ORIGINAL PAPER

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Prevalence of Metabolic Syndrome in the Hospitalized Psychiatric Patients

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ABSTRACT

Introduction: Metabolic Syndrome (MetS) is one of the most common syndromes that include a set of serious cardiovascular risk factors. MetS is highly prevalent in the high risk population and contributes to reduced lifespan. The primary goal of the study is to assess the prevalence of MetS and its relation to the treatment modalities and the psychiatric diagnosis. **Methods:** A cross-sectional study for the hospitalized patients in the Mental Health hospital in Taif city, Saudi Arabia that was conducted between Dec 2013 - Nov 2015. We included adult patients who were admitted to the inpatient service. We diagnosed MetS according to the new International Diabetes Federation (IDF) definition. **Results:** A total of 313 patients with mean age 48.4+10.8 years old, the majority were male and single, 68.3% have high school degree or less, mean BMI in the overweight range, and mean waist circumference 96.5+14.0 cm. Compared to these without MetS, those with MetS more likely to have BMI and waist circumference (P <0.001), higher SBP (P 0.028), have diabetes, hypertension and hyperlipidemia (all P <0.001), longer inpatient hospitalization (P 0.0036), report sedentary lifestyle (P 0.733), consume soft drink on a daily basis (P 0.030), and were active smoker (P 0.002). Those with MetS were less likely to be on Haloperidol and valproic acid (P 0.026). **Conclusion:** 39% of the participated hospitalized patients met the criteria for MetS and they tends to have significantly higher adiposity measures, cardiovascular markers, more likely to have comorbid conditions, and be active smokers.

Keywords: Metabolic syndrome, MetS, psychiatric, inpatient.

1. INTRODUCTION

Metabolic Syndrome (MetS) is one of the most common syndromes that include a set of serious cardiovascular risk factors includes central obesity, dysglycemia, high cholesterol level and elevated blood pressure (1-2). The mean prevalence of MetS in the general population is 13 %; but it's higher in the Gulf area than most western countries. Women are more likely to have MetS 37.4% than men 28.95% (3). MetS do increase the risk of long-term complications such as cardiovascular diseases (CVD), type 2 Diabetes mellitus (T2DM) and mortality (4, 5).

MetS is highly prevalent in the high risk population as a recent study showed that 46 % of the acute coronary syndrome (ACS) patients in the Gulf area have MetS (6, 7). It is even associated with worse outcome in such patients as it increased the risk of heart failure and recurrent myocardial ischemia (6). Previous study has showed that patients with history of MetS were more likely to self-report history of stroke 43.5% compared to those without MetS (8).

Most common mental condition is mixed anxiety and depression disorders which are more common in women (9, 10). Schizophrenia occurs throughout the world and the prevalence of schizophrenia almost reaches 1% internationally (11). In 2013, a previous local study on 430 medical records of patients at Mental Health Hospital, Taif, Saudi Arabia has conducted and the result was 60.7% of those patients had a history of drug addiction and 88.8% of them were diagnosed with schizophrenia (12). Although the prevalence of bipolar disorder in the Arab world is estimated to be 1-5% which is similar to the one reported worldwide.

In a study which evaluated the prevalence of MetS in a 100 patients attending psychiatric day centers showed that 55% met the criteria for MetS with similar prevalence rates between those with psychotic and non-psychotic disorders (13). A cross-sectional study evaluated the prevalence of MetS in community psychiatric nurses showed that they have a double relative risk of developing MetS in comparison with the

general population. In the same study, the first generation antipsychotics were significantly associated with MetS (14).

MetS contributes to reduced lifespan, causing distress, and functional impairment of the affected individuals. It is thought that the MetS is common in patient who were admitted to the psychiatric hospital especially those started on anti-psychotic but there is still a lack of study to identify the size of problem is Saudi Arabic and more specifically in Taif city. The primary goal of the study is to assess the prevalence of MetS and the medical comorbidities among the hospitalized patients with mental illness in Taif, Saudi Arabia. Also we will assess its relation to the treatment modalities and the psychiatric diagnosis.

2. GOAL

The primary goal of the study is to assess the prevalence of MetS and the medical comorbidities among the hospitalized patients with mental illness in Taif, Saudi Arabia. Also we will assess its relation to the treatment modalities and the psychiatric diagnosis.

3. MATERIAL AND METHODS

A cross-sectional study for the hospitalized patients in the Mental Health hospital in Taif city, Saudi Arabia that was conducted between Dec 2013 - Nov 2015. We included male and female patients who were > 18 years old and who were admitted to the inpatient service. We excluded unconscious patients and those with incomplete clinical data.

Study proposal was submitted to Taif University School of Medicine Ethical Committee and was approved.

