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COMPARISON OF SERUM LIPID LEVELS BETWEEN SUICIDAL AND NON-SUICIDAL DEPRESSION PATIENTS

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ABSTRACT

Background: Lower levels of circulating lipids is risk factor for suicide in depressive disorder. A reduced serum cholesterol level may be accompanied by changes in viscosity and function of serotonin receptors and transporter, thus predisposing to suicidal behaviour.

Materials and Methods: A total of 100 depressive patients (50 suicidal and non-suicidal) and 100 healthy matched control subjects were recruited from mental hospital, Indore and lipid profile was measured.

Results: Suicidal depression patient group has shown significantly less Total Cholesterol, Triglyceride, LDL-c, VLDL-c than Non-Suicidal depression patient group

Conclusion: Lower levels of serum cholesterol is predictor of suicidal behaviour in depressive disorder.

KEYWORDS : depression, cholesterol, lipids, suicide, serotonin

INTRODUCTION

Suicide is an important public health problem and is one of the leading causes of death worldwide (O'Connor et al., 2013). Biological markers might be linked to suicidality, among which serum lipid levels might play an important role (Lee et al., 2011; Asellus et al., 2010; Huang et al., 2005; Lee et al., 2003).

Cholesterol is a core component of the central nervous system (CNS), essential for the cell membrane stability and the correct functioning of neurotransmission (Ghaemi et al., 2000).

Altered levels of plasma esterified cholesterol which is in equilibrium with membrane cholesterol might have resulted in decreased membrane fluidity and an increase in the order of membrane lipid bilayer. This might impair the serotonergic neurotransmission, which has been implicated in the pathophysiology of suicide (Mathew et al., 2018).

Many studies have demonstrated an association between suicidal behaviour and low levels of total serum cholesterol (Segoviano-Mendoza et al., 2018; Olié et al., 2011; Diaz-Sastre et al., 2007; Rabe-Jabłońska & Poprawska, 2000; Ainiyet & Rybakowski, 1996; Maes et al., 1997). This association has mainly been reported in men (Olié et al., 2011; Diaz-Sastre et al., 2007).

However, one of the main limitations of most of the studies is that they have evaluated the lipid profile in patients who are receiving antidepressant medications, and because of this, it is difficult to entangle the altered lipid profile that could be attributed to suicidality in depression per se or the antidepressant medications. Another limitation of most of the above studies is the small sample sizes. Many of the above studies had limitations in the form of lack of healthy control group.

In the current study not only healthy controls were included, depression patients were divided into two groups i.e. suicidal and non-suicidal and both groups were not only compared to healthy controls but also among themselves so that the clear contribution of suicidality in altered lipid levels could be elucidated.

AIM : To measure and compare serum cholesterol levels between depression patients with suicidal behaviour, without suicidal behaviour and normal healthy control..

METHODOLOGY: A total of 100 depressive patients(according to ICD-10 ,aged 18-60 years, drug naïve or drug free (for 3 months) and 100 healthy age and sex matched control subjects were recruited from mental hospital, indore. Depressive patients were divided into two groups i.e 50 with suicidal behaviour and 50 without suicidal behaviour. Patients with comorbid psychiatric illness, dyslipidemia, hypertension or endocrinological disorders were excluded. Blood samples were drawn after overnight fasting. Fully automated analysers were used for testing the blood samples. Plasma levels of total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-c) were determined by enzymatic colorimetric methods (Enzymatic peroxidase colour test). GPO-PAP method using glycerol-3-phosphate oxidase was used for TG and CHOD-PAP method using cholesterol oxidase for TC. For (HDL-c) selective detergent was used as endpoint accelerator. LDL-c was determined by Friedewald formula i.e (TC-HDL-[TG/5]). Patient group was assessed on HAM-D, Beck's SSI,SBQ.

TABLE 1: CLINICAL CHARACTERISTICS OF THE DEPRESSION PATIENTS

Variables	Suicidal depression patients Mean± SD	Non-Suicidal depression Patients Mean± SD
Age of onset of illness (in years)	28.64±8.76	27.66±9.20
Duration of illness (in months)	45.48±46.08	53.64±45.49
HAM-D SCORES	28.64±5.24	21.60±4.88
BECK'S SSI SCORES	21.18±4.79	
SBQ-R SCORES	13.88±2.38	

*p< 0.05; **p< 0.01; ***p< 0.001

TABLE 2: COMPARISON OF LIPID PARAMETERS BETWEEN NON-SUICIDAL DEPRESSION PATIENTS AND NORMAL HEALTHY CONTROL.

