

# Lipid Parameters – Significance in Patients with Endogenous Depression

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## ABSTRACT

**Background:** People are aware of the consequences of high serum lipid levels, specifically, total cholesterol. Awareness about harmful effects of very low levels of serum lipids is still lacking. Very low levels of serum lipids lead to psychological consequences.

**Objectives:** The objective of this study was to show whether there was a significant relationship between serum lipid levels and depression.

**Material and Methods:** Total 70 subjects were included in this study. 40 subjects suffering from depression as assessed with the help of clinical findings and Beck Depression Inventory (BDI) scores were included in the study group, while control group comprised of 30 normal subjects. Lipid profile was done on blood samples obtained after overnight fasting. BDI scores were also obtained in control group using BDI. Co-relation between BDI score and lipid levels was obtained in both the groups.

**Results:** Serum lipid levels were significantly low in study group as compared to control group. There was a significant negative co-relationship between serum lipid levels with depression. Subjects of study group having lower lipid levels specifically Total Cholesterol (TC) ( $r = -0.78$ ), Low-Density Lipoprotein (LDL) ( $r = -0.69$ ), TG ( $r = -0.41$ ) and Very Low-Density Lipoprotein (VLDL) ( $r = -0.418$ ), showed higher BDI scores ( $p < 0.05$ ).

**Conclusion:** We can conclude that there is a significant relationship between low TC and depression. Similarly, low levels of serum LDL, TG and VLDL also showed significant relationship with depression. Lipid levels below a certain limit are not good as it may cause depression. Patients with low lipid levels should be screened for depression so that if necessary, corrective measures can be taken at the earliest.

## INTRODUCTION

The health hazards of high serum TC have been established in various studies [1,2]. A lot is known about the desirable total cholesterol levels ( $<200$  mg/dl), but recent research shows that very low cholesterol levels may be just as unhealthy as very high total cholesterol levels. Although, cholesterol-lowering medications might lower the risk of heart attacks or strokes, our obsession with lowering cholesterol completely ignores the potential psychological consequences that may occur with low cholesterol [3]. Unfortunately, people are not aware of the dangers of low cholesterol.

People with low cholesterol levels are more likely to score high on measures of depression and anxiety than people with normal or high cholesterol levels. Adequate cholesterol is so essential that your body warns you with depression if serum cholesterol level is too low. The lower the cholesterol level, the deeper is the depression [1].

Depression is one of the contributory causes of morbidity in the general population, particularly with increasing stress. There are various aspects of the association between the TC levels and the health of the patient.

We undertook this study to assess the relationship between serum TC levels and depression. We also tend to assess the relationship of other lipid profile parameters like serum TG, HDL, LDL and VLDL with degree and severity of depression.

## MATERIALS AND METHODS

This study was conducted in the Clinical Biochemistry Laboratory, Department of Medicine and Department of Psychiatry at AVBRH, Sawangi (M) Wardha, India. The concerned psychiatrist randomly chose a group of 40 known patients of endogenous depression with mean age of  $35.44 \pm 1.23$ , not associated with any other disease (study group). A group of 30 healthy individuals with mean age of

$32.43 \pm 2.13$  (control group) were selected from the local area by the physician. Written informed consent of all the individuals included in the study was taken at the time of health check-up, after describing the indications and utility of this study.

**Exclusion criteria:** Subjects with any other major illness; medication use for acute or chronic illnesses or for the treatment of hypercholesterolemia; smokers; subjects on treatment for depression, those on oral contraceptives and not falling in the age group of 30-70 years were excluded from the study.

Serum TC and other lipid parameters like TG, HDL, LDL and VLDL levels of both the groups were estimated to assess the relationship between lipid parameter and depression. Fasting blood samples were collected at the same time as health history. Estimation of serum cholesterol was done by CHOD-PAP Method [4] using fully automatic batch analyzer.

The intensity, severity and depth of depression was assessed in both the groups using the BDI [5] which is composed of 21 questions or items, each with four possible responses. In this inventory, each response is assigned a score ranging from zero to three, indicating the severity of the symptom. The sum of all BDI item scores indicates the severity of depression. For people who have been clinically diagnosed, scores from 0 to 9 represent minimal depressive symptoms, scores of 10 to 16 indicate mild depression, scores of 17 to 29 indicate moderate depression and scores of 30 to 63 indicate severe depression.

The statistical methods used were z-test and Pearson's Correlation Coefficient. As the data is quantitative and the numbers of observations were more than 30, we used Z-test and for showing association between two quantitative data we used Pearson's Correlation Coefficient.

