

Relationship between Cholesterol Levels and Suicide Attempts in Chronic Psychosis

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Abstract Objective: Suicide is the most common cause of premature death of schizophrenia. This study investigated the relationship between cholesterol levels and suicidal behaviour in chronic psychosis. **Methods:** The study group consisted of 109 schizophrenia, schizoaffective and other non affective psychosis defined by Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-V) criteria. Lifetime suicide attempts of patients were retrospectively screened. The patients were divided into two groups with and without suicide. Serum cholesterol levels were compared between two groups. **Results:** The mean total cholesterol, triglyceride, HDL and LDL levels were 163.8 mg/dl, 150.8 mg/dl, 40.8 mg/dl and 132.4 mg/dl, respectively in the study group while they were 197.1 mg/dl, 194 mg/dl, 44.9 mg/dl and 124.2 mg/dl, respectively in the control group. Total cholesterol levels were significantly lower than patients with suicidal attempts compared with the patients with no suicidal attempts ($p=0,03$). No association was found between suicidal attempt and HDL cholesterol ($p=0,24$), triglyceride ($p=0,193$), and LDL ($p=0,45$). **Conclusion:** This result supports the hypothesis of association low plasma cholesterol levels and suicidal behavior in psychosis

Keywords: *Suicid, psychosis, cholesterol*

1. Introduction

Suicide is the most common cause of premature death of schizophrenia[1]. Suicide rates in psychotic patients were 8.6% before the first hospital admission and 5.3% in the first year of treatment[2]. Age, severity of depressive symptoms, aggressive and impulsive personality characteristics are factors that increase risk of suicide[3]. Surveys show that recurrent suicide attempts in psychosis are high regardless of whether patients are treated with or without hospitalization[4]. Previous suicide attempts are considered the strongest predictor of future suicide attempts[5]. Many researchers have focused on investigating biomarkers that may be related to suicide in order to prevent and treat suicidal behavior. Metabolic dysregulation; altered lipid profile, especially low total cholesterol and LDL levels, was associated with higher risk of suicide in schizophrenic patients[6]. The relationship between low cholesterol and increased risk of suicide has also been reported in impulsive aggressive behavior, mood disorders, substance abuse, psychosis, and personality disorders[7]. It's unclear how calm low cholesterol may be related to brain function mediated by suicidal behavior[8]. Postmortem brain studies have shown that patients with violent suicide attempts have lower gray matter cholesterol content, especially frontal cortex when compared to nonviolent suicides[9].

In this study, lipid and lipoprotein profiles were examined in patients with schizophrenia and other psychotic patients with or without suicide attempt. We aimed to confirm whether the change in lipid profile has increased the risk of suicide in patients with psychosis.

2. Materials and Methods

This retrospective study was carried out in psychiatry clinics of Community Mental Health Center, Turkey, between October 2016 and July 2017. Serum lipid levels were measured as part of a routine screening in all psychosis patients once in six monthly sessions. The total sample consisted of 63 schizophrenia, 16 schizoaffective and 30 other non affective psychosis. Schizophrenia, schizoaffective and other non affective psychosis was diagnosed by psychiatrists according to the criteria of the Diagnostic and Statistical Manual of Mental Disorders 5th Edition.

The lipid levels were performed by enzymatic methods for total cholesterol (TC) and triglyceride (TG), and clearance methods for high-density lipoprotein cholesterol (HDL-C) and low-density lipoprotein cholesterol (LDL-C).

Anthropometric measurements are measured on the same digital medical scale. The weight is measured with a digital scale. BMI was calculated by dividing the height by weight in square meters (kg/m²).

The exclusion criteria were as follows: aged under 18 years old or above 65 years old, substance abuse or dependence, the presence of non mental chronic medical illness, pregnancy, dementia, moderate or severe mental retardation.

Patient's length, body weight, waist circumference were measured. Body mass index were calculated. Triglyceride, HDL, LDL, total cholesterol levels were recorded.

Statistical analyses were performed using the SPSS 23.0 software package and the significance level used was $p < 0.05$. Relationships between discontinuous variables were tested by chi-square analysis. The compliance of the data with a normal distribution is analyzed via the Shapiro-Wilk test. In comparison of two independent groups, the Student's t-test was used to compare means between continuous variables, Mann Whitney U Test was used for variables that don't have normal distribution.

3. Results

In total, we enrolled 109 schizophrenia, schizoaffective disorder and other psychosis (61,5% male). The average age of these patients was 39,3 years, disease onset age was 21,4, the number of hospitalizations was 6.4. Sociodemographic and clinical features of patients are shown in [Table 1](#).

