

# Differences of Fasting Blood Glucose Level in People with Schizophrenia between Before and After Getting Aripiprazole Treatment

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## Abstract

**Citation:** Turangan DR, Loebis B, Husada SM, Nasution NM. Differences of Fasting Blood Glucose Level in People with Schizophrenia between Before and After Getting Aripiprazole Treatment. Open Access Maced J Med Sci. <https://doi.org/10.3889/oamjms.2019.403>

**Keywords:** Fasting Blood Glucose; Aripiprazole; Schizophrenic

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**Received:** 11-Jun-2019; **Revised:** 13-Jul-2019; **Accepted:** 14-Jul-2019; **Online first:** 28-Aug-2019

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**Funding:** This research did not receive any financial support

**Competing Interests:** The authors have declared that no competing interests exist

**BACKGROUND:** Schizophrenia is a serious disorder of the brain and mind. People with schizophrenia are at high risk of developing type diabetes, due to overall poor physical health, poor health care, unhealthy lifestyles, and side effects of antipsychotic drugs. However, atypical antipsychotics have their deficiencies, because they can be associated with worsening cardiovascular risk factors such as weight gain, hyperglycemia and hyperlipidemia.

**AIM:** Difference in fasting blood glucose levels in people with schizophrenia between before and after receiving aripiprazole treatment.

**METHODS:** This research was conducted in November 2017-September 2018. This research was first conducted in Indonesia, especially North Sumatra. This research is a numerical comparative analytical study paired with an experimental design approach. The number of samples is 44 people. Blood samples are taken in schizophrenia patients before getting the drug, before meals and before activities, assessed fasting blood glucose levels before being treated with aripiprazole and after drug administration for 6 weeks. Data analysis used was a paired test for differences in fasting blood glucose levels in people with schizophrenia between before and after receiving aripiprazole treatment.

**RESULTS:** Based on the demographic characteristics found the research subjects based on the most age group were 31-40 years age group of 30 subjects (68.2%), based on the highest level of education was high school by 26 subjects (59.1%), based on the most marital status was by status not married for 24 subjects (54.5%). It was found that the average blood glucose level before being given aripiprazole in schizophrenic patients was  $89.23 \pm 7.13$ . It was found that the average blood glucose level after being given aripiprazole in schizophrenic patients was  $86.5 \pm 10.1$ . It was found that there were no differences in blood glucose levels before and after being given aripiprazole in schizophrenic patients

**CONCLUSION:** There was no difference in blood glucose levels before and after being given aripiprazole in schizophrenic patients with p-value (0,078).

## Introduction

Schizophrenia is a serious disorder of the brain and mind. The incidence of schizophrenia appears to be consistent throughout the world over the past half-century and targets the number of people with schizophrenia in Sudan who need treatment of around 65,517 people. The peak age of onset is 20-28 years for men and 20-32 years for women. Onset in

children is much rarer. The main treatment for schizophrenia is antipsychotic drugs, which are often combined with psychological and social support. Cardiovascular risk in psychiatric disorders is partly related to antipsychotic therapy [1].

Despite the progress of treatment in prevention, Cardio Vascular Disease (CVD) remains a leading cause of death worldwide. CVD is responsible for 30% of deaths and is one of the long-term health considerations in the overall population. CVD is also

the most common natural cause of death in schizophrenia, accounting for a total of 34% of deaths among male patients and 31% of deaths in female patients and is only treated with suicide. In fact, it is estimated that the prevalence of dyslipidemia, hypertension, obesity and diabetes type 2 is approximately 1.5 to 2 times higher in people with schizophrenia and other serious mental illnesses compared to the general population. Although the prevalence of appropriate metabolic syndrome in adults with schizophrenia varies greatly (between 20% and 60%), general estimates usually put this twice that of the normal population [2].

Cases of diabetes ketoacidosis have recently been reported in people with schizophrenia immediately after receiving treatment with aripiprazole. This study explores the metabolic profile of aripiprazole patients undergoing extensive metabolic follow-up, including an oral glucose tolerance test (OGTT), to detect abnormalities in glucose homeostasis [3].

