ORIGINAL ARTICLE

Estimation of Fasting Blood Glucose and Lipid Profile among Patients with Psychotics Disorders under Medications

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Abstract:

Background: Individuals who are treated with antipsychotic medications especially atypical group are facing several metabolic and biochemical changes that might put them at higher risk of developing several diseases. **The aim** of this study was to evaluate the fasting blood glucose level and lipid profile among those with common psychotic disorders under effect of atypical antipsychotic drugs compared with healthy population.

Materials and Methods: A laboratory- based case control study was conducted and carried out in Khartoum State (AlTigani AlMahy Hospital for Psychotic and Mental Diseases) from May to November 2017. The samples were drawn from fifty patients of common psychotic disorders as case group and another fifty from healthy individuals as control group to estimate the level of fasting blood glucose and lipid profile using Mindary Biosystems PS200.

Results: out of 50 cases, 52% were males and 48% females. It was found that there was a significant increase in mean of all tested parameters, fasting blood glucose (FBG) (109.19±26.27), Total Cholesterol (167.23±41.79), Triglyceride (161.80±59.29) and Low Density Lipoprotein (LDL) (66.42±16.72) but decrease in High Density Lipoprotein (HDL) (53.96±17.86), all with (p.value 0.00) compared to control. There was no correlation between parameters and age, but positive correlation was observed between LDL and duration (R-0.047).

Conclusion: Individuals under atypical antipsychotic medications had higher levels of fasting blood glucose and lipid profile than normal individuals.

Key words: A typical antipsychotic drugs, Lipid profile, Blood glucose level.

Introduction:

Psychosis is a mental disorder characterized by disordered thought processes blunted or inappropriate emotional responses bizarre behavior ranging from hypo activity to hyperactivity with agitation, aggressiveness, hostility, and combativeness; social in which a person pays less-than-normal attention to the environment and other people. Psychosis can be chronic or acute.(1) There are diseases which can present with psychosis, the most common of them (Schizophrenia, Bipolar and major Depressive disorders). Schizophrenia is one of the most serious and frightening of all mental illnesses.(2) Bipolar disorder is a major public health problem associated with significant morbidity and a high mortality risk.(3) Depression is a seriously disabling public health problem of very high prevalence.(4) Psychiatric patients treated by different types of antipsychotic drugs especially typical group which cause different changesin human body physiology and biochemistry such as; Olanzapine, Risperidone and Clozapine.(5, 6)

In several studies that were done in patients who received typical antipsychotic drugs (clozapine , olanzapine , benztropine , risperidone) for schizophrenia and bipolar disorder and others, they found that hyperglycemia might result from changes in glucose regulation leading to impaired glucose tolerance and insulin resistance,these may put them in a pre-diabetic status,diabetes mellitus type 2 (DM type2) or other metabolic syndromes. The risk of developing diabetes mellitus and other complications is deferring form using one drug to another. (7-11)

Schizophrenia has high prevalence of diabetes mellitus 2 to 4 times more prevalent than in the general population. (12)

The mechanism of insulin resistance thought from the ability of antipsychotic drugs to inhibit caracole induced insulin secretion by the pancreatic β-cell was, at a relatively high concentration, due to lower receptor affinity, similar to the muscarinic receptor antagonist atropine. The effect of drugs in glucose and insulin level is shown according to dose and time,highest effect is seen in high dose and longtime of using treatment. (13)

Several studies investigated the relationship between psychiatric patients who were treated with anti-psychiatric medications specially a typical one and lipid profile; results found increase in total cholesterol (TC), triglycerides (TG), low density lipoprotein cholesterol (LDL), very low density lipoprotein cholesterol (VLDL) and decrease in high density lipoprotein cholesterol (HDL), but had

greater effect on triglyceride concentration).[14,15]

Other studies showed that patients with an established psychotic illness with expected consequences had a higher rate for developing cardiovascular disease, coronary heart disease, infection, inflammation and accidental death. [10, 16]

Materials and Methods:

This is a Laboratory- based case control study which was conducted from May to November 2017 in AlTigani AlMahy Hospital Khartoum - Sudan. It included Sudanese hospitalized psychiatric patients who received a typical antipsychotic medications for diagnosed common psychotic disorders (Bipolar, schizophrenia and major Depressive disorder). One hundred subjects were recruited for this study fifty represented case group and fifty as control group. This study was conducted to analyze the parameters of lipid profile, fasting blood glucose and studied the correlation between these variables.