**Keywords:** Lipid profile, Depression, Beck Depression Inventory

## RESULTS

The mean age of the subjects of study group in years is  $35.44 \pm 1.23$  and in the control group, it is  $32.43 \pm 2.13$  [Table/Fig-1]. The number of males and females in the study group were 15 and 25 and in the control group were 14 and 16, respectively [Table/Fig-2].

Age Group(yrs)	Control Group	Study Group
31-40	18 (60)	28 (70)
41-50	4 (13.3)	10 (25)
51-60	5 (16.67)	1 (2.5)
61-70	3 (10)	1 (2.5)
Total	30 (100)	40 (100)
Mean	32.43	35.44
SD	2.13	1.23
Range	32-69	35-68

**[Table/Fig-1]:** Age wise distribution of subjects of both the groups  
Values in the brackets are in percentage.

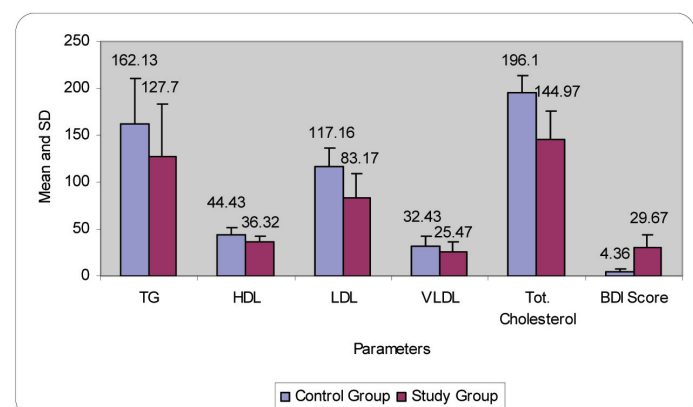
Gender	Control Group	Study Group
Male (n=29)	14 (46.67)	15 (37.5)
Female (n=41)	16 (53.33)	25 (62.5)
Total (n=70)	30 (100)	40 (100)

**[Table/Fig-2]:** Gender wise distribution of subjects of both the groups  
Values in the Brackets are in Percentage

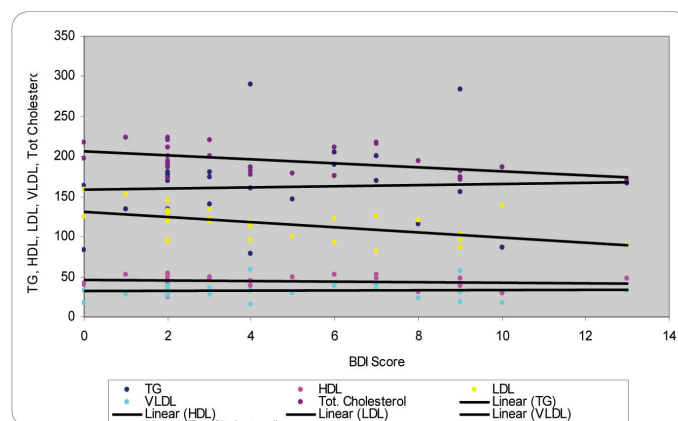
Lipid levels and BDI score in subjects of study and control groups: [Table/Fig-3] shows the values of TC, TG, HDL, LDL, VLDL and BDI scores. The mean TG levels in the study and the control group were  $127.70 \pm 55.25$  mg/dl and  $162.13 \pm 48.67$  mg/dl ( $p=0.007$ ), respectively. The mean HDL-C levels in the study and the control groups were  $36.32 \pm 6.84$  mg/dl and  $44.43 \pm 7.69$  mg/dl ( $p=0.000$ ), respectively. The mean LDL-C levels in the study and control group were  $83.17 \pm 25.45$  mg/dl and  $117.16 \pm 19.77$  mg/dl ( $p=0.000$ ), respectively. The mean VLDL-C in the study and control groups were  $25.47 \pm 11.08$  mg/dl and  $32.43 \pm 9.76$  mg/dl ( $p=0.007$ ) respectively. The mean TC levels in the study and control groups were  $144.97 \pm 30.98$  mg/dl and  $196.10 \pm 17.61$  mg/dl ( $p=0.000$ ), respectively. The difference in the mean values of lipid levels between control and study group is statistically significant. The BDI score in the study and control groups were  $29.67 \pm 14.59$  and  $4.36 \pm 3.29$  ( $p=0.000$ ), respectively and it is statistically significant.

[Table/Fig-3] shows that serum levels of TC, TG, HDL, LDL and VLDL were low in study group as compared to the controls, while the BDI score showed higher value in study group as compared to control group.

