

Metabolic Syndrome, and Cardiovascular Risk among Mentally Ill Patients

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Abstract

Patients with serious mental illness have an increased prevalence of the metabolic syndrome in comparison to the general population. Metabolic syndrome is a constellation of cardiovascular risk factors including diabetes, hypertension, obesity and dyslipidemia. It is potentially reversible and may explain the higher incidence of cardiovascular disease in patients with serious mental illness. The aim of the study is to see the prevalence of metabolic syndrome among mentally ill patients and what might be the underlying the cause behind the scene A descriptive, retrospective study was conducted at mental health clinic, Batticaloa, Teaching Hospital (BTH), Sri Lanka. The data were collected over a period of two months from 15th of October to 15th of December 2017. Data were harvested from the medical records. Total 55 mentally ill patient's medical records were analyzed for this study. Out of 55, females were 30 (54.5%) and males were 25 (45.5%). Furthermore, 30 (54.5%) patients had an evidence of metabolic syndrome. The association of metabolic syndrome among male and female was not statistically significant ($P > 0.05$). In this study, metabolic syndrome is more prevalent among, patient with trifluoperazine (70%) drug group, risperidone (66.6%) and olanzapine (53.12%).

Keywords

Metabolic Syndrome, Cardiovascular Risk and Anti-Psychotic Medications

1. Introduction

Mentally ill health patients such as depression, schizophrenia, and bipolar disorders has been associated with wide range of metabolic derangement including metabolic syndrome and increased prevalence of cardiovascular risk such as ob-

esity, dyslipidemia and diabetes or prediabetes. The prevalence of metabolic syndrome in patients with antipsychotic medications is higher than that seen in general population [1].

Metabolic syndrome is defined as a clustering of risk factors including cardiovascular risk and diabetes. Several criteria are for diagnosing metabolic syndrome. Metabolic syndrome is a set of risk factors that include abdominal obesity, a decreased ability to process glucose (insulin resistance), dyslipidemia and hypertension. Patients who have this syndrome have been shown to be at an increased risk of developing cardiovascular disease and type 2 diabetes.

Several organ systems are affected, including muscle, adipose, hepatic, nervous, and adrenal tissues, but from a clinical standpoint, the most important site of impact is the vasculature. Cumulative effects of classical risk factors such as pre-diabetes, dyslipidemia, and hypertension very likely contribute to increased risk of cardiovascular disease seen in individuals with the metabolic syndrome [2]. Insulin resistance is a major contributor to glucose intolerance, and the lipoprotein abnormalities seen in the metabolic syndrome are also expectable. Furthermore, with resistance to insulin, unrestrained lipolysis leads to increased delivery of free fatty acids to the liver for triglyceride (TG) synthesis and packing into very low-density lipoprotein (VLDL) particles. Higher VLDL levels contribute to lower HDL levels because of the reciprocal exchanges between these lipoproteins mediated by cholesterol ester transfer protein [2].

The prevalence of overweight or obese in individuals with mentally ill patient has generally been believed to be greater than in individuals without the disorder [3]. However, regarding an increased risk for metabolic syndrome, not just obesity itself but rather increased central obesity or visceral adiposity is thought to pose the greatest risk for development of type 2 diabetes, dyslipidemias, and other cardiovascular complications [3]. A descriptive retrospective study was conducted by Umakanth M *et al.*, which revealed that nearly two-thirds of the mentally ill population 29 (63.1%) were found to be overweight 21 (45.7%) and 8 (17.4%) were obese [4].

According to guidelines used by National Cholesterol Education Programme expert panel on detection, evaluation and treatment of high blood cholesterol in adults (Adult Treatment Panel III) (NCEP-ATP III), metabolic syndrome consist of three or more risk factors out of following risk factors such as a waist circumference that measures at least 35 inches (89 centimeters) for women and 40 inches (102 centimeters) for men, high triglyceride level, 150 mg/dL (1.7 mmol/L), or higher of this type of fat found in blood, reduced high-density lipoprotein (HDL) cholesterol, less than 40 mg/dL (1.04 mmol/L) in men or less than 50 mg/dL (1.3 mmol/L) in women, increased blood pressure, 130/85 mmHg or higher and elevated fasting blood sugar, 110 mg/dl or higher.

