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Original Article

Assessment of the glycemic and lipidemic profile of patients suffering from bipolar disorder.

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Abstract

Background: Impaired glycemic profile and cognitive impairment are generally associated with bipolar disorders. Patients on long-term use of psychotropic drugs are more prone to other medical abnormalities etc. The study's objective was to assess the glycemic and lipidemic profiles of patients with bipolar disorder reported at a tertiary care hospital in the Khyber Pakhtunkhwa-Pakistan.

Methodology: This was a cross-sectional study conducted in a private hospital in Khyber Pakhtunkhwa from January 2020 to June 2021. A total of 400 patients were enrolled in the study, and the sample size was calculated using a WHO calculator. Blood tests were performed for high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C), total cholesterol (TC), fasting glucose, and triglycerides (TG).

Results: Of the total 400 enrolled patients, 84.0% (n=336) had a diagnosis of bipolar disorder while rest of the 16.0% (n=64) had Schizophrenia. No statistical difference was found in the metabolic parameters following the primary diagnosis. As for pharmacological parameters, patients with bipolar disorders were receiving more psychiatric medicines than schizophrenic patients with a p-value < 0.001.

Conclusion: It is concluded that the levels of HDL, LDL, and total cholesterol were significantly elevated in the manic condition compared to the Euthymic phase and by improving their glycemic and lipidemic profiles, cognitive dysfunction might be rectified, and functioning can be improved.

Keywords

Hyperglycemia, Hyperlipidemia, Lipid Profile, Bipolar Disorders.

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Introduction

Bipolar disorder is a brain condition that might become a reason for alteration in a person's mood, energy, or functional outcomes[1]. Previously, it was known as manic depression. People with bipolar disorder experience powerful emotional states that characteristically occur during different periods of days to weeks. Some of the recent investigations revealed the prevalence of BP disorder throughout the life of a person 2.4% approximately[2].

A person with bipolar disorder feels his life divided into two different dimensions. One with desperateness whiles the other with powerful energy. He/she loses complete focus from his routine life. The person becomes depressed and hopeless. This is why he loses his glycemic and lipidemic control as well[3]. Patients with bipolar disorders generally maintain their energy levels by taking a proper diet, which prevents their blood sugar levels from dropping down[4]. Pre-mature mortality is also associated because of the higher suicidal rate and medical abnormalities[1]. Several medications, including different mood stabilizers, anti-depressants, and other long-acting antipsychotics, are widely used by clinicians to treat acute mood episodes and prevent relapses, etc[5,6]. It is evident from the researcher's reports that psychotropic drugs possess numerous side effects, which cause more and more burden on the community. These side effects include metabolic syndrome, hepatic malfunction, thyroid, and parathyroid dysfunctions, etc[7].

At least three out of five medical abnormalities, including high blood pressure, high serum triglycerides, high blood glucose level, abdominal obesity, and low serum HDL, constitute a medical condition called "MetS ."The onset of this condition may upsurge the threat of DM type 2 and CV events[8, 9]. A study displayed the overall prevalence of MetS as 37.3% in bipolar patients[10]. Similarly, 13.7% of patients were reported as victims of DM [11,12]. Another study showed a higher rate of MetS (45.3%) when treatment was done with antipsychotics compared to antipsychotic free treatment[13]. The Mets presence and consequently the glucose and lipids levels are linked with both the general medical and psychiatric conditions of the patients having bipolar disorders. Moreover, patients with MetS and co-morbid bipolar disorders experience more hospitalization and lesser intuition[14].

According to some researchers, there is a link between the lipid profile and the possible suicidal shots and their lethality in severe bipolar disorders[15]. The objective of the study was to assess the glycemic and lipidemic profiles of patients with bipolar disorder reported at a tertiary care hospital in Khyber Pakhtunkhwa-Pakistan.