Hert's research, at all in Liege Belgium in 2007 reported reversibility of diabetes-related to the drug aripiprazole. In this study found that 74.2% (23) patients were taking monotherapy with aripiprazole. The average daily dose was 16.3 mg (SD 6.9). Overall, 5 patients received the highest dose of 30 mg. All patients remained clinically stable [3]. However, L'Italien's and colleagues in the USA 2007 study, aripiprazole has been marketed with an emphasis on metabolism with little or no increase in blood glucose or weight gain. The incidence of metabolic syndrome in patients receiving aripiprazole was 5.3% compared with 14.3% in patients with placebo [4].

Several studies of Reddymasu, et al., in USA (2008) report cases that link aripiprazole with blood glucose and cause weight gain [5].

Wani, et al., 2015 in India. Where there was a significant increase in fasting blood glucose levels on giving of aripiprazole for 14 weeks ( $p < 0.001$ ) [8].

Zhang's research in China 2014 found that fasting blood glucose and total cholesterol had significant differences between the three treatment groups (olanzapine, quetiapine, and aripiprazole). There were significant differences between the three treatment groups in the magnitude of changes in fasting glucose levels, triglycerides, and high-density lipoproteins. The difference in ranking in fasting glucose levels among the three groups found that the increase in the olanzapine group (mean = 94.5) was significantly greater than in the aripiprazole group (mean = 66.8) ( $p < 0.01$ ). From this study, the mean fasting blood glucose levels at  $4.65 \pm 1.14$  mmol/L and before the administration of aripiprazole were  $4.74 \pm 1.74$  mmol/L. From this study also found a mean change in fasting blood glucose levels at the time before aripiprazole administration of  $0.08 \pm 1.97$  mmol/L [7].

Racial and ethnic differences are associated with metabolic syndrome. Positive metabolic syndrome for black and white people can be associated with an increased risk of Cardio Vascular Disease (CVD), while metabolic is negative for Hispanics and Americans, the Philippines can be associated with an increased risk of diabetes. The possibility of differences in genotypes in the application of risk factors which are metabolic syndrome [2].

The Batak tribe is one of the hundreds of tribes found in Indonesia. Batak tribes are found in the North Sumatra region. There are several sub-tribes and hundreds of clans found in the Batak tribe. The Batak people themselves have tribes, among others: Karo, Mandailing, Simalungun, Toba, Pakpak, Angola and Coastal Batak [13].

The report on the results of Basic Health Research (RISKESDAS) by the Ministry of Health, shows that the prevalence of diabetes in Indonesia is 6.9%. Meanwhile, if viewed based on provinces in Indonesia for the Province of North Sumatra, the prevalence of diabetes mellitus sufferers is 1.8% or around 160 thousand people [14].

According to the American Diabetes Association (ADA) that diabetes mellitus is associated with irreversible risk factors including family history, age and ethnicity [15]. Lifestyle is a risk factor with different behavioural characteristics in each tribe will affect the increase in the number of people with diabetes mellitus [16]. Batak people tend to consume meat and eat a lot of frequency [17].

So, through this research and background, I wanted to find out the differences in fasting blood glucose levels in people with Batak tribal schizophrenia between before and after getting aripiprazole treatment in Indonesia.

## Material and Methods

Types of research Numerical comparative analysis paired with experimental research design and data retrieval methods with repeated measurements (pre-test post-test) without a control group, to see differences in fasting blood sugar levels in people with schizophrenia tribal batak between before and after receiving aripiprazole treatment.

This research was carried out at the inpatient installation BLUD RSJ Prof.Dr. M.Ildrem Medan on November 2017-September 2018. The population in this study were schizophrenic patients, while the affordable population were Schizophrenic patients at the Inpatient Mental Hospital Installation Prof. Dr M. Ildrem Medan. The sample in this study was a nonprobability sampling type consecutive sampling,

namely all subjects who came and met the selection criteria of 44 people.

The researcher assessed PANSS towards the research subject. all research subjects (schizophrenic patients) were collected for blood sampling using Glucometers). Taking blood is taken at 08.00-10.00 WIB, before being treated with Aripiprazole. After administration of the drug for 6 weeks with flexible-dose of aripiprazole, the fasting blood glucose level was assessed. Before taking blood, the patient is advised to fast for 10-12 hours.