There are strong association between mental illness and metabolic syndrome including diabetes irrespective of whether patient taking antipsychotic or not. Compare with normal population, risk of developing metabolic syndrome in patient with mentally ill is twofold high [5]. The prevalence of metabolic syndrome

varies with different countries it range from 3.6% to 68% [1]. Compare with older antipsychotics, atypical antipsychotics are less side effects and patients friendly and number of study proven it [3]. An interventional study conducted in UK, it has clearly shown that patient on haloperidol show more adipose tissue fat than those who were in olanzapine [5]. Another study conducted in Poland, compare with risperidone, olanzapine cause more metabolic derange. The aim of the study is to see the prevalence of metabolic syndrome among mentally ill patients and what might be the underlying the cause behind the scene.

2. Methodology

A descriptive, retrospective study was conducted at mental health clinic in the Batticaloa, Teaching Hospital (BTH), Sri Lanka. Data were harvested from the medical records. The validated questionnaire was used to collect information of the patients. The questionnaire was pre-tested among 10 patients' data at mental health clinic at BTH. The changes were made where necessary to enhance comprehensibility and appropriateness. All most all the data were made available by the medical team when patients come with their relatives for their routine clinic visit. Even though most of mentally ill patients are stable mind with their medications, however demographic data were collected with help of their relatives. First part of the questionnaire contained questions related to demographic data including address, sex, age, body weight, waist circumference and BMI. Second parts of the questionnaire contained blood sugar, recorded blood pressure, triglyceride, total cholesterol and high-density lipoprotein levels. This was the routine blood checkup, doing regular basis at mental clinic. Each and every time, procedure was explained and got consent from the patients and relatives. As we did retrospective study based on patients' medical records, we did not contact with the patients or relatives. The data were collected over a period of two months from 15th of October to 15th of December 2017. We included all mentally ill patients with antipsychotic medications for at least three month of clinic follow-up. We excluded patients' age of less than 16 years and more than 69 years old, patients with inadequate data and patients with antipsychotic medications for less than three months duration.

BMI was further categorized into underweight ($\text{BMI} < 18.5 \text{ kg/m}^2$), normal ($\text{BMI} 18.5 \text{ to } 24.9 \text{ kg/m}^2$), over-weight ($25.0 \text{ to } 29.9 \text{ kg/m}^2$) and obese ($\text{BMI} \geq 30.0 \text{ kg/m}^2$). With available data metabolic syndrome was established as follows, it consist of three or more risk factors out of following risk factors such as a waist circumference that measures at least 35 inches (89 centimeters) for women and 40 inches (102 centimeters) for men, high triglyceride level, 150 mg/dL, (1.7 mmol/L), or reduced high-density lipoprotein (HDL), less than 40 mg/dL (1.04 mmol/L) in men or less than 50 mg/dL (1.3 mmol/L) in women, increased blood pressure, 130/85 mmHg or higher and elevated fasting blood sugar, 100 mg/dl or higher. The approval was taken from the head of the institution. All statistical analysis was performed using Statistical Package for Social Sciences (SPSS V.21).

3. Results

Total fifty-five mentally ill patient's medical records were analyzed for this study. Out of 55, females were 30 (54.5%) and males were 25 (45.5%). Interestingly, more than 50% of mentally ill populations were in the age group of 30 - 49. Furthermore, nearly half of the population 26 (47.3%) were under category of over-weight and only 10 (18.2%) were obese. Out of 55, 10 (18.2%) patients were diagnosed as pre-diabetes and diabetes while, six (10.9%) patients had hypertension. Moreover, 32 (58.2%) of population had increased to talcholesterol (more than 200 mg/dl), and 39 (70.9%) of population had increased triglyceride (more than 150 mg/dl). Patient were on various anti-psychotic medications, such as olanzapine 32 (58.2%), risperidone 24 (43.6%), and trifluoperazine 20 (36.4%). In this study, metabolic syndrome is more prevalent among, patient with trifluoperazine (70%) drug group than risperidone (66.6%) and olanzapine (53.12%). Finally, 30 (54.5%) patients had an evidence of metabolic syndrome (**Table 1**). The association of metabolic syndrome among male and female were not statistically significant ($P > 0.05$).