Methodology

A cross-sectional study conducted in a private hospital in Khyber Pakhtunkhwa from January 2020 to June 2021. No ethical approval was required for the study. Four hundred patients diagnosed with schizophrenia or bipolar disorder (according to DSM) were enrolled in the study. A purposive sampling technique was used in this study, and the sample size was calculated using a WHO calculator. The psychiatrist's team was given a form for completion, which included various demographic characters of the study population, including age, gender, their marital status, occupation, education, BD or Schizophrenia primary diagnosis, phase of their bipolar illness, i.e., mania, depression, or euthymia and existing pharmacological therapy. The admitted patient's blood samples were collected and sent to a lab for examination. In contrast, the outcomes of preceding blood screening for out-patients were supposed to be effective (if the last blood sample was drawn within 2 months before entry in the study). The patients observed a 10hrs fasting period before giving their blood for examination. The blood screening/examination included the fasting levels of blood glucose, HDL-C, TC, LDL-C, and levels of TG.

Patients over 18 years with a primary diagnosis of schizophrenia or bipolar disorder were included in the study. All the patients were requested to submit a written consent. While non-consenting subjects, those are having pregnancy or recent childbirth, any chronic neurological disorder, an intellectual

disability, an acute or severe medical illness, and history of active molecules dependency during the last six months were excluded.

The euthymic phase of BD was defined as "a Young Mania Rating Scale[16] (YMRS) score ≤12" and a "Montgomery-Åsberg Depression Rating Scale (MADRS) ≤10" with psychopathological conditions stable for at least six months. Data were analyzed using the statistical program SPSS version 20. Quantitative data were presented as mean and SD, while qualitative data was presented as frequency and percentages. Data was stratified concerning subgroups. The student's t-test for independent samples was used for continuous variables and Pearson's chi-square test ($\chi 2$) for categorical variables. One-way ANOVA followed by Turkey's posthoc analysis was applied for continuous variables. In contrast, Pearson's chi-square test was applied for categorical variables. A p-value < 0.05 was considered significant.

Results

Of total 400 enrolled patients, 84.0% (n=336) had a diagnosis of bipolar disorder while rest of the 16.0% (n=64) Schizophrenia. The patients' mean age was 50.44 years. According to gender distribution, 47.0% (n=188) were male while rest of the 53.0% (n=212) were female. 80.0% (n=320) patients were married, 17.0% (n=68) remained unmarried while 3.0% (n=12) were separated. 54.5% (n=218) patients were un-educated, 33.5% (n=134) patients were holding bachelor's degree while rest of the 12.0% (n=48) patients were holding master's degree. The average number of psychiatric medicine that an individual was taking at the time of valuation was 2.98 ± 1.14 for bipolar patients while 1.88 ± 1.10 for schizophrenic patients. 80% (n=320) of the patients were treated previously with a single antipsychotic drug; others 20% (n=80) were treated with at least lithium, an anti-depressant, and valproate. Table 1 shows the demographic data and the clinical characteristics of the patients.

Table 1: Clinical and demographic characteristics of the study patients.

Variables		**(n=400)**
Age; Years (Mean±SD)		50.44±2.40
Gender	Male	188(47)
	Female	212(53)
Marital Status	Married	320(80)
	Unmarried	68(17)
	Separated	12(3)
Education Level	Un educated	218(54.5)
	Bachelor	134(33.5)
	Master	48(12)
Primary Diagnosis	Bipolar disorder	336(84)
	Schizophrenia	64(16)
Metabolic Parameters (Mean±SD)	HDL-C (mg/dL)	50.52±10.00
	LDL-C (mg/dL)	106.00±15.10
	TC (mg/dL)	175.44±18.44
	TG (mg/dL)	128.48±22.66
	Glucose (mg/dL)	90.00±08.66
Pharmacological Treatment	Mean Psychiatric drugs used by the patients	2.98±1.14
	Patients on antipsychotic drugs	320(80)
	Patients on anti-depressant, lithium, valproate	80(20)

HDL-C-High Density Lipoprotein Cholesterol; LDL-C-Low Density Lipoprotein Cholesterol, TC-Total Cholesterol, TG-Triglycerides

No statistical difference was found when we compared the metabolic parameters by the primary diagnosis. As for pharmacological parameters, patients with bipolar disorders were receiving more psychiatric medicines than schizophrenic patients with a p-value < 0.001 (Table 2).