The average age of the patients with suicide attempt was 38 ± 9.4 years and the mean age of those without suicide attempt was 40.5 ± 13 years. There were no statistically significant differences between the groups in terms of age, gender smoking rates, body mass index, formal education ($p > 0.05$). ([Table 1](#))

Table 1. Sociodemographic and Clinical Characteristics of Patients

	Frequency			P
	All Psychosis Patients	Suicidal Attempt		
		YES (N=36)	NO (N=73)	
Age	39,30±12	37,1±9,4	40,4±13	0,18
Sex (Male/Female)	67/42 %61,5/%38,5	25/11 %69,4/30,6	42/31 %57,5/42,5	0,23
Marital Status Married/Single	36/73 %33/%77	10/26 %27,8/%72,2	26/47 %35,6/%64,4	0,37
Smoking Yes/No	62/47 %56,9/%43,1	26/10 %72,2%27,8	37/36 %50,7/%49,3	0,06
Education Years	6,8±3,8	6,6±3,4	6,9±4,1	0,86
Onset Age	21,4±7,8	19,8±5,5	22,2±8,7	0,13
Hospitalisation	6,4±7,7	7,5±7,2	5,9±7,9	0,31

Mean total cholesterol, triglyceride, HDL and LDL levels were 161 mg/dl, 167 mg/dl, 43 mg/dl and 1234 mg/dl respectively in patients who had made at least one suicidal attempt all through life. Mean total cholesterol, triglyceride, HDL and LDL levels were 193 mg/dl, 189 mg/dl, 47 mg/dl and 122 mg/dl respectively in the control group. Total cholesterol levels were significantly lower in patients with suicidal attempts compared with the patients with no suicidal attempts ($p=0,04$). No association with suicidal attempts was found with HDL cholesterol ($p=0,78$), triglyceride ($p=0,46$) and LDL($p=0,25$) in subjects studied (Table 2).

Table 2. Frequency of suicidal attempts of patients who have chronic psychosis

Serum Cholesterol levels mg/dl	Frequency		P	
	All Psychosis Patients	Suicidal Attempts		
		Yes (N=29)		No(N=72)
Total Cholesterol	182±54	161±53	193±52	0,04
Triglyceride	182,3±144	167±97	189±162	0,46
HDL	46±20	43±11	47±23	0,78
LDL	123±47	124±61	122±40	0,25

A weakly/moderately positive-correlation was found between the total number of hospitalisations in patients with psychosis and triglyceride levels ($r: +0,239$, $p: 0,045$). The mean number of suicidal attempt was $0,72 \pm 1,7$ in the study group. A weakly/moderately inverse-correlation was found between the total number of suicidal attempts in patients with psychosis and total cholesterol levels ($r: -0,300$, $p: 0,02$).

4. Discussion

In this study, we investigated the association of suicide attempts with total cholesterol and lipoprotein profiles in psychotic patients who had an episode of suicide attempt and without any suicidal behavior.

Previous reports have not found differ between patients with and without suicidal attempt with respect to demographic variables[10]. Similarly in our study there were no statistically significant differences between the groups in terms of age, gender smoking rates, body mass index, formal education.

Previous studies suggested that altered lipid profile, including low total cholesterol (TC) and low-density lipoprotein-cholesterol (LDL-c) levels, is associated with high suicide risk in schizophrenic patients[6,11,12,13]. In our study, total cholesterol levels were lower in all chronic psychotic patients who had an episode of suicide attempt similar to previous studies. There was no difference between patients with and without suicide attempt at triglyceride, HDL, LDL cholesterol levels.

High suicide rates in early psychotic patients have been reported consistently in studies[14]. In addition, it has been reported that low cholesterol levels are associated with severe suicidal ideation in early psychotic patients[15]. In our study, we found a similar relationship between the high suicide attempt rate (33%) and low total cholesterol level in the chronic period of the disease. Contrarily, in a retrospective study of 213 psychiatric patients, researchers found no difference in serum cholesterol levels between patients with and without suicide attempts[16].

A study analyzed the brain oxysterol levels, the enzymatic oxidation products of cholesterol, in the prefrontal cortex of suicide victims. Their results show a significant increase in 24-hydroxysterol, which reflects a higher turnover of cholesterol. They suggest that this metabolic process may be responsible for a reduction in central and peripheral cholesterol in these patients [16]. Finally, low lipid levels in schizophrenia patients may also be associated with metabolic syndrome. The incidence of metabolic syndrome in patients with schizophrenia was found lower than in patients without suicide attempt[17]. The relationship between serum cholesterol and suicidal behavior is also explained by the hypothesis that low serum cholesterol levels may cause decreased central serotonergic activity with changes in viscosity and function of serotonin receptors and carriers[18].

Some methodological limitations should be considered in the interpretation of our results; the small sample size of the groups studies, dietary differences that affect serum cholesterol levels. Additionally, retrospective study design may be an another limitation.

In conclusion, this study has contributed to many of the studies showing the relationship between suicidal behavior and lower total plasma cholesterol levels. Therefore, in patients with chronic psychosis we support the role of plasma cholesterol as a biological status indicator in the evaluation of suicide risk.

5. Conflict of Interest

The authors declare that there are no conflicts of interest.

6. Ethics Approval and Consent to Participate

This retrospective study was carried out in psychiatry clinics of the Adana State Hospital Community Mental Health Center, Turkey, between October 2016 and July 2017. The institutional review board approved this study. This study was approved by the Ethics Committee. All procedures were followed in accordance with the Good Clinical Practice standards and with the Helsinki Declaration of 2008.

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