Researchers collected the personal data, admitting diagnosis, past medical history and medication information. Data about the duration of the psychiatric illness and documented substance abuse were also collected. Data about exercise and self-image also were assessed.

The waist circumference (WC) was taken according to WHO STEPS protocol which is through measuring the near midpoint between the lower margin of the last profound rib and the top of the iliac crest. Each patient's height and weight were measured and Body Mass Index (BMI) was calculated. BMI classified according to World Health Organization (WHO) classification into underweight (<18.5 kg/m2), healthy weight (18.5-24.9 kg/m2), overweight (25-29.9 kg/m2), and obese (30 kg/m2).

We collected laboratory data from the patients` files using the medical record number and name. This includes fasting plasma glucose (FPG), triglyceride (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL), and total cholesterol.

We diagnosed MetS according to the new International Diabetes Federation (IDF) definition, as following:

* Central obesity (defined as WC ≥ 94cm for men and ≥ 80cm for women);

Plus any two of the following four risk factors:

• TG level: ≥ 150 mg/dL or specific treatment for this lipid abnormality.

• HDL cholesterol: < 40 mg/dL in males and < 50 mg/dL in females, or specific treatment for this lipid abnormality.

•Systolic blood pressure (SBP) ≥ 130 or diastolic blood pressure (DBP) ≥ 85 mm Hg, or treatment of previously diagnosed hypertension (HTN).

•FPG ≥ 100 mg/dL, or previous T2D diagnosis.

Data were collected and analyzed using the Statistical Package for the Social Sciences (SPSS) software V20. Frequencies and percentages were used for each variable; The Chi squared test was used to study the relationship between variables and the T-test was used to compare between means.

4. RESULTS

A total of 313 patients with mean age 48.4+10.8 years old, the majority were male and single, 68.3% have high school degree or less, mean BMI in the overweight range, mean waist circumference 96.5+14.0 cm, most of them report sedentary lifestyle with only 5.3% exercising > 100 min per week (Table 1). Although 88.4% of them believe that exercise is important to health but only 13.8% attending the hospital gym. Majorities underesti-

Baseline characteristics (N=313)	
Mean age (yrs)	48.4+10.8
Male (%)	76.3
Single (%)	73.7
High school degree or less (%)	68.3
Mean weight (Kg)	70.1+16.4
Mean BMI (Body Mass Index) (Kg/m2)	26.5+6.2
Mean WC (waist circumference) (cm)	96.5+14.0
Mean SBP (Systolic Blood Pressure) (mmHg)	120+16.1
Mean DBP (Diastolic Blood Pressure) (mmHg)	75.1+11.8
Mean pulse rate (bpm)	86.9+16.1
Metabolic syndrome (%)	39.0
Diabetes (%)	13.7
Hypertension (%)	22.5
Hyperlipidemia (%)	26.1
Documented substance abuse (%)	11.8
Medications	
Beta-blocker (%)	10.2
ACEi(Angiotensin Converting Enzyme Inhibitors)/ ARB (Angiotensin Receptor Blockers) (%)	2.9
Metformin (%)	10.5
Sulfonylurea (%)	0.7
Insulin (%)	1.5
Statin (%)	24
Psychiatric Data	
Mean duration of Mental Health hospitalization (years)	12.7+7.6
Schizophrenia (%)	74.9
Bipolar (%)	1.4
Personality disorders (%)	1.4
Other psychiatric diagnosis (%)	22.3
Typical antipsychotic agent (%)	38.0
Both typical and atypical antipsychotic (%)	20.1
SSRI (Selective Serotonin Reuptake Inhibitors) (%)	5.4
TCA (Tricyclic Antidepressants) (%)	5.4

SNRI (Serotonin Norepinephrine Reuptake Inhibitors) (%)	1.5
Olanzapine (%)	20.2
Risperidone (%)	20.3
Haloperidol (%)	39.8
Chlorpromazine (%)	15.8
Aripiprazole (%)	13.5
Quetiapine (%)	12.6
Trifluoperazine (%)	5.7
Valproic acid (%)	18.6
Carbamazepine (%)	17
Lithium (%)	1.8
Laboratory Data	
Mean total cholesterol (mg/dl)	164.4+34.7
Mean LDL (Low Density Lipoprotein) (mg/dl)	99.0+30.9
Mean HDL (High Density Lipoprotein) (mg/dl)	47.0+13.8
Mean triglyceride (mg/dl)	112.2+65.6
Mean creatinine (mg/dl)	0.84+0.2
Mean fasting glucose (mg/dl)	96.0+63.4
Lifestyle habits	
Sedentary lifestyle (%)	83.1
Exercise > 100 min per week (%)	5.3
Believe that exercise is important to health (%)	88.4
Attending the hospital gym (%)	13.8
Underestimate his/her weight (%)	76.6
Believe that obesity is a risk for someone health (%)	74.8
Daily soft drink consumption (%)	59.4
Active smoking (%)	55.6
Duration of smoking (years)	21.5+11.2

mate their weight while believe that obesity is a risk for someone health. More than half of the patients consume soft drinks daily and were active smoke.