Ethical considerations:

The study was approved by the department of clinical chemistry-faculty of medical laboratory Sciences-Sudan International University. Also a verbal consent was obtained from patients directly or indirectly from their relatives.

Sampling collection and processing:

Following aseptic techniques, 3ml of venous blood was collected from the group of the study and control group (fasting sample). Then centrifuged and stored in refrigerator -20 until tested for estimation of (glucose and lipid profile) which was done by fully automated chemistry analyzer Mindary BS 200.

Statistical analysis:

Data were analyzed using SPSS version 21. Expressed as Mean, Standard deviation and percentage. Independent T test was used to compare between the mean of study parameters (glucose, total cholesterol, triglyceride, HDL, LDL) in case and control and Pearson correlation was done to study the correlation between analyzed parameters and study variables (duration and age). P value $\leq$ 0.05 considered as significance.

Results:

The descriptive statistics of the study showed that the case group included 52% males and 48% females (figure 1), and the results showed that the mean concentration of fasting blood glucose level was significantly increased in psychiatric patients (109.19±26.27) compared to control group (72.22±19.73) with P.value 0.00 (figure 2). The mean concentration of total cholesterol was significantly increased in psychiatric patients (167.23±41.79) compared to control group(113.88±18.23) with P.value 0.00 (figure 3). The mean concentration of triglyceride was significantly increased in psychiatric patients (161.80±59.29) compared to control group (100.93±23.79) with P.value 0.00 (figure 4). The mean concentration of high density lipoproteins was significantly decreased in psychiatric patient (53.96±17.86) compared to control group (76.88±19.40) with Pvalue 0.00 (figure5) and Low density lipoproteins mean concentration was significantly increased in psychiatric patient (66.42±16.72) compared to control group (34.79±13.09) with P.value 0.00 (figure6).

The correlation analysis showed that LDL was positively correlated with duration of using antipsychotic drugs with R-value 0.292, P.value 0.029, (figure7, 8) and there was no correlation between duration and age of patients with other parameters.

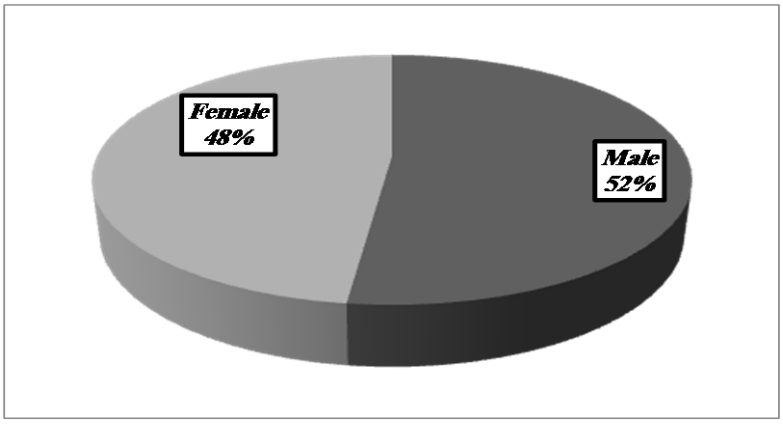
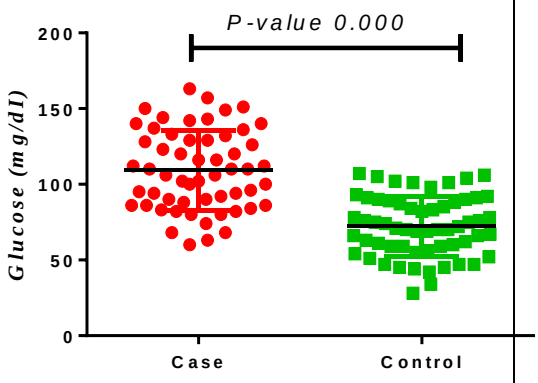
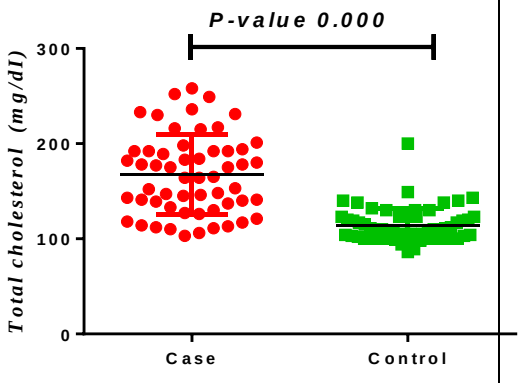


