

Metabolic syndrome in patients with severe mental illness in Gorgan

Mohammad
Zaman Kamkar,
Akram Sanagoo¹,
Fatemeh Zargarani²,
Leila Jouybari³,
Abdoljalal Marjani⁴

Department of Psychiatry, Golestan Research Center of Psychiatry, Golestan University of Medical Sciences, ¹Nursing Research Center, Golestan University of Medical Sciences, ²Department of Psychiatry, Golestan University of Medical Sciences, ³Education Development Center, Golestan University of Medical Sciences, ⁴Department of Biochemistry and Biophysics, Metabolic Disorders Research Center, Gorgan Faculty of Medicine, Golestan University of Medical Sciences, Gorgan, Golestan Province, Iran

Address for correspondence:

Prof. Abdoljalal Marjani, Department of Biochemistry and Biophysics, Metabolic Disorders Research Center, Gorgan Faculty of Medicine, Golestan University of Medical Sciences, Gorgan, Golestan Province, Iran.
E-mail: abdoljalal@yahoo.com

Abstract

Background: Metabolic syndrome is commonly associated with cardiovascular diseases and psychiatric mental illness. Hence, we aimed to assess the metabolic syndrome among severe mental illness (SMI). **Materials and Methods:** The study included 267 patients who were referred to the psychiatric unit at 5th Azar Education Hospital of Golestan University of Medical Sciences in Gorgan, Iran. **Results:** The mean waist circumference, systolic and diastolic blood pressure, triglyceride and fasting blood glucose levels were significantly higher in the SMI with metabolic syndrome, but the high density lipoprotein (HDL)-cholesterol was significantly lower. The prevalence of metabolic syndrome in SMI patients was 20.60%. There were significant differences in the mean of waist circumference, systolic (except for women) and diastolic blood pressure, triglyceride, HDL-cholesterol and fasting blood glucose in men and women with metabolic syndrome when compared with subjects without metabolic syndrome. The prevalence of metabolic syndrome in SMI women was higher than men. The most age distribution was in range of 30-39 years old. The most prevalence of metabolic syndrome was in age groups 50-59 years old. The prevalence of metabolic syndrome was increased from 30 to 59 years old. **Conclusion:** The prevalence of metabolic syndrome in patients with SMI in Gorgan is almost similar to those observed in Asian countries. The prevalence of metabolic syndrome was lower than western countries. These observations may be due to cultural differences in the region. It should be mention that the families of mental illness subjects in our country believe that their patients must be cared better than people without mental illness. These findings of this study suggest that mental illness patients are at risk of metabolic syndrome. According to our results, risk factors such as age and gender differences may play an important role in the presence of metabolic syndrome. In our country, women do less physical activity than men; therefore, the incidence of metabolic syndrome is higher among women.

Key words: Gorgan, metabolic syndrome, severe mental illness

INTRODUCTION

Metabolic syndrome is a cluster of risk factors for some diseases such as cardiovascular disease (CVD) and type 2

diabetes. According to the adult treatment panel (ATP III) criteria, any three of the five components are necessary for the diagnosis of metabolic syndrome: Elevated waist

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circumference, blood pressure, serum triglyceride and glucose and reduced high-density lipoprotein (HDL) cholesterol.^[1] Metabolic syndrome is associated with CVD and psychiatric mental illness.^[2-5] Some studies have shown the relationship between metabolic syndrome and coronary artery diseases in different ethnic groups, gender, age, and postmenopausal women.^[6-12] Several studies in Europe have reported 28-37% prevalence of metabolic syndrome with mental illness such as schizophrenia.^[13-16] Many other studies indicated 43% and 46% prevalence of metabolic syndrome in the United States and Canada respectively.^[17,18] Incidentally, people with psychiatric diseases such as schizophrenia have lower life expectancy than people without mental illness and subjects with coronary artery diseases.^[19] Metabolic syndrome is reported in 19-63%, 42.4%, 12-36%, and 8-56% patients with schizophrenia, schizoaffective psychosis, relapsing depression, and bipolar affective disorder, respectively.^[20-23] Studies on patients with severe mental health have shown that males and females schizophrenic patients have 138% and 251% more chance to have metabolic syndrome than general populations.^[17] Individuals with severe mental illnesses (SMI) show a higher prevalence of metabolic syndrome than those who do not a metabolic syndrome.^[24,25] These people indicate an important social and/or occupational dysfunction.^[26] The elevated prevalence of metabolic syndrome in these subjects may be related to the disease itself, treatment with the antipsychotic drug, obesity, consumption of high-fat diets, low physical activity, and active smoking.^[27] Patients with SMI die earlier than the general population. Premature deaths prevalence among these subjects varies between 80% and 95%.^[28] Studies have shown that individuals with metabolic syndrome have 4 and 3 times more risk of developing diabetes and coronary heart disease, respectively.^[12,29] Metabolic syndrome is a complex disease. Prognosis of this disease is poor and needs specific attention to control. The prevalence of metabolic syndrome among psychiatric disorders patients has been rarely studied. The aim of the present study was to assess the metabolic syndrome among patients with SMI in Gorgan (South East of Caspian Sea, Iran).