Table 1. Baseline characteristics of the whole cohort

Most common comorbidities were hyperlipidemia, hypertension and diabetes respectively. The most common prescribed antihypertensive medication was beta blocker while the metformin was the most common antidiabetic medications. The mean pulse rate, mean SBP and mean DBP were within normal limits. Statin was prescribed for one-fourth of the patients with optimal lipid control.

The most common psychiatric diagnosis is schizophrenia with a mean duration of Mental Health inpatient hospitalization of 12.7+7.6 years. The most common prescribed psychiatric medications group was typical antipsychotics with Haloperidol been the most commonly prescribed. The risperidone and olanzapine was the most common atypical antipsychotics medications while only 13.5% were on aripiprazole. The most common prescribed mood stabilizer was valproic acid.

Out of all the patients 39.0% met the criteria of MetS (Table 2). Compared to these without MetS, those with MetS more likely to have high weight, BMI and waist circumference (all P <0.001), higher SBP (P 0.028), have diabetes (P 0.001), hypertension and hyperlipidemia (all P <0.001), be on beta-blocker (P <0.001), be on metformin (P 0.003), be on statin (P <0.001), be on insulin (P 0.014), and longer inpatient hospitalization (P 0.0036). Those with MetS were less likely to be on Haloperidol (P 0.026) and valproic acid (0.026) when compared to those with-

	MetS	No MetS	P value
Total participants (%)	39.0	61.0	n/a
Mean age (yrs)	48.5+9.4	48.3+11.7	0.908
Male (%)	77.1	75.8	0.799
Single (%)	70.6	76.1	0.377
High school degree or less (%)	70.2	66.9	0.17
Mean weight (Kg)	76.0+16.9	66.2+15.0	<0.001
Mean BMI (Body Mass Index) (Kg/m2)	29.0+5.3	25.2+6.2	<0.001
Mean waist circumference (cm)	103.5+12.0	92.0+13.4	<0.001
Mean SBP (Systolic Blood Pressure) (mmHg)	122.8+20.0	118.2+12.7	0.028
Mean DBP (Diastolic Blood Pressure) (mmHg)	76.2+10.8	74.4+12.3	0.185
Mean pulse rate (bpm)	87.1+15.1	86.7+16.7	0.837
Diabetes (%)	23.2	7.3	0.001
Hypertension (%)	37	12.1	<0.001
Hyperlipidemia (%)	39.6	16.7	<0.001
Documented substance abuse (%)	15.6	9.2	0.109
Medications			
Beta-blocker (%)	19.1	4.2	<0.001
ACEi(Angiotensin Converting Enzyme Inhibitors)/ ARB(Angiotensin Receptor Blockers) (%)	3.7	2.4	0.549
Metformin (%)	17.3	6.1	0.003
Sulfonylurea (%)	0.9	0.6	0.772
Insulin (%)	3.6	0.0	.014
Statin (%)	37.3	15.2	<0.001
Psychiatric Data			
Mean duration of Mental Health hospitalization(yrs)	13.8+8.1	12.0+7.2	0.036
Schizophrenia (%)	78.1	72.9	
Bipolar (%)	0.9	1.7	
Personality disorders (%)	2.6	0.6	0.503
Other psychiatric diagnosis (%)	18.4	24.8	
Typical antipsychotic agent (%)	35.1	39.9	
Both typical and atypical antipsychotic (%)	18.0	21.4	0.575
SSRI (Selective Serotonin Reuptake Inhibitors) (%)	4.5	6.2	0.596
TCA (Tricyclic Antidepressants) (%)	6.3	4.8	0.600
SNRI (Serotonin Norepinephrine Reuptake Inhibitors) (%)	1.8	1.2	0.681
Olanzapine (%)	17.2	22.2	0.306
Risperidone (%)	17.1	22.4	0.272
Haloperidol (%)	31.9	45.0	0.026
Chlorpromazine (%)	12.6	17.9	0.231
Aripiprazole (%)	14.8	11.8	0.309
Quetiapine (%)	11.8	13.1	0.754
Trifluoperazine (%)	5.4	6.0	0.833
Valproic acid (%)	11.7	23.2	0.016
Carbamazepine (%)	14.4	18.7	0.355