Table 2: Metabolic, socio-demographic and medication recommendation in bipolar and schizophrenic patients.

Parameters	Bipolar disorders (n=336)	Schizophrenia (n=64)	p-value
	(Mean±SD)		
No. of psychiatric medicine	2.98±1.14	1.88±1.64	< 0.001*
Anti-depressant (%)	12(3.57)	4(6.25)	< 0.001*
Lithium (%)	6(1.78)	2(3.12)	< 0.001*
Valproate (%)	2(0.59)	1(1.56)	< 0.001*
Antipsychotics (%)	80(23.80)	20(31.25)	< 0.001*
HDL-C (mg/dL)	47.22±8.12	46.50±6.00	0.22
LDL-C (mg/dL)	108.00±10.10	100.20±8.22	0.31
TC (mg/dL)	170.24±12.46	169.00±11.14	0.44
TG (mg/dL)	124.40±20.16	122.28±10.68	0.50
Glucose (mg/dL)	90.00±04.00	89.44±10.00	0.66

HDL-C-High Density Lipoprotein Cholesterol; LDL-C-Low Density Lipoprotein Cholesterol, TC-Total Cholesterol, TG-Triglycerides.
*p<0.05 is considered statistically significant.

During this study, we assessed the variances among the cholesterol, triglycerides, and glucose values in those suffering from numerous phases of bipolar disorders. These results are shown in Table III. It is clear from the below table that the levels of HDL, LDL, and total cholesterol were meaningfully elevated in the mania complaints in comparison to the euthymic phase. We did not find any significant variance among the patients suffering from bipolar disorders and the euthymic phase.

Table 3: Serum levels of cholesterol, glucose, and triglycerides in different phases of bipolar disorder.

Parameters	MDD	Mania	Euthymia
HDL-C	48.16±8.4*	40.0±4.0	50.2±4.0
LDL-C	118±4.0*	99.0±2.4	104±6.6
TC	188±8.8*	164±5.4	174±8.1
TG	128±2.0	114±3.8	122±6.6
Glucose	90±4.10	90±4.0	92±06.0

*MDD vs. Mania (p value < 0.001).
MDD-Major Depressive Disorders; HDL-C-High Density Lipoprotein Cholesterol; LDL-C-Low Density Lipoprotein Cholesterol, TC-Total Cholesterol, TG-Triglycerides.

Discussion

To compromise human life quality and reduce life expectancy, numerous metabolic and psychiatric abnormalities play a vital role. This study was conducted in a tertiary care hospital of Peshawar in order to compare the HDL-C, LDL-C, TC, TG, and glucose in those patients suffering from schizophrenia and bipolar disorder. We did not find any significant variance among these parameters by comparing the results. Contrary to our study, some researchers have reported an increase in metabolic risks in patients having bipolar disorders when compared to those possessing schizophrenia. Several researchers

explored the glycemic and lipid profile in patients having MDD (major depressive disorders)[17-19]. A meta-analysis recently displayed the elevated levels of triglycerides, diminished levels of high-density lipoprotein, momentous changes in levels of low-density lipoproteins, and total cholesterol in the first episode of major depressive disorder (MDD)[20]. In a study, it was found that the levels of triglycerides were higher in bipolar depression in comparison to schizophrenia, whereas the levels were decreased in manic conditions.

Moreover, bipolar disorder patients possessed more triglycerides as compared to psychotic patients, whereas low-density lipoproteins were significantly lower in patients with mania in comparison to those having schizophrenia and bipolar depression[21]. Chung et al. assessed the triglyceride and serum cholesterol in patients with type I bipolar disorders hospitalized for acute mood episodes. The researchers reported an association between chronic depressive indications and elevated quantities of serum cholesterol. Contrariwise, negative linkage was recorded between the serum triglyceride and overall psychiatric symptoms[22]. Another study conducted by Huang et al. showed the lipid and glucose levels of 32 depressed bipolar, 32 mania, and 64 healthy individuals. The study results displayed lower cholesterol levels in those subjects having mania compared to those with depressed moods. Moreover, the lowest level of dyslipidemia was observed in acute bipolar manic patients. Some of the researchers showed their results with no significant difference among the two[23].