MATERIALS AND METHODS

267 patients with SMI, aged 18-73 years (mean age 38.93 ± 10.79 years) who were treated with antipsychotic drugs and referred to the psychiatric unit at 5th Azar Education Hospital of Gorgan Faculty of Medicine, Golestan University of Medical Sciences in Gorgan, Iran in 2014. SMI patients were defined if they are in the following category: Schizophrenia, bipolar 1 mood disorder, major depressive disorder with psychotic features, psychotic

or mood disorder in association with a general medical condition and schizoaffective disorder. SMI patients were diagnosed by a psychologist. We excluded patients without complete information, pregnant, substance abuse, anxiety disorders, mental retarded, and Axis II disorders.

A 10 ml blood samples were collected after an overnight fast of 12 h. Serum fasting blood glucose, HDL-cholesterol, total cholesterol and triglyceride levels were determined with commercial kits by spectrophotometer techniques (Model JENWAY 6105 UV/VIS) in the Metabolic Disorders Research Center. The Friedewald equation was used to calculate low density lipoprotein cholesterol (LDL-cholesterol) level. Weight was measured, while subjects were minimally clothed without shoes, using digital scales. Height was measured in standing position using tape meter while the shoulder was in a normal position. Body mass index (BMI) was defined as weight in kilograms divided by height in meters squared. Overweight was defined as BMI 25.0-29.9 kg/m² and obese as BMI ≥30 kg/m².^[30] Waist circumferences were measured at the point halfway between the lower border of ribs and the iliac crest in a horizontal plane.^[31] Systolic and diastolic blood pressure was measured in sitting position from the right hand. Metabolic syndrome identified if SMI patients had any three or more of the following criteria, according to the ATP III^[1] as it has shown in Table 1.

This study was approved by the Research Deputy Ethics Committee of the Golestan University of Medical Sciences. The results are revealed as means and standard deviations and percentages. A software system SPSS for Windows (version 16.0, SPSS Inc., Chicago, Illinois, USA) was used to calculate the statistical analysis. The evaluation of results was carried out using independent sample *t*-test and Chi-squared test. A *P* < 0.05 was considered as statistically significant.

RESULTS

The present study assessed 267 patients with SMI. The mean age of the subjects was 38.90 ± 0.66 years. Table 2 shows the biochemical data of the subjects with and without the metabolic syndrome in patients with SMI. The

Table 1: Risk factors for the metabolic syndrome according to ATP III

Risk factors	Defining level
Waist circumference	Males: >102 cm, females: >88 cm
Triglyceride levels	≥150 mg/dL
HDL levels	Males: <40 mg/dL, females: <50 mg/dL
Blood pressure	Systolic: ≥130 mmHg, diastolic: ≥85 mmHg
Fasting glucose levels	≥110 mg/dL

ATP III: Adult treatment panel III, HDL: High density lipoprotein

mean waist circumference, systolic and diastolic blood pressure, triglyceride and fasting blood glucose levels were significantly higher in the SMI with metabolic syndrome, but the mean HDL-cholesterol was significantly lower ($P < 0.05$). The prevalence of metabolic syndrome in SMI was 20.60%. Tables 3 and 4 show biochemical data of SMI men and women with and without metabolic syndrome. There were significant differences in the mean of waist circumference, systolic (except for women) and diastolic blood pressure, triglyceride, HDL-cholesterol and fasting blood glucose in men and women with metabolic syndrome when compared with subjects without metabolic syndrome ($P < 0.05$). There were no significant differences in total cholesterol and LDL-cholesterol. The prevalence

of metabolic syndrome in SMI women (32%) was higher than men (13.77%). Table 5 shows the distribution of different age groups in patients with SMI with and without metabolic syndrome. The most age distribution was in the range of 30-39 years old. The most prevalence of metabolic syndrome was in age groups 50-59 years old. The prevalence of metabolic syndrome was increased from 30 to 59 years old.

