2001;44 (5): 537–543.

4.Groop L. Genetics of the metabolic syndrome. British Journal of Nutrition2000;83 (83): S39–S48.

5.Bouchard G. Genetics and the metabolic syndrome. International journal of obesity 1995; 19: 52–59.

6.Alberti KG, Zimmet P. Definition, diagnosis and classification of diabetes and its complications. Part I: diagnosis and classification of diabetes provisional report of WHO consultation. Diabet Med 1998;15: 539–553.

7.Alberti KG, Zimmet P, Shaw J. Metabolic syndrome-a new worldwide definition. Lancet 2005;366:1059–1062.

8.National Cholesterol Education Program: Executive Summary of the third report of the National Cholesterol Education Program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (adult treatment panel III). JAMA 2001; 285: 2486-2497.

9.Grundy SM, Benjamin IJ, Burke GL, Chait A, Eckel RH, Howard BV et al. Diabetes and cardiovascular disease: a statement for healthcare professionals from the American Heart Association. Circulation 1999; 100: 1134-46.

10.Lee WL, Cheung AM, Cape D, Zinman B, Impact of diabetes on coronary artery disease in women and men: a meta-analysis of prospective studies. Diabetes Care 2000; 23: 962-8.

11.The IDF consensus worldwide definition of the metabolic syndrome, 2006.

12.Misra A, Misra R, Wijesuriya M, Banerjee D. The metabolic syndrome in South Asians: continuing escalation and possible solutions. Indian J Med Res. 2007;125(3):345–354.

13.Verma P, Srivastava RK, Jain D. Association of Lifestyle Risk Factors with Metabolic Syndrome Components: A Cross-sectional Study in Eastern India. Int J Prev Med. 2018 Jan 29;9:6. doi: 10.4103/ijpvm.IJPVM_236_17. eCollection 2018.

14.Zabetian A, Hadaegh F, Azizi F: Prevalence of metabolic syndrome in Iranian adult population, concordance between the IDF with the ATPIII and the WHO definitions. Diabetes Res Clin Pract 2007, 77:251-257.

15.Waleed IA. Helicobacter pylori infection and its relationship to metabolic syndrome: is it a myth or fact? Saudi J Gastroentrol. 2011;17:165-9.

16.Al-Rubeaan K, Bawazeer N, Al-Faris Y, Youssef AM, AL-Yahya AA; Al-Qumaidi H, et al. Prevalence of metabolic syndrome in Saudi Arabia - a cross sectional study. BMC Endocr Disord. 2018 Mar 5;18(1):16.

17.Ervin RB. Prevalence of metabolic syndrome among adults 20 years of age and over, by sex, age, race and ethnicity, and body mass index: United States, 2003-2006. Natl Health Stat Report 2009, 13:1-7.

18.Ferrannini E. Metabolic syndrome: a solution in search of a problem. J Clin Endocrinol Metab. 2007;92:396–8.

19.Campion J, Milagro FI, Martinez JA. Individuality and epigenetics in obesity. Obes Rev. 2009;10:383–92.

20.Danny E, Girish LK, Nadya M, Anjali A and Bobby VK. Metabolic syndrome and cardiovascular disease in South Asians. Vasc Health Risk Manag. 2009; 5: 731–743.

21.Thomas GN, Ho SY, Janus ED, Lam KS, Hedley AJ, Lam TH. The US National Cholesterol Education Programme Adult Treatment Panel III (NCEP ATP III) prevalence of the metabolic syndrome in a Chinese population. Diabetes Res Clin Pract 2005; 67:251-7.

22.Lee J, Ma S, Heng D, Tan CE, Chew SK, Hughes K, et al. Should central obesity be an optional or essential component of the metabolic syndrome? Ischemic heart disease risk in the Singapore Cardiovascular Cohort Study. Diabetes Care 2007; 30:343-7.

23.Park HS, Kim SM, Lee JS, Lee J, Han JH, Yoon DK, et al. Prevalence and trends of metabolic syndrome in Korea: Korean National Health and Nutrition Survey 1998-2001. Diabetes Obes Metab 2007; 9:50-8.