4. Discussion

The Teaching hospital Batticaloa is the largest hospital in the eastern part of the Sri Lanka, it has well organized psychiatric unit and conducting twice a week clinic in the hospital. In both clinic around 100 mentally-ill patients are getting treatment in regular basis. This amount is fairly higher compare with other area of our eastern province. In this study, prevalence of metabolic syndrome among mentally ill patient is 54.5%. However, the prevalence for the metabolic syndrome among the general population of US, adults is approximately 24% [2]. However, two cross-sectional studies revealed that 60% prevalence of metabolic syndrome was observed among schizophrenic patients and a 75% prevalence rate was estimated among mood disorder patients of Hispanic origin [6]. Furthermore, metabolic syndrome is highly prevalent in patients with schizophrenia with reported prevalence that ranges from 10.1% to 69.3% [6]. In Singapore, the prevalence of metabolic syndrome in the community had been reported to range from 17.7% to 26.2% [7]. Unfortunately, prevalence of metabolic syndrome in the normal population is not evaluated in Sri Lanka. However, in US and Singapore it was ranged from 17.7% to 26.2% [7]. Furthermore, prevalence of metabolic syndrome is increased by two-fold in mentally ill population. The reason behind this is mentally ill condition itself and medications. There is a considerable literature on the metabolic adverse effects of antipsychotic agents and, in particular, second generation antipsychotics (SGAs) appear to induce more weight gain and metabolic abnormalities than first generation antipsychotics (FGAs) [8]. However, in this study metabolic syndrome is more prevalence among trifluoperazine (70%) drug group than risperidone (66.6%) and olanzapine (53.12%). Several studies revealed that, second generation antipsychotics has been associated with increased prevalence of metabolic syndrome [9].

Table 1. Sex, age, BMI, fasting blood sugar, total cholesterol, triglyceride, high density cholesterol, waist circumference, hypertension and metabolic syndrome percentage among mentally ill patients.

Category	N	(%)
Sex		
Male	25	45.5
Female	30	54.5
Age		
20 - 29	7	12.7
30 - 39	21	38.2
40 - 49	10	18.2
50 - 59	17	30.9
BMI		
Under-weight	6	10.9
Normal	13	23.6
Over-weight	26	47.3
Obese	10	18.2
Fasting blood sugar		
Normal (less than 99 mg/dl)	45	81.8
Pre-diabetes (100 - 125 mg/dl)	8	14.5
Diabetes	2	3.6
Total cholesterol (TC)		
Less than 200 mg/dl	23	41.8
More than 200 mg/dl	32	58.2
Triglyceride (TG)		
Less than 150 mg/dl	16	29.0
More than 150 mg/dl	39	70.9
High-density lipoprotein (HDL) Male		
Less than 40 mg/dl	8	32
More than 40 mg/dl	17	68
High-density lipoprotein (HDL) Female		
Less than 50 mg/dl	14	46.
More than 50 mg/dl	16	53.3
Waist circumference (Male)		
More than 102 cm	10	40
Less than 102 cm	15	60
Waist circumference (Female)		
More than 89 cm	22	73.3
Less than 89 cm	08	26.6
Hypertension		
Less than 130/80 mmHg	45	89.0
More than 130/80 mmHg	6	10.9
Metabolic syndrome		
Present	30	54.5
Absent	25	45.5

In this study, only 10 (18.2%) of the population had blood sugar above 100 mg/dl. However, similar study was reported that the prevalence of type-2 diabetes was the same in young people with schizophrenia and their healthy peers [10]. Furthermore, a study conducted in UK, where increased risk of diabetes among mentally ill patients was reported [11] [12]. Increased cardio vascular disease (CVD) morbidity is also found in patients with mental disorders other than schizophrenia. In a sample of adult with psychotic symptoms, the risk for CVD was increased by 60% - 70% in patients with mood disorder or post-traumatic stress disorder (PTSD) relative to the Framingham 10-year risk of CVD (10). Even though metabolic syndrome and cardiovascular risks are common among mentally ill patient, but we don't have any statistical report. According to this study, 32 (58.2%) of population had increased TC (more than 200 mg/dl), and 39 (70.9%) of population had increased TG (more than 150 mg/dl). Early detection of metabolic syndrome reduces the incidence of cardiovascular risk including diabetes, hypertension and cholesterol in future.

5. Conclusion

Patients with severe mental illnesses, particularly schizophrenia and mood disorders, have proved a higher prevalence of metabolic syndrome or its components compared with the general population. Regular monitoring of all features of metabolic syndrome is the cornerstone of its early detection and management. There is an urgent need to develop and implement effective programs to increase life expectancy in mentally ill patients. Further studies could examine the efficacy and effectiveness of weight-reducing interventions in lowering the risk for metabolic syndrome and subsequent cardiovascular-related morbidity and mortality in patients with mentally ill.

Limitation of the Study

There are number of limitations of this study, all most all data were collected from the medical records, unfortunately we didn't get smoking and alcohol details. We didn't compare the cardiovascular risk factors before and after starting anti-psychotic medication. Finally, we collected data from medical records those who are in anti-psychotic medications rather than different psychiatric disorder. As second generation antipsychotic medications are expensive and limited availability, most of our mentally ill patients are on first generation of anti-psychotic medications.

Availability of Data and Material

All data gathered during this study are included in this published article.

Competing Interests

The author declares that no competing interests.

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