Data analysis analysed descriptively statistically. The data will then be presented in the form of tables and narratives according to the variables studied.

**Table 1: Distribution of Research Subjects Based on Demographic Characteristics**

| Variable           | n  | %    |
|--------------------|----|------|
| Age (year)         |    |      |
| 20-30              | 8  | 18.2 |
| 31-40              | 30 | 68.2 |
| 41-50              | 6  | 13.6 |
| Education          |    |      |
| Primary school     | 6  | 13.6 |
| Junior high school | 9  | 20.5 |
| Senior high school | 26 | 59.1 |
| Bachelor           | 3  | 6.8  |
| Marital status     |    |      |
| Single             | 24 | 54.5 |
| Married            | 20 | 45.5 |

Table 1 shows that the proportion of the age of schizophrenic patients is 20-30 years (18.2%), 31-40 years (68.2%), and 41-50 years (13.6%). In the Ayano study in 2016, it was stated that the onset of schizophrenia usually occurs between late adolescents and mid 30 years. For men, the peak age is onset for the first psychotic episode in the beginning to mid-20 years. The proportion of education for schizophrenic patients is elementary school (13.6%), junior high school (20.5%), and high school (59.1%), D3/S1 (6.8%). Young Lee's study in 2010 found that the demographics of schizophrenia patients were based on education with a mean of 12.8 and a standard deviation of 2.9. The marital status is unmarried (54.5%) and married (45.5%) [7]. In Wani et al.'s research in 2015 found that from marital status, schizophrenic patients were not married (82%) and married (18%).

**Table 2: Fasting blood glucose levels before given aripiprazole in schizophrenic patients**

| Variable | Mean  | SD   | Minimum | Maximum |
|----------|-------|------|---------|---------|
| Pre FBG  | 89.23 | 7.13 | 76      | 102     |

Table 2 shows that the blood glucose level score with an average of 89.23 and standard deviation 7.13, a minimum value of 76, and a maximum value of 102. This shows that blood glucose levels in schizophrenic patients do not experience interference, indicated by normal scores, blood glucose levels are  $\leq 125$  mg/dL [3]. In the study of Wani et al., in 2015 found a mean score of fasting blood glucose levels before being given Aripiprazole was 86.5 with a

standard standard deviation of 10.62 in 50 schizophrenics [8].

**Table 3: Fasting Blood glucose levels after being given aripiprazole in schizophrenic patients**

| Variable | Mean | SD   | Minimum | Maximum |
|----------|------|------|---------|---------|
| Post FBG | 86.5 | 10.1 | 50      | 107     |

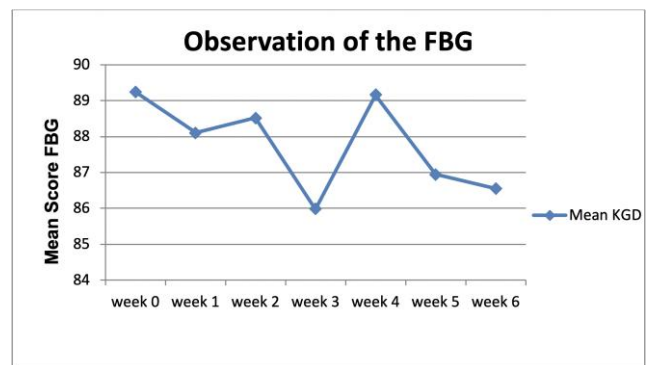
Table 3 shows that the blood sugar level score with an average of 86.5 and a standard deviation of 10.1, a minimum value of 50, and a maximum value of 107. This shows that blood glucose levels in schizophrenic patients do not experience interference, as indicated by normal blood glucose levels  $\leq 125$  mg/dL5. In the study of Wani et al., In 2015, the mean score of fasting blood glucose levels after being given aripiprazole for 6 weeks was 90.92 with a standard deviation of 9.73 in 50 schizophrenics [8].