Lithium (%)	2.7	0.01	0.316
Laboratory Data			
Mean total cholesterol (mg/dl)	168.9+36.9	161.4+32.9	0.064
Mean LDL (Low Density Lipoprotein) (mg/dl)	104.3+31.9	95.3+29.8	0.018
Mean HDL (High Density Lipoprotein) (mg/dl)	42.3+12.6	50.2+13.8	<0.001
Mean triglyceride (mg/dl)	142.9+75.1	91.8+49.1	<0.001
Mean creatinine(mg/dl)	0.87+0.2	0.81+0.2	0.017
Mean fasting glucose (mg/dl)	112.7+96.6	85.0+15.9	0.002
Lifestyle habits			
Sedentary lifestyle (%)	84.9	81.9	
Exercise > 100 min per week (%)	4.2	6.0	0.733
Believe that exercise is important to health (%)	88	88.7	0.869
Attending the hospital gym (%)	14.9	13.2	0.669
Underestimate his/her weight (%)	79.0	75	0.487
Believe that obesity is a risk for someone health (%)	79.6	70.7	0.135
Daily soft drink consumption (%)	66.9	54.6	0.030
Active smoking (%)	66.4	48.3	0.002
Duration of smoking (years)	20.8+11.6	22.1+11.8	0.497

out MetS. Otherwise no significant difference was found between groups in regards to the psychiatric diagnosis or medications.

Table 2. Comparison of the whole group based on the metabolic syndrome (MetS) diagnosis

Regarding the laboratory data, those with MetS were more likely to have higher LDL (P 0.018), higher triglyceride (P <0.001), lower HDL (P <0.001), higher creatinine level (P 0.017), and higher fasting blood glucose (P 0.002). Regarding the lifestyle habits, those with MetS were more likely to report sedentary lifestyle (P 0.733), consume soft drink on a daily basis (P 0.030), be active smoker (P 0.002), believe that obesity represent a health hazard (P 0.135), and underestimate their weight (P 0.487).

Partial correlation between MetS and antipsychotics showed marginally significant positive correlation (r 0.131, P 0.056) and non-significant positive correlation between MetS and the history of substance abuse; when adjusting for age, gender, hospitalization duration, BMI, physical activity and smoking.

5. DISCUSSION

Our study showed that 39% of the screened patients have MetS. An Iranian study was done among 267 patients who were admitted to the psychiatric unit showed that MetS is commonly associated with cardiovascular diseases and psychiatric mental illness (15). A study conducted as community-based national epidemiological health over a 5-year period in 1995 in Saudi Arabia showed the overall age-adjusted prevalence of MetS is

39.3% (16). Korean nationwide study with limited exclusion criteria to investigate the prevalence of MetS and its relationship with antipsychotics medications showed a prevalence of 36.5% in all patients and was significantly higher in men than women (17).

There is a strong relation between Schizophrenia, Bipolar and Personality disorders and MetS as shown in our results. A retrospective review showed that patients with severe mental illnesses, mostly schizophrenia and chronic mood disorders have higher prevalence of MetS compared with the general population (18). A study of three cross-sectional surveys including clinical health measures in rural regions of Australia during 2004-2006 showed that MetS was associated with major depressive disorder (19).

Our study showed that being a single male with means BMI in the overweight range and sedentary lifestyle significantly increase the risk of seeing positive results. A cross-sectional analysis of 1902 men and 1932 women whom 50-69 years of age in France showed that the frequency of most MetS components increased with spending most of the time in front of the TV or using the computer and decreased with increasing physical activity levels (20).

Smoking increases the risk of MetS among psychiatric patients, as shown in our study that 66.4% were active smoker. Recent study showed that the risk of evolving MetS in smokers (especially those with more than 20 pack-years) was 1.9 (95% CI 1.1-3.7) compared to non-smokers (21).

The role of psychiatric medications especially Haloperidol and Valproic Acid were significantly high in patients with MetS compared to those without MetS. It was shown that weight gain commonly accompanied by drug treatment of psychiatric disorders and is often lead to increase the appetite or food hunger (22). Although in our study those with MetS were less likely to be on Valproic Acid, this may explained by excess risk on other antipsychotics medications.

Our weakness includes single center and cross sectional study design while our strengths includes large sample size, comprehensive laboratory and clinical data.

6. CONCLUSION

This 39% of the participated hospitalized patients met the criteria for MetS. Those with MetS tends to have significantly higher BMI, WC, and LDL and more likely to have comorbid conditions and be active smokers. Non-significant positive correlation were found between MetS and both psychiatric diagnosis and the treatment modalities.

Drafting the article and revising it critically for important intellectual content. KA, AKA, IA, AAA, BA, TM: Final approval of the version to be published.

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