

Prevalence of Metabolic Syndrome and Metabolic Abnormalities among Patients with Depression

Mazen Khalil Ali, MD, AB (Psych)* Haitham Ali Jahrami, PhD**

Objective: To evaluate the prevalence of metabolic syndrome (MetS) and metabolic abnormalities among patients with depression.

Design: A Case-Control Study.

Setting: Psychiatric Hospital, Ministry of Health, Kingdom of Bahrain.

Method: Forty-seven adult patients diagnosed with Major Depressive Disorder (MDD) were matched 1:1 by age and sex to 47 controls. Personal characteristics were documented and the following measurements were included: weight and height, waist and hip circumference, fasting blood glucose, lipids profile and blood pressure. Statistical analysis used: Case-control analysis of the two groups was done.

Result: Forty-seven adult patients diagnosed with Major Depressive Disorder (MDD) and 47 controls; 21 (44.7%) patients suffered from metabolic syndrome compared to controls 15 (31.9%). Obesity (OR=2, 95% CI: 0.85-4.5) and raised Blood Pressure (OR=2, 95% CI: 0.9-4.7) were the two components of MetS which revealed a difference between the two groups.

Conclusion: Metabolic abnormalities are highly prevalent among patients with depression in Bahrain. Females had a higher prevalence of metabolic syndrome compared to males.

Bahrain Med Bull 2018; 40(2): 86 - 89

Depression is one of the most common psychiatric disorders which encompasses a cluster of symptoms including emotional, somatic and cognitive. The main characteristic of depression is low mood or anhedonia with other symptoms like decreased concentration, decreased appetite, insomnia, fatigue, thoughts of guilt, worthlessness, and hopelessness. To be diagnosed with depression, the above-mentioned symptoms must be present for at least two weeks. It affects 121 million people worldwide. Depression is currently the second cause of disability and the fourth highest contributor to the burden of diseases according to the WHO; it is expected to be the second after cardiovascular diseases by 2020¹.

Patients with depression have a four-fold increased risk of early death compared to non-depressed². The mortality from depression decreases if chronic health conditions are controlled³. It has been found that many of the depressed patients die prematurely due to cardiovascular diseases (CVDs) and this is mediated by the so-called metabolic syndrome (MetS)⁴.

MetS is characterized by at least three of the following: large waist circumference, hypertension, elevated fasting blood sugar, high serum triglycerides, and low HDL levels. It is

associated with the increased risk of diabetes mellitus (DM) type II and cardiovascular disease⁵. This syndrome was first described in the 1960s as "pluri-metabolic syndrome". It was found to be more common among coronary artery disease patients⁶. However, the present term was coined in 1998 by the World Health Organization (WHO)⁷. Currently, there are several definitions of MetS by different international bodies including World Health Organization, Adult Treatment Panel III, and International Diabetes Federation (IDF). IDF criteria for MetS was used in this study⁸.

There is a debate whether some components of MetS are more important than others in affecting patients with depression⁹. The severity of depression also plays a role in the predisposition to MetS¹⁰. The predisposition to MetS is higher among depressed female patients¹¹.

Management of depression should include screening for risk factors for MetS as well as encouraging healthy lifestyles such as eating habits, exercise, smoking, and alcohol consumption.

The aim of this study is to evaluate the prevalence of MetS among patients diagnosed with major depression compared to normal controls.

* Consultant Psychiatrist
Psychiatric Hospital

** Chief of Rehabilitation Services
Periphery Hospitals
Ministry of Health
College of Medicine and Medical Sciences, Arabian Gulf University
Kingdom of Bahrain
E-mail: hjahrami@health.gov.bh

METHOD

A matched case-control study was conducted where cases of adult patients (47) diagnosed with Major Depressive Disorder (MDD) were matched 1:1 by age and sex to controls (47) who were healthy volunteers and free from mental illness. Patients below 18 and above 65 years of age, and patients with existing cardiovascular complications or diseases were excluded from the study.

Personal characteristics were documented. The measurements included were weight, height, waist and hip circumference, fasting blood glucose, lipid profile, blood pressure. A written informed consent was obtained from all the participants.

Data were analyzed using SPSS version 22. The mean and Standard Deviation (SD) were reported for continuous variables Pearson Chi-Squared or Fisher's Exact test, and independent samples t-test were used to investigate the differences between groups.

RESULT

Both the cases (47) and controls (47) were matched for the number, sex, and age. Table 1 describes the different parameters involved in our study.

