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Original Research

The effect of the COVID-19 pandemic period on the prevalence of metabolic syndrome in patients with schizophrenia and bipolar disorder

Metabolic syndrome and COVID-19 Pandemic Period

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Abstract
Aim: This study aimed at investigating the impact of COVID-19 lockdown on metabolic profile in bipolar disorder and schizophrenia patients at the time of COVID-19.
Material and Method: This study was completed with 190 individuals diagnosed with schizophrenia (116) and bipolar disorder (74). Waist circumference and blood pressure measurements were taken on the same date as triglyceride, glucose and HDL data in the electronic recording system of the participants. Initial assessment data are measurements within 3 months prior to the publication of the first case in Turkey. The second evaluation data, on the other hand, is the data obtained within 3 months after the date of removal or relaxation of the restrictions, which is defined as the normalization period.
Results: A significant increase was observed in the incidence of metabolic syndrome in the participants after the COVID-19 lockdown. In addition, a significant increase in glucose, triglyceride and diastolic blood pressure values, and a significant decrease in HDL values were detected. There was no significant change in systolic blood pressure and waist circumference values.
Discussion: It has been shown that the COVID-19 lockdown increases the incidence of metabolic syndrome in patients with schizophrenia and bipolar disorder and causes irregularities in metabolic syndrome parameters.

Keywords
Metabolic Syndrome, Schizophrenia, Bipolar Disorder, COVID-19 Lockdown

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Introduction

The recent novel coronavirus-2019 (COVID-19) worldwide pandemic emerged as a pneumonia pandemic in China in December 2019 [1]. The first case of coronavirus emerged in Turkey on 11 March 2020, and on the same date the World Health Organization declared a pandemic [2]. The government of Turkey enforced many measures to mitigate the spread of COVID-19, such as enforcing spatial distancing, the use of medical face masks, closing schools, and encouraging self-isolation [3]. In addition to these, governments and national health authorities have acted swiftly, recommending 'isolation' policies and/or various levels of social restraint/isolation to reduce the infection rate [4]. Like many countries, a strict lockdown has been declared in Turkey to practice social distancing and prevent the spread of infection [5].

These restrictions were initially considered the most effective way to prevent the spread of the infection. However, over time, it was seen that they brought some problems with them. Motor inactivity, changes in sleep and eating patterns, less exposure to daylight, and disruption in medical controls have led to the emergence of some metabolic problems or worsening [6].

According to the definition of the International Diabetes Federation, metabolic syndrome (MetS) is defined by a combination of abdominal obesity, high blood pressure, low high-density lipoprotein cholesterol (HDL-C), high triglycerides and hyperglycemia [7].

Metabolic syndrome now affects more than a billion people throughout the world based on current estimates [8]. Although MetS affects almost every part of society, it is even more important for individuals with serious mental illnesses (SMI) such as schizophrenia (SCH) and bipolar disorder (BD). This population has a greater risk of early all-cause mortality than the general population. Epidemiological studies show that patients with severe mental illness have a decreased life expectancy of 7-24 years. About 60% of the mortality in psychiatric patients is due to physical comorbidities, mainly cardiovascular diseases [9]. All components of the metabolic syndrome are shown as independent risk factors for cardiovascular disease [10].

It is known that social isolation, physical inactivity and metabolic problems are common in BD and SCH patients. However, the effects of the quarantine period on this patient group have not been investigated. The aim of this study was to examine the effect of the first pandemic period on metabolic syndrome prevalence and metabolic parameters such as Blood pressure, Glucose levels, abdominal obesity in patients with sch and BD. Knowing the effect of the COVID-19 lockdown period on metabolic parameters will provide data for such situations that may occur in the future and help to take the necessary precautions in advance.

Material and Methods

Participants

This study was completed with 190 individuals diagnosed with SCZ (116) and BD (74) according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). The inclusion criteria of the participants were defined as a continuation of at least 1 year of disease treatment at Fatih Community Mental Health Center and being over 18 years old. The interview team consisted of a psychiatrist and an occupational therapist. Verbal informed consent was obtained from the participants or their caregivers before inclusion in the study. Ethics committee approval (2020-194) was obtained in accordance with the principles of the Declaration of Helsinki before starting the study.

Assessments

Demographic Profile

Participants' age, gender, educational status, employment status, marital status, presence of chronic disease, and diagnosis of psychiatric disease were questioned.