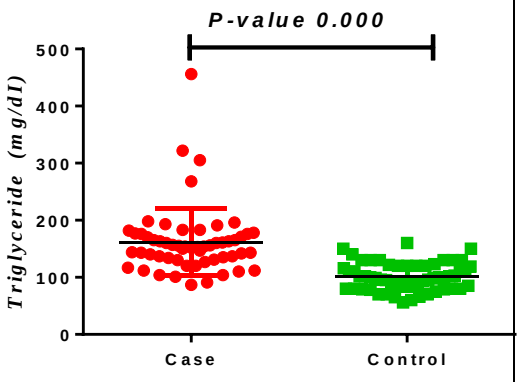
Figure (1): Frequency of males and females in the study group



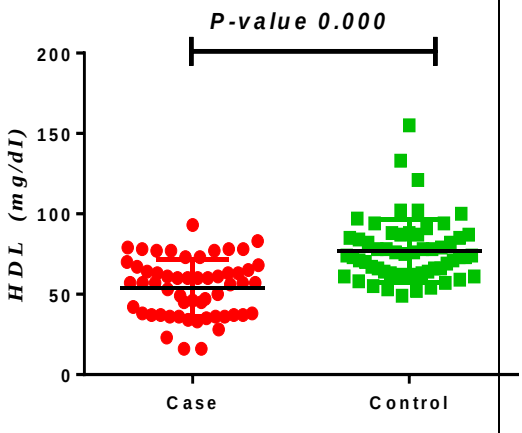
figure(2): Mean concentration of glucose in study group



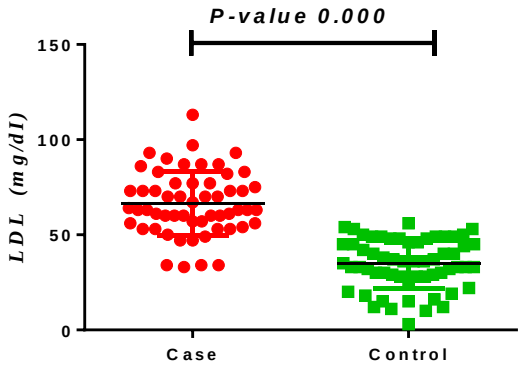
figure(3): Mean concentration ofT.Cholesterol in study group



figure(4): Mean concentration of triglyceride in study group:



figure(5): Mean concentration of HDL in study group :



figure(6): Mean concentration of LDL in study group

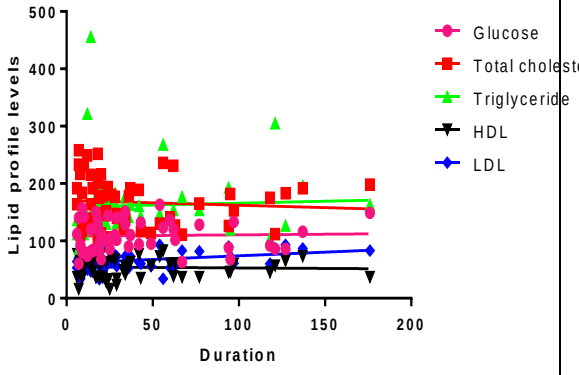


Figure (7): correlation between lipids and duration

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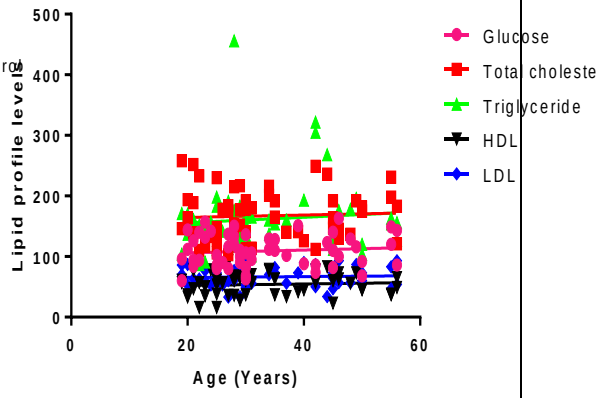

figure(8): correlation between lipids and age:

Tables (1): Difference between male and female:

Parameters	Male (Mean±SD)	Female (Mean±SD)	*P-value*
Glucose (mg/dl)	111.93±24.84	106.25±27.88	0.425
Total cholesterol (mg/dl)	171.55±39.37	162.59±44.53	0.430
Triglyceride (mg/dl)	166.79±71.50	156.44±43.28	0.512
HDL (mg/dl)	58.00±18.15	49.62±16.80	0.079
LDL (mg/dl)	68.55±16.19	64.14±17.29	0.330

Discussion:

Psychotic patients treated by two types of atypical antipsychotic drugs first one was olanzapine as first line and clozapine as second line when patients did not response to first line according to psychiatric doctors.Olanzapine and clozapine showed high risk than other drugs in weight gain, diabetes mellitus and dyslipidemia. [5]

In fact these findings in agreement with study done by Jyoti and et al who reported that, one of side effects of antipsychotic drugs was hyperglycemia in fasting blood and postprandial blood glucose (due to accumulation of fat in liver and muscle cause insulin resistance in tissue). One of the causes is disruption of glucose transport to peripheral tissues and due to that it has been suggested the antipsychotic drugs may block glucose accumulation directly at the level of the glucose transporter (GLUT) protein in both the peripheral and brain tissue, causing hyperglycemia. Another suggested that the cause is the blockade of 5HT2A receptor which inhibit the uptake of glucose in skeletal muscle. Thirty reasons that is cause derangement of pancreatic function specially beta cells, the blockade of muscarinic type 3 (M3) and 5-HT1A receptorsis reasons behind diminished of beta cell. Last suggest that is cause insulin resistance. [17]

These patients are at risk of devolving diabetes mellitus type 2 and diabetic ketoacidosis more than other population by causing hyperglycemia and insulin resistance. [8, 17]

The cases revealed that antipsychotic treated patients slowly had high fasting glucose level compared to patients with normal individuals. Total cholesterol had significant increase in case group than control group, our study agree with another study, which confirmed the elevation of fasting blood glucose level which cause impaired glucose tolerance and total cholesterol level in our patients than normal population, that reported the hyperglycemia and diabetes mellitus in majority involved who patients used clozapine and olanzapine, and showed hypercholesterolemia and hypertriglyceridemia.[7, 8, 16]Similarly triglycerides, HDL and LDL levels had markedly increased in case group compared with control group by means and P value, this was agreement with another study that found elevation in triglyceride and others. [8]

All studies proved hyperglycemia and dyslipidemia included that patients were at high risk to develope DM type 2, metabolic syndrome , and hypertension. These

side effects put those patients at high risk to develop cardio vascular disorder specially coronary heart disease and other cardiac complications. [8, 10, 14, 15]

This study found positive correlation between duration and LDL which means that when patients use antipsychotics drug for long times that will cause more elevation in LDL level that will cause severe problems and end with death, but another study did not agree with our study results, this found no correlation between LDL and duration but other parameters had positive correlation. [17] No relation between duration and other parameters in interest that means when duration increase have same effect in (glucose, total cholesterol, triglyceride, HDL) level.

There was no correlation between age and lipids change which means that the effect of these drugs in lipids in different ages is similar effect. The difference between males and females proved that the males had high risk than females, means, stander deviation and p-value high in males than females.

Conclusion:

The results of the study concluded that Sudanese psychiatric patients under medications had high fasting blood glucose level and lipids profile than normal population. As a consequence that might put them at higher risk to develop diabetes mellitus type 2, metabolic syndrome, coronary heart disease and other serious disorders if they are left without any interventions.

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