Table 1: Personal Characteristics of Cases and Controls

Variable	Controls n=47	Cases n=47	Independent Samples t-test
Male	19 (40%)	19 (40%)	N/A
Female	28 (60%)	28 (60%)	
Age	44.0±6.9	48.04±10.33	0.26
Weight (kg)	74.6±15.3	84.05±19.02	0.01*
Height (cm)	163.6±7.7	163.13±9.47	0.77
Body Mass Index (BMI)	27.9±5.4	31.79±7.89	0.005*
Systolic Blood Pressure	128.7±18.8	137.28±22.15	0.04*
Diastolic Blood Pressure	78.3±11.6	75.70±12.53	0.29
High-Density Lipoprotein (HDL)	1.3±0.4	1.28±0.31	0.52
Low-Density Lipoprotein (LDL)	2.8±0.8	2.99±0.80	0.26
Triglyceride	1.6±1.2	1.47±0.74	0.63
Cholesterol	4.9±1.0	4.92±0.87	.074
Fasting Blood Sugar	5.5±1.3	5.93±1.29	0.12
Waist Circumference	93.6±13.2	101.93±14.88	0.005*
Hip Circumference	103.4±12.9	109.13±14.06	0.04*
Waist Hip Ratio	0.9±0.1	0.94±0.08	0.12

* P<0.05

The mean weight among cases with MDD (84 kg) was higher than the mean weight of controls (74.6 kg). The mean BMI of cases (31.79) was in the obesity range, whereas the mean BMI of controls 27.86 was in the overweight range.

The mean systolic blood pressure among cases (137.27) was elevated according to IDF criteria (≥ 130), whereas the mean of systolic blood pressure among controls was normal (128.7). The mean diastolic blood pressure among both cases (75.7) and

controls (78.34) were within the normal range (≤ 85). The mean waist circumference among cases (101.92 cm) was greater than controls (93.5 cm). Most of the other parameters were higher among cases than controls.

The average weight among control females (72.6 kg) was lower than control males (77.6 kg); the corresponding BMI were 28.47 and 26.96 for control females and control males, respectively. The mean systolic and diastolic blood pressures among control males was higher than females. The waist circumference among the two groups was equal (93.4 and 93.64). The triglycerides are almost twice as high among control males (2.11) than females (1.2). The fasting blood sugar was comparable among the two groups.

The mean weight of female cases (87.3 kg) was higher than the males (79.1 kg). The mean BMI among females (34.8) was higher than males (27.3). The mean systolic blood pressure among females (141.2) was higher than males (131.4), but the mean diastolic pressure was almost equal among the two groups. The cholesterol profile was comparable among the two groups. The mean waist circumference was higher among females (107 cm) compared to males (94.3 cm).

According to IDF criteria for MetS, 21 (44.7%) suffer from MetS compared to controls 15 (31.9%). Taking each factor individually, 26 (55.3%) were obese than controls 18 (38.3%). Blood pressure was elevated among cases 32 (68.1%) than among controls 24 (51.5%). The triglycerides are equally elevated among cases and control 13 (27.7%). The number of cases with reduced HDL cholesterol 35 (74.5%) was almost equal to controls 34 (72.3%). The fasting blood sugar was slightly higher among cases 23 (48.9%) than among controls 20 (42.6%), see table 2.

Table 2: Prevalence of Metabolic Syndrome in Cases and Controls

Variable	Controls (n=47)		Cases (n=47)		OR (95% CI)
	Yes N (%)	No N (%)	Yes N (%)	No N (%)	
Obesity	18 (38.3%)	29 (61.7%)	26 (55.3%)	21 (44.7%)	2.0 (0.85-4.5)
Raised Triglycerides	13 (27.7%)	34 (72.3%)	13 (27.7%)	34 (72.3%)	1.0 (0.4-2.4)
Reduced HDL Cholesterol	34 (72.3%)	13 (27.7%)	35 (74.5%)	12 (25.5%)	1.2 (0.45-2.8)
Raised Blood Pressure	24 (51.1%)	23 (48.9%)	32 (68.1%)	15 (31.9%)	2.0 (0.9-4.7)
Fasting Blood Sugar	20 (42.6%)	27 (57.4%)	23 (48.9%)	24 (51.1%)	1.2 (0.6-2.9)
Metabolic Syndrome	15 (31.1%)	32 (68.1%)	21 (44.7%)	26 (55.3%)	1.7 (0.75-4.0)

Twenty-one (75%) female patients were obese compared to 5 (26.3%) males. Twelve (42.9%) female controls were obese

compared to 6 (31.6%). The triglycerides were more elevated among male controls, 8 (42.1%), than all other groups. A greater reduction was found in HDL cholesterol levels among female cases and controls, 22 (78.6%), compared to male cases and controls, 13 (68%). Elevated systolic blood pressure was more common among female cases than female controls. However, elevated blood pressure was slightly more common among male cases, 13 (68.4%), than male controls, 11 (57.9%). Elevated fasting blood sugar among male controls, 9 (47.4%), was higher than male cases, 7 (36.8%). On the other hand, fasting blood sugar was more elevated among female cases, 16 (57.1%), than female controls, 11 (39.3%). The prevalence of MetS among female cases, 18 (64.3%), was almost twice the number of female controls, 9 (32.1%). Prevalence of MetS among male controls, 6 (31.6%), was higher than male cases, 3 (15.8%).