Diagnosis of the Metabolic Syndrome

In the study, the diagnosis of metabolic syndrome was made in accordance with the definition set by the National Cholesterol Education Program-Adult Treatment Panel-III [11]. According to this definition, five criteria are shown for diagnosing metabolic syndrome. 1) Fasting blood glucose above 110 mg/dL, 2) Arterial blood pressure above 130/85 mmHg, 3) Waist circumference over 102 cm in men and 88 cm in women, 4) Serum triglyceride (TG) level > 150 mg/ dl, 5) Serum HDL concentration is <40 mg/ dl for male individuals and <50 mg/dl for female individuals. In addition, a criterion for metabolic syndrome was considered to be met if the individual was receiving antihypertensive therapy, insulin or hypoglycemic therapy, TG-lowering therapy, and/or HDL-raising therapy.

Procedure

The data of the participants, collected in two different periods, were obtained from the electronic recording system and from the waist circumference and blood pressure measurements.

First assessment: The first case in Turkey was seen on March 11, 2020, and after which partial and full lockdowns were applied to individuals according to age groups. Initial assessment data are data for the 3 months before the first case release.

Second assessment: The normalization period or new normal period refers to the period when restrictions were lifted or relaxed in Turkey on May 11, 2020. Data were collected within 3 months after 11 May 2020.

Statistical Method

Data analysis was done with SPSS version 22. Descriptive statistics (mean, standard deviation (SD) and frequency) were calculated for all demographic and clinical variables. The dependent sample t-test and Wilcoxon T-test were used to examine the relationship between continuous variables. The McNemar test was used in the analysis of categorical metabolic syndrome criteria. The limit of significance was chosen as $p \leq 0.05$ for all statistics.

Results

SCZ was diagnosed in 61.1% of the participants and 38.9% were patients with BD; 64.2% of the patients were male; 62.1% of the participants did not receive post-primary education, 78.4% were single, 83.7% were not working and 77.9% had no chronic diseases. The mean age of the participants was calculated as 43.52 years (SD=12.15) and their sociodemographic characteristics are presented in Table 1.

There was no significant difference in the number of participants with low HDL (HypoHDL), high blood pressure (hypertension), high glucose (hyperglycemia), and high waist

circumference before and after COVID-19 lockdown (p=0.472, p=0.063, p=0.824, p= p= 0.501). On the contrary, a significant increase was observed in the incidence of high TG (hyperTG) and metabolic syndrome (p=0.010, p=0.0008). (Figure 1).

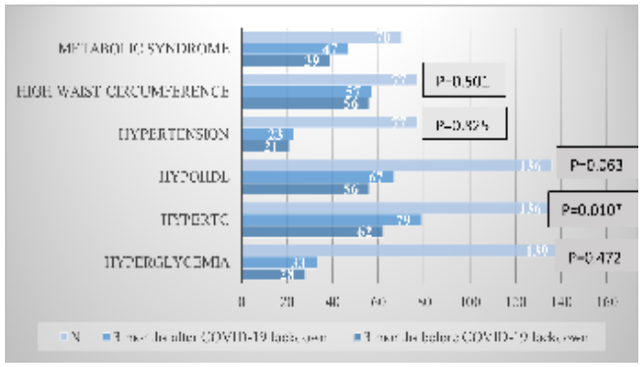


Figure 1. Comparison of metabolic syndrome criteria 3 months before and 3 months after COVID-19 lockdown

Table 1. Sociodemographic characteristics

Descriptive Variables	N	%
Gender		
Female	104	62.7
Male	62	37.3
Educational status		
Primary school	109	65.7
High school	35	21.1
University	22	13.3
Marital status		
Single	128	77.1
Married	38	22.9
Occupational status		
Unemployed	142	85.5
Working	24	14.5
Diagnosis		
Schizophrenia	106	63.9
Bipolar disorder	60	36.1
Chronic disease		
No chronic disease	130	78.3
Have 1 chronic disease	22	13.3
Have 2 chronic diseases	9	5.4
Have 3 chronic diseases	5	3.0
	Min.-Max.	**Mean-Standard Deviation**
Age	18-74	43.72±12.30

Table 2. Comparison of metabolic syndrome parameters 3 months before and 3 months after COVID-19 lockdown

	3 months before lockdown (Mean-Standard Deviation)	3 months after lockdown (Mean-Standard Deviation)	N	p
Glucose	104.84±29.64	111.37±44.27	139	0.022*
Triglycerides	156.03±77.54	197.79±122.67	136	0.000*
HDL	46.37±11.40	45.02±11.87	136	0.041*
Systole	120.31±20.46	118.23±20.31	65	0.400
Diastole	75.54±14.36	80.02±10.69	65	0.008*
Waist circumference	108.78±10.87	109.74±12.06	65	0.305

There was a significant increase in glucose, triglyceride and diastolic blood pressure values of the participants (p= 0.022, p=0.000, p= 0.008). A significant decrease in the HDL value (p= 0.041) was detected. There were no significant changes in systolic blood pressure and waist circumference values (Table 2).