DISCUSSION

Our study showed a low prevalence of metabolic syndrome (20.60%) in patients with SMI according to the ATP III criteria. Several studies have assessed whether an increased

Table 2: Biochemical characteristic of SMI with and without metabolic syndrome

Parameters	Total number of SMI	SMI with metabolic syndrome	SMI without metabolic syndrome	P
Number of patients (%)	267 (100)	55 (20.60)	212 (79.40)	
Age (years)	38.90±6.60	41.77±9.36	38.41±11.03	0.49
Waist circumference (cm)	90.73±7.80	102.78±10.93	87.88±11.65	0.001
BMI (kg/m ²)	25.55±3.10	30.28±4.87	24.34±4.80	0.001
Systolic blood pressure (mmHg)	105.88±7.30	110.40±15.24	104.72±10.81	0.02
Diastolic blood pressure (mmHg)	67.94±6.00	72.30±11.39	66.72±9.15	0.001
Triglyceride (mg/dL)	156.14±5.16	211.94±8.24	144.10±8.00	0.001
Total cholesterol (mg/dL)	169.50±2.94	180.34±5.12	167.36±4.73	0.087
HDL-cholesterol (mg/dL)	50.01±9.40	41.52±13.56	51.98±15.33	0.001
LDL-cholesterol (mg/dL)	87.73±2.60	96.38±5.02	85.92±4.07	0.121
Glucose (mg/dL)	83.77±1.45	105.04±43.10	78.91±11.92	0.001

BMI: Body mass index, HDL: High density lipoprotein, LDL: Low density lipoprotein, SMI: Severe mental illness

Table 3: Biochemical characteristic of SMI in men with and without metabolic syndrome

Parameters	Total number of SMI	SMI with metabolic syndrome	SMI without metabolic syndrome	P
Number of patients (%)	167 (100)	23 (13.77)	144 (86.23)	
Age (years)	39.21±11.01	43.11±8.35	38.75±11.21	0.123
Waist circumference (cm)	90.15±11.64	104.11±9.98	88.40±10.63	0.001
BMI (kg/m ²)	24.42±4.01	28.72±3.56	23.71±4.22	0.001
Systolic blood pressure (mmHg)	52.10±11.50	115.0±15.04	106.28±10.77	0.014
Diastolic blood pressure (mmHg)	68.85±10.18	78.05±10.45	67.70±9.45	0.025
Triglyceride (mg/dL)	92.16±9.16	260.06±9.41	157.53±8.55	0.001
Total cholesterol (mg/dL)	45.16±4.63	183.0±4.81	164.38±4.59	0.639
HDL-cholesterol (mg/dL)	50.38±14.26	43.05±16.60	51.29±13.74	0.001
LDL-cholesterol (mg/dL)	81.40±4.08	87.72±4.93	80.61±3.97	0.669
Glucose (mg/dL)	83.27±1.92	112.89±3.79	79.56±1.10	0.001

BMI: Body mass index, HDL: High density lipoprotein, LDL: Low density lipoprotein, SMI: Severe mental illness

Table 4: Biochemical characteristic of SMI in women with and without metabolic syndrome

Parameters	Total number of SMI	SMI with metabolic syndrome	SMI without metabolic syndrome	P
Number of patients (%)	100 (100)	32 (32)	68 (68)	
Age (years)	38.77±10.50	41.06±9.90	37.69±10.67	0.135
Waist circumference (cm)	66.05±14.74	102.03±11.52	86.76±13.56	0.001
BMI (kg/m ²)	27.43±6.09	31.16±5.32	25.67±5.65	0.001
Systolic blood pressure (mmHg)	45.10±12.24	107.08±14.96	101.40±10.21	0.14
Diastolic blood pressure (mmHg)	66.05±9.24	69.06±10.73	64.63±8.16	0.025
Triglyceride (mg/dL)	81.13±6.80	184.88±6.44	115.66±5.79	0.001
Total cholesterol (mg/dL)	33.17±5.09	178.84±5.35	173.68±5.00	0.639
HDL-cholesterol (mg/dL)	49.34±17.47	40.65±11.73	53.42±18.29	0.001
LDL-cholesterol (mg/dL)	98.48±4.41	101.25±5.09	97.18±4.08	0.669
Glucose (mg/dL)	84.93±2.99	100.62±4.57	77.54±1.36	0.001

BMI: Body mass index, HDL: High density lipoprotein, LDL: Low density lipoprotein, SMI: Severe mental illness

Table 5: Distribution of different age groups in SMI with and without metabolic syndrome