DISCUSSION

Only one study from GCC countries evaluated the prevalence of MetS and its components among adult patients suffering from different psychiatric disorders¹². Our study is the first in the GCC countries to evaluate the prevalence of MetS and its components among adults suffering from major depression specifically.

The prevalence of overweight in GCC countries and obesity among adults range from two-thirds to three-quarters of the population¹³. The rates of hypertension and diabetes mellitus in the region are also among the highest in the world^{14,15}. Obesity is more common in women than men, similarly the prevalence of MetS which is higher among women¹⁶.

Different studies showed that the prevalence of MetS ranges from 29.6% to 36.2% among males and 36.1% to 45.9% among females according to IDF criteria¹⁶. These rates are similar to other Arab countries¹⁷.

Some factors are found to be associated with MetS in the GCC including lower education, age and higher income¹⁸. Other factors include decreased physical activity, sedentary lifestyle as well as diet quality¹⁹.

Approximately 28% of the adult population in Qatar suffer from MetS²⁰. A study in India has found a high prevalence (44.3%) of MetS among inpatients suffering from depression²¹. Another study found that antipsychotic medication and low aerobic fitness were significantly correlated with MetS among first-time hospitalized young depressed patients²². MetS is found to be higher (37.2%) among drug-naïve patients with depression than among healthy controls (16.3%)²³.

In our study, MetS is more prevalent among depressed patients (44.7%), compared to healthy controls (31.9%) according to the IDF criteria. Among the individual components contributing to the diagnosis of MetS, obesity was found to be the only one with a statistically significant difference between cases and controls. MetS was found to be high among depressed females (64.3%) and least among depressed males (15.8%). Obesity, raised blood pressure and fasting blood sugar were high among depressed females (75%, 75%, and 57.1%, respectively).

The lifestyle-related diseases among women in the GCC countries have reached an alarming level²⁴. The obesity rates among females ranges from 29% to 45.7%, which is one of the highest globally. Physical inactivity among females in the region is very high (45% to 98.7%). Prevalence of diabetes is also high (21%) as well as hypertension (20.9% to 53%). Some studies have also shown that there is a higher genetic predisposition to diabetes among Arabs compared to Caucasians²⁵.

CONCLUSIONS

MetS and its components are highly prevalent among depressed patients in Bahrain. MetS is also high among the general population. It could be a contributing factor to a poor prognosis of depression; therefore, an early treatment plan that includes lifestyle modification and better eating habits could help a better and faster remission of depression.

Author Contribution: All authors share equal effort contribution towards (1) substantial contributions to conception and design, acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript version to be published. Yes.

Potential Conflicts of Interest: None.

Competing Interest: None.

Sponsorship: None.

Acceptance Date: 11 April 2018.

Ethical Approval: Approved by the Secondary Healthcare Research Committee, Ministry of Health, Kingdom of Bahrain.

REFERENCES

1. Marazziti D, Rutigliano G, Baroni S, et al. Metabolic Syndrome and Major Depression. *CNS Spectr* 2014; 19(4):293-304.
2. Wulsin LR, Vaillant GE, Wells VE. A Systematic Review of the Mortality of Depression. *Psychosomatic Medicine* 1999; 61(1):6-17.
3. Everson-Rose SA, Meyer PM, Powell LH, et al. Depressive Symptoms, Insulin Resistance, and Risk of Diabetes in Women at Midlife. *Diabetes Care*; 27(12):2856-62.
4. McIntyre RS, Alsuwaidan M, Goldstein BI, et al. The Canadian Network for Mood and Anxiety Treatments (CanMAT) Task Force Recommendations for the Management of Patients with Mood Disorders and Comorbid Metabolic Disorders. *Annals of Clinical Psychiatry* 2012; 24(1):69-81.
5. Dunbar JA, Reddy P, Davis-Lameloise N, et al. Depression: An Important Comorbidity with Metabolic Syndrome in a General Population. *Diabetes Care* 2008; 31(12):2368-73.
6. Avogaro P, Crepaldi G, Enzi G, et al. Associazione Di Iperlipemia, Diabete Mellito E Obesita' di Medio Grado. *Acta Diabetologica* 1967; 4(4):572-90.