Discussion

The present study aimed at investigating the impact of COVID-19 lockdown on metabolic profile in BD and SCZ patients at the time of COVID-19. To the best of our knowledge, this is the first study to investigate the impact of the COVID-19 lockdown on the frequency of metabolic syndrome in patients with BD and SCZ.

According to the results of our study conducted in patients with BD and SCZ, it was revealed that the frequency of metabolic syndrome increased after the lockdown period compared to before. When metabolic syndrome parameters were examined separately, it was determined that there was an increase in the average of glucose, triglyceride and diastolic blood pressure, and a decrease in the average of HDL. In addition, it was found that the incidence of hyperTG increased significantly.

Our study showed that the incidence of metabolic syndrome increased in BD and SCZ patients after the COVID-19 lockdown. In this case, immobility, which is a natural consequence of the lockdown process, may have been effective. It is known that decreased physical activity is a risk factor for metabolic syndrome. Risks of inactivity are underscored by data that shows that sitting >42 hours per week had a 4%-12% attributable risk of metabolic syndrome, and high serum triglyceride levels [12]. BD and SCZ patients are a group with more social isolation than healthy individuals before the pandemic [13]. However, the lockdown that came with the pandemic process also prevented these patients from accessing Community Mental Health Centers, and thus a state of complete inactivity occurred.

Eating habits, which are stated to have changed during the lockdown process, may have also been effective in the increase in the frequency of metabolic syndrome [4]. Based on available evidence, it is known that altered eating habits, increases in insulin resistance, total body fat, belly fat, and inflammatory cytokines are the main metabolic consequences. All these factors are strongly associated with the development of the metabolic syndrome [14].

On the contrary, in a study conducted on healthy participants, it was found that there was no change in the incidence of metabolic syndrome between before and after the COVID-19 lockdown [15]. According to another study investigating the effects of COVID-19 lockdown, weight gain and sleep changes were more common in the group with psychiatric illness than in the healthy group [16]. This may be due to the BD and SCZ patient group being in the risk group for metabolic syndrome. Controlled studies are needed to understand this more clearly.

In the group of patients with cardiovascular risk, it is stated that physical inactivity during COVID-19 lockdown is the cause of hyperTG and hypoHDL [17]. Patients with schizophrenia and bipolar disorder are also shown in the cardiovascular risk group [18]. In this patient group, there is a risk of cardiovascular disease due to genetic predisposition, as well as many risk

factors such as antipsychotic drugs used, poor diet, physical inactivity, high smoking and obesity [18]. The causal role of different lipid subfractions in the development of vascular diseases has been known for many years [19]. In the results of our study, it was found that an increase in the average TG value and a decrease in the average HDL was observed after the COVID-19 quarantine, which supports the literature. This result shows that the COVID-19 lockdown process is not well managed for patients with schizophrenia and bipolar disorder, and that the lipid profile of the patients deteriorates and also poses a cardiovascular risk.

In our study, we found that after the COVID-19 lockdown, diastolic blood pressure increased significantly compared to before, and there was no significant difference in systolic blood pressure. In a study conducted during the COVID-19 lockdown in a healthy population, it was found that diastolic and systolic blood pressures decreased [20]. Hypertension has been reported as one of the causes of increased cardiovascular risk in SCZ and BD patients. The reason for high blood pressure is that they have less access to preventive interventions [21]. Considering this information and the result we found together, it can be thought that patients could not take measures for high blood pressure on their own during the COVID-19 lockdown period, due to the limited access to healthcare facilities.

It is known that a decrease in recommended physical activity from a relatively high level to a low level for 14 days leads to metabolic disparities such as increased intra-abdominal and ectopic and hyperinsulinemia, even in young healthy adults [22]. According to the findings of our study, although there was no significant increase in the incidence of hyperglycemia in patients with BD and SCZ after the COVID-19 lockdown, a significant increase was found in the mean plasma glucose.

Conclusion

The COVID-19 lockdown has been a period of increased metabolic syndrome for SCZ and BD patients. We tried to collect possible reasons for this situation. In line with all this information, it can be said that the fact that SCZ and BD patients were not given a special intervention regarding the COVID-19 lockdown and compliance with the new rules affected them negatively in terms of metabolic syndrome criteria. It is important to develop intervention strategies for this group in the future.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

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