Age groups (years)	Total subjects <i>n</i> (%)	Subjects with metabolic syndrome number (%)	Subjects without metabolic syndrome number (%)	<i>P</i>
29<	49 (100)	2 (4.08)	47 (95.92)	<0.001
30-39	99 (100)	22 (22.22)	77 (77.78)	<0.001
40-49	66 (100)	16 (24.24)	50 (75.76)	<0.001
50-59	44 (100)	12 (27.27)	32 (72.73)	<0.001
60-69	7 (100)	1 (14.38)	6 (85.72)	<0.001
69>	2 (100)	2 (100)	0 (0)	<0.001
Total	267 (100)	55 (100)	212 (100)	

SMI: Severe mental illness

prevalence of the metabolic syndrome is prevalent among patients with SMI in comparison to the general population. Studies showed that prevalence of metabolic syndrome was estimated to be 60% and 75% among schizophrenic and mood disorder patients, respectively.^[32] Recent studies of Heiskanen *et al.* indicated that prevalence of metabolic syndrome in patients with schizophrenia was 37% in comparison to the general population.^[16] Many other studies have reported prevalence of metabolic syndrome changes in patients with SMI in different populations such as Hong Kong (35%), USA (28.7-60%), Australia (54%), Canada (44.7%) and Finland (37.1%).^[16,18,33-36] Interestingly Asian population show a lower prevalence of metabolic syndrome in patients with SMI than Western populations. Studies on Taiwan and Thailand populations indicated that prevalence of metabolic syndrome in schizophrenia patients was 22% and 20%, respectively.^[37,38] Our results show that the prevalence of metabolic syndrome in patients with SMI in Gorgan is lower than western populations^[16,18,34-36] and almost similar to some other Asian countries.^[37,38] Study of McEvoy *et al.*, in the USA showed that elevated risk of metabolic syndrome in patients with SMI to be 138% and 251% for males and females, respectively.^[17] The results of this study demonstrate that lifestyle of patients with SMI in Gorgan are not the same as the western countries. Many studies have shown that unhealthy lifestyle and poor diet of these patients have an important role in etiology of the metabolic syndrome.^[2,39] SMI patients are at risk for metabolic syndrome, therefore, should be screened and identify to prevent probable future type 2 diabetes mellitus and CVDs. SMI show 2-3 times the incidence of higher type 2 diabetes mellitus and CVDs than the general population.^[25] A recent study in the USA indicated that all CVDs risk factors such as central obesity, hypertension, dyslipidemia, and hyperglycemia were higher in SMI than in the general population.^[40] Study of Lozano *et al.*^[41] revealed that deaths due to diabetes and CVDs are estimated to increase by 2020.^[41] The prevalence of metabolic syndrome in our sample of patients with SMI is lower than North American^[17,18] and European studies,^[13-16] these differences may be due to geographic differences. The lower prevalence of metabolic syndrome in these patients proposed that differences in lifestyle factors might

decrease susceptibility to metabolic syndrome in this area when it is compared to other populations. The influence of lifestyle factors such as physical activity and diet were not evaluated in this study. The 20.60% prevalence of metabolic syndrome is lower than the study from Australia (68%).^[42] The prevalence of metabolic syndrome in mental patients in Gorgan deserves more attention from health service providers. Elevated mortality is reported from psychiatric disorders such as schizoaffective, bipolar, and depressive disorders.^[43-45] In our study, the prevalence of metabolic syndrome was lower than some other studies in patients with bipolar disorder and psychotic depression.^[44,46-48] Our results suppose that psychiatric illness should be taking into account a risk factor for metabolic syndrome, which makes it necessary to screen people with any psychiatric disorder.^[49] The variation of metabolic syndrome prevalence among SMI were seen mostly in ages 50-59 years old in comparison to other age groups. Our results were not in agreement with some other studies.^[3,4,17,18] Our findings indicated that metabolic syndrome among these patients differs significantly from ages 30 up to 59 years old. In our study, the prevalence of metabolic syndrome was different between genders, which is in agreement with the findings of other studies.^[1,3-5,13-18,42,43,49-53] The onset of metabolic syndrome from an early age may increase the risk of CVDs in SMI. Cardiovascular risk factors treatment should be considered the main care in people with mental disorders in addition to screening for CVD risk factors.

CONCLUSION

Our results show that the prevalence of metabolic syndrome in patients with SMI in Gorgan is almost similar to those observed in Asian countries. The prevalence of metabolic syndrome was lower than western countries. These observations may be due to cultural differences in the region. It should be mention that the families of mental illness subjects in our country believe that their patients must be cared better than people without mental illness. These findings of this study suggest that mental illness patients are at risk of metabolic syndrome. According to our results, risk factors such as age and gender differences may play an important role in the presence of metabolic

syndrome. In our country, women do less physical activity than men. Hence, the incidence of metabolic syndrome may be higher among women.

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Conflicts of interest

There are no conflicts of interest.

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