It is, however, believed that a significant alteration can be seen in both the glycemic and Lipidemic profiles of the patients possessing schizophrenia and bipolar disorder. The exact causes responsible for the increase in metabolic disorders are still under debate. It is proposed that multiple reasons, including environmental, social, and lifestyle factors and a few genetic mechanisms, may cause an increase in metabolic disorders to risk factors. A recent study reported that in schizophrenia, the metabolic comorbidities are found to be genetic in nature, and they are independent of the side effects of the drugs[24]. Some other studies suggested the involvement of the use of greater quantities of anti-depressants in schizophrenia and bipolar disorders[25].

As the objective of this study was to assess the glycemic and lipidemic profile of patients with bipolar disorders, an investigation was done on whether being in a different phase of bipolar disorder can affect the serum levels of TC, TG, glucose, etc. The results of post hoc analysis showed a lower level of HDL, LDL, and total cholesterol in mania compared to those with euthymic bipolar patients. Moreover, LDL and total cholesterol levels were significantly lower among patients with mania than in those with MDD. This study showed an inverse relationship between mood and cholesterol levels and vice versa.

In our study, the mean value of total cholesterol in patients with bipolar disorder was 170.24 ± 12.46, whereas in those with schizophrenia was observed as 169.00 ± 11.14. These results are consistent with the results of the other researchers. They identified low serum cholesterol in mania than in healthy individuals 26 or those with bipolar depression. An unclear underlying mechanism was involved in the altered lipid profile in patients with mania. These alterations are due to the onset of mood symptoms. However, the possibility of the involvement of some other neurotransmitters can not be ruled out.

In another study, triglycerides in patients with both bipolar disorder and schizophrenia were higher. Both conditions were linked with an elevated risk of triglyceride levels that surpassed the normal upper range of 150 mg/dl[27,28]. The outcomes of a study revealed that the prevalence of MetS components was a bit higher than some other studies. The study also indicated lower HDL and FPG as 29.8% and 25.3% respectively in patients suffering from schizophrenia[29].

Our study is limited to a particular area of KP. A study comprising a vast area of the country will produce outcomes that will be more beneficial. It is suggested that lower levels of cholesterol have

been associated with severe mood depression disorders with attempts of suicide, and this aspect comes from a psychopathological viewpoint[30,31]. As cholesterol levels can be checked over a simple and comparatively low-cost blood examination, longitudinal studies with periodical clinical and laboratory follow-up should be implemented to further clarify the association between low cholesterol levels and mood episodes particularly (hypo)mania in bipolar disorders. Cognitive dysfunctions can be rectified by improving the glycemic and lipidemic profiles of patients suffering from bipolar disorders. In order to evaluate and manage the serum glucose and serum lipids levels in patients suffering from bipolar disorders and schizophrenia, health care professionals should spare their time. A strong relation is seen among the prevalence of cerebrovascular stroke and metabolic disorders, and this is due to the MetS. Newly diagnosed patients with bipolar disorders are also reported with an increased prevalence of MetS. Therefore, it is recommended that an early assessment of these conditions be considered to make an adequate and prompt treatment and reduce the cardiometabolic abnormalities.

Conclusion

It is concluded that the levels of serum glucose, triglycerides, and cholesterol in bipolar and schizophrenic patients do not differ, which suggests that psychotropic medicines are used. An unhealthy lifestyle may remarkably affect the metabolic parameters in both bipolar and schizophrenic patients. Thus, they should periodically be assessed. Interestingly, low cholesterol in (hypo) manic patients compared to euthymic and depressed patients showed an association between the metabolic profile and clinical symptoms. Impaired glycemic and lipidemic profiles are linked with cognitive dysfunction in patients suffering from bipolar disorders. By improving their glycemic and lipidemic profiles, cognitive dysfunction might be rectified, and functioning can be improved.

Conflicts of Interest

The authors have declared that no competing interests exist.

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