Parameters	Suicidal Depression Patients Mean±SD N=50	Healthy controls Mean±SD N=50	T	P

Total Cholesterol (mg/dl)	**146.29± 37.90**	**159.76± 28.67**	**-2.004**	**0.048***
Triglycerides (mg/dl)	105.96± 48.43	164.84± 66.83	-5.044	**0.000*****
HDL-c (mg/dl)	42.41± 13.63	38.02± 6.20	2.072	**0.041***
LDL-c (mg/dl)	84.17± 29.87	92.04± 23.26	-1.468	0.145
VLDL-c	28.03± 28.28	30.92± 14.57	-0.642	0.522

*p< 0.05; **p< 0.01; ***p< 0.001

TABLE 3: COMPARISON OF LIPID PARAMETERS BETWEEN SUICIDAL DEPRESSION PATIENTS AND NORMAL HEALTHY CONTROLS.

Parameters	*Suicidal Depression Patients Mean± SD N=50*	*Non-suicidal Depression Patients Mean± SD N=50*	*t*	*P*
Total Cholesterol (mg/dl)	146.29±37.90	197.08± 51.01	5.651	***0.000****
Triglycerides (mg/dl)	105.96±48.43	168.24± 91.05	4.270	***0.000****
HDL-c (mg/dl)	42.41±13.63	59.12± 61.89	1.865	0.065
LDL-c (mg/dl)	84.17±29.87	134.49± 161.40	2.168	***0.033****
VLDL-c	28.03±28.28	40.31± 31.18	2.063	***0.042****

*p< 0.05; **p< 0.01; ***p< 0.001

TABLE 4: COMPARISON OF LIPID PARAMETERS BETWEEN SUICIDAL DEPRESSION PATIENTS AND NON-SUICIDAL DEPRESSION PATIENTS.

Parameters	**Non-suicidal Depression Patients (Mean±SD) N=50**	**Healthy controls (Mean±SD) N=50**	**T**	**P**
Total Cholesterol (mg/dl)	197.08± 51.01	167.84± 31.08	3.462	**0.001****
Triglycerides (mg/dl)	168.24± 91.05	150.02± 48.43	1.249	0.214
HDL-c (mg/dl)	59.12± 61.89	40.38± 5.53	2.133	**0.035***
LDL-c (mg/dl)	134.49± 161.40	93.90± 22.20	1.762	0.081
VLDL-c	28.03± 28.28	30.92± 14.57	1.943	0.055

*p< 0.05; **p< 0.01; ***p< 0.001

RESULTS

- Non-suicidal depression patient group has shown significantly more HDL-c, Total Cholesterol than the control group.
- Suicidal depression patient group has shown significantly less Total Cholesterol, Triglycerides and significantly more HDL-c than control group.
- Suicidal depression patient group has shown significantly less Total Cholesterol, Triglyceride, LDL-c,VLDL-c than Non-Suicidal depression patient group.

DISCUSSION

SUICIDALITY AS A CONTRIBUTORY FACTOR FOR LOW LIPID LEVELS

On comparing lipid parameters i.e HDL, LDL, VLDL, total TG, total cholesterol, between Non-suicidal depression patient and control group. There were no statistically significant difference between patient and control group in respect to VLDL level and LDL level. Non-suicidal depression patient group has shown significantly more HDL-c, Total Cholesterol than the control group.

On comparing lipid parameters i.e HDL, LDL, VLDL, total TG, total cholesterol, between Suicidal depression patient and control group. There were no statistically significant difference between patient and control group in respect to VLDL level and LDL level. Suicidal depression patient group has shown significantly less Total Cholesterol, Triglycerides and significantly more HDL-c than control group.

On comparing lipid parameters i.e HDL, LDL, VLDL, total TG, total cholesterol, between Suicidal depression patient and Non-Suicidal depression patient group. There were no statistically significant difference between both groups in respect to HDL level.

Suicidal depression patient group has shown significantly less Total Cholesterol, Triglyceride, LDL-c, VLDL-c than Non-Suicidal depression patient group.

The above findings are consistent with several studies that have shown association of lower lipid profile with suicidality in depression (Segoviano-Mendoza et al.,2018; Olié et al., 2011; Diaz-Sastre et al., 2007; Rabe-Jabłońska &Poprawska, 2000; Maes et al., 1997).

Segoviano-Mendoza