7. World Health Organization. Definition, Diagnosis and Classification of Diabetes Mellitus and its Complications: Report of a WHO Consultation. Part 1, Diagnosis and Classification of Diabetes Mellitus. 1999. http://apps.who.int/iris/bitstream/10665/66040/1/WHO_NCD_NCS_99.2.pdf Accessed on 18 May 2017.
8. International Diabetes Federation. The IDF Consensus Worldwide Definition of the Metabolic Syndrome. 2006. file:///C:/Users/Research/Downloads/IDF_Meta_def_final.pdf Accessed on 18 May 2017.
9. Foley D, Morley KI, Madden PA, et al. Major Depression and the Metabolic Syndrome. *Twin Research and Human Genetics* 2010; 13(4):347-58.
10. Ahola AJ, Thorn LM, Saraheimo M, et al. Depression is Associated with the Metabolic Syndrome among Patients with Type 1 Diabetes. *Annals of Medicine* 2010; 42(7):495-501.
11. Pulkki-Råback L, Elovainio M, Kivimäki M, et al. Depressive Symptoms and the Metabolic Syndrome in Childhood and Adulthood: A Prospective Cohort Study. *Health Psychology* 2009; 28(1):108.
12. Alosaimi FD, Abalhassan M, Alhaddad B, et al. Prevalence of Metabolic Syndrome and its Components among Patients with Various Psychiatric Diagnoses and Treatments: A Cross-Sectional Study. *General Hospital Psychiatry* 2017; 45:62-9.
13. Ng SW, Zaghloul S, Ali HI, et al. The Prevalence and Trends of Overweight, Obesity and Nutrition-Related Non-Communicable Diseases in the Arabian Gulf States. *Obesity Reviews* 2011; 12(1):1-3.
14. Kearney PM, Whelton M, Reynolds K, et al. Worldwide Prevalence of Hypertension: A Systematic Review. *Journal of Hypertension* 2004; 22(1):11-9.
15. Sarah W, Gojka R, Anders G, et al. Global Prevalence of Diabetes. *Diabetes Care* 2004; 27(5):1047-53.
16. Mabry RM, Reeves MM, Eakin EG, et al. Gender Differences in Prevalence of the Metabolic Syndrome in Gulf Cooperation Council Countries: A Systematic Review. *Diabetic Medicine* 2010; 27(5):593-7.
17. Sliem, Hamdy Ahmed et al. "Metabolic Syndrome in the Middle East." *Indian Journal of Endocrinology and Metabolism* 16.1 (2012): 67–71. PMC. Web. 21 Mar. 2018.
18. Malik M, Razig SA. The Prevalence of the Metabolic Syndrome among the Multiethnic Population of the United Arab Emirates: A Report of a National Survey. *Metabolic Syndrome and Related Disorders* 2008; 6(3):177-86.
19. Dunstan DW, Salmon J, Owen N, et al. Associations of TV Viewing and Physical Activity with the Metabolic Syndrome in Australian Adults. *Diabetologia* 2005; 48(11):2254-61.
20. Al-Thani MH, Cheema S, Sheikh J, et al. Prevalence and Determinants of Metabolic Syndrome in Qatar: Results from a National Health Survey. *BMJ Open* 2016; 6(9):E009514.
21. Grover S, Nebhinani N, Chakrabarti S, et al. Prevalence of Metabolic Syndrome among Patients with Depressive Disorder Admitted to a Psychiatric Inpatient Unit: A Comparison with Healthy Controls. *Asian Journal of Psychiatry* 2017; 27:139-44.
22. Nyboe L, Vestergaard CH, Lund H, et al. Metabolic Syndrome in First-Time Hospitalized Patients with Depression: A 1-Year Follow-Up Study. *Acta Psychiatrica Scandinavica* 2016; 133(3):241-8.
23. Grover S, Nebhinani N, Chakrabarti S, et al. Metabolic Syndrome in Drug-Naive Patients with Depressive Disorders. *Indian Journal of Psychological Medicine* 2013; 35(2):167.
24. Alshaikh MK, Filippidis FT, Al-Omar HA, et al. The Ticking Time Bomb in Lifestyle-Related Diseases among Women in the Gulf Cooperation Council Countries; Review of Systematic Reviews. *BMC Public Health* 2017; 17(1):536.
25. Gosadi IM, Goyder EC, Teare MD. Investigating the Potential Effect of Consanguinity on Type 2 Diabetes Susceptibility in a Saudi Population. *Human Heredity* 2014; 77(1-4):197-206.