**Table 4: Differences in fasting blood glucose levels before and after being given aripiprazole in schizophrenic patients**

| Variable | Mean  | SD   | p     |
|----------|-------|------|-------|
| Pre      | 89.23 | 7.13 | 0.078 |
| Post     | 86.5  | 10.1 |       |

Table 4 it can be seen that there is no difference in blood glucose levels before and after being given aripiprazole in schizophrenic patients with p-value (0.078)  $> 0.05$ . In the study, Wani et al. 's research in 2015 found that there were no significant differences in blood glucose levels before and after being given aripiprazole in schizophrenic patients who were followed for 6 weeks [8].

Lee and his colleagues' study in Korea in 2010 found that fasting blood glucose levels after administration of aripiprazole were no different from those at baseline not given aripiprazole. In this study found that the average dose of aripiprazole was 9.3 mg in week 1, 12.5 mg in week 2, 17.6 mg in week 4 and 24.7 mg at week 8. In the study, baseline blood glucose levels were obtained. with (mean = 96.1 and sd = 16.4), after administration of aripiprazole at week 8 with (mean = 90.1 and sd = 17.1) [9].



**Figure 1: Observation of mean fasting blood glucose (FBG) scores before and after being given aripiprazole in schizophrenic patients**

Figure 1, it can be seen that the mean total fasting blood glucose score in men with week 0 Batak schizophrenia is 89.23, the mean total FBG score in men with week 1 Batak schizophrenia is 88.11, mean total FBG score in men with week 2 Batak schizophrenia was 88.52, the mean total FBG score in men with week-old Batak schizophrenia was 85.98, average total FBG score in men with Batak weeks of schizophrenia 4 is 89, 16, the mean total FBG score in men with week 5 week Batak schizophrenia is 86.95, the mean total FBG score in men with week 6 schizophrenia is 86.55.

From the graph shows a decrease in fasting blood glucose scores on subjects before being given aripiprazole and after being given aripiprazole.

## Discussion

In a study by Newcomer, et al., They found that nondiabetic schizophrenia patients showed adverse effects on glucose regulation after they started with antipsychotic drugs, which could vary in severity independent of adiposity and potentially increase long-term cardiovascular risk [10].

Gupta Research et al. reported a 17% prevalence rate for diabetes in a review of 208 patients with psychotic disorders who received antipsychotic drugs. In the study of Wani et al., there were 52.2% (n = 24) were pre-diabetic while 13% (n = 6) had diabetes mellitus at the end of 14 weeks of follow-up. Thus, the study findings are by Gupta et al. (13% vs 17%) [11].

Hyperglycemia, in some extreme cases and associated with ketoacidosis or hyperosmolar coma or death, has been reported in patients treated with atypical antipsychotic drug products, including aripiprazole. Risk factors that may predispose patients to severe complications include obesity and a family history of diabetes. In a clinical trial with aripiprazole, there were no significant differences in the incidence rates of adverse reactions related to hyperglycemia (including diabetes) or laboratory values of abnormal glycemia compared with placebo. Appropriate risk estimates for adverse reactions associated with hyperglycemia in patients treated with aripiprazole and with other atypical antipsychotic drug products are not available to allow direct comparison. Patients treated with antipsychotic drug products, including aripiprazole, must be observed for signs and symptoms of hyperglycemia (such as polydipsia, polyuria, polyphagia and weakness) and patients with diabetes mellitus or with risk factors for diabetes mellitus should be monitored regularly to control glucose deterioration [12].

In conclusion, a total of 44 subjects of

schizophrenic patients who were included in the study were at the inpatient installation of Mental Hospital, Prof. Dr. M. Ildrem Medan in November 2017-August 2018.

1. Based on the demographic characteristics found the research subjects based on the highest age group were the age group 31-40 years amounting to 30 subjects (68.2%), based on the highest level of education was high school by 26 subjects (59.1%), based on the highest marital status amounting to 24 subjects (54.4%).

2. It was found that the average blood glucose level before being given aripiprazole in schizophrenic patients was as large as  $89,23 \pm 7,13$ .

3. It was found that the average blood glucose level after being given aripiprazole in schizophrenic patients was as big as  $86,5 \pm 10,1$ .

4. It was found that there were no differences in blood sugar levels before and after being given aripiprazole in schizophrenic patients.

## Acknowledgement

Authors would like to acknowledge Prof. Dr M. Ildrem Psychiatric Hospital, Medan, Indonesia for facilitating the research.

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