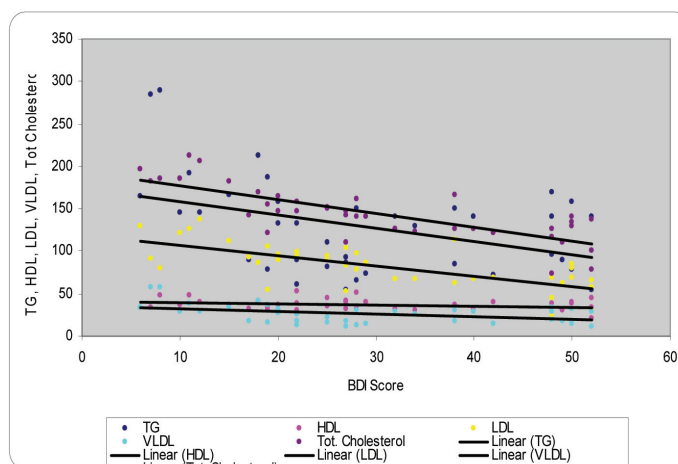
TC, HDL and LDL were significantly low in study group as compared to control group, while BDI score was significantly high in study group as compared to control group.



**[Table/Fig-3]:** Comparison of TG, HDL, LDL, VLDL, TC and BDI score in control and study groups



**[Table/Fig-4]:** Correlation of BDI score with TG, HDL, LDL, VLDL, TC in control group  
TC ( $r = -0.478$ ) and LDL ( $r = -0.52$ )



**[Table/Fig-5]:** Correlation of BDI score with TG, HDL, LDL, VLDL, TC in study group  
TC ( $r = -0.78$ ), LDL ( $r = -0.69$ ), TG ( $r = -0.41$ ), VLDL ( $r = -0.418$ ), HDL ( $r = -0.26$ )

## DISCUSSION

TC has been identified as a risk factor for older adult mortality but is commonly attributed to the fact that low TC levels indicate malnutrition, chronic infections, and subclinical or hidden diseases [6-8].

Our study found that the TC levels were significantly low in patients suffering from depression as compared to healthy individuals. This may be due to changes in the cholesterol content of the synaptosomal membrane and a decrease in the number of serotonin receptors due to a decrease in cholesterol concentration [9]. Since membrane cholesterol freely exchanges with the cholesterol in the surrounding medium, a lowered cholesterol concentration may contribute to a decrease in brain serotonin, with poorer suppression of aggressive behavior [7,10]. All other parameters besides TC showed lower values in patients of depression [Table/Fig-3]. The BDI scores are higher in subjects of study group. Low lipid levels can be the cause of decreased activity of serotonin receptors and serotonin transporter by decreasing the lipid micro viscosity of the membrane of the neural cell [11,12]. Cholesterol is essential as 10-20% of the brain is composed of cholesterol. Essential substances like the sex hormones, vitamin-D and bile acids are also constructed of cholesterol. Therefore it is absolutely not true that a low cholesterol level is healthier [13].

According to a recent study, men who have relatively low levels of cholesterol ( $< 160$  mg/dl) are four to seven times more likely to report symptoms of severe depression than men with high cholesterol levels [14].

Person with low cholesterol can benefit by raising their level through healthy dietary measures, like consuming more fish, fish oil or linseed oil. Eating fatty fish or linseed oil can help to lift depression. Fatty fish

such as salmon, cod, and linseed oil contain omega-3 fatty acids which are required to raise the levels of serotonin in a way similar to anti-depressants [12].

Depression is one of the contributory causes of morbidity in the general population, particularly with increasing stress.

These values and [Table/Fig-4 and 5] showed that the negative co-relation is stronger in study group, as compared to control group. This indicates that as the TC and LDL value decreases the severity of depression increases. In study group, other lipid parameters like TG and VLDL also showed significant negative co-relation with BDI scores ( $r = -0.41$  and  $r = -0.418$ ), respectively. HDL does not show any significant co-relation with BDI score in study group ( $r = -0.26$ ). Very few of researchers have been able to assess the co-relation between low lipid levels and depression. More work is required in this field. Once the relation between low levels and depression is assessed, it will not only be easy to diagnose the condition but also will help in screening the healthy people for depression by estimating their serum cholesterol levels and further we can prevent this by taking timely measures.

## CONCLUSION

It was found that there is a strong negative correlation between lipid levels, particularly TC and LDL with depression. Lipid levels below a certain limit are not good as it may cause depression. Patients with low lipid levels should be screened for depression so that if necessary, corrective measures can be taken at the earliest. More over serum TC can also be used as a screening test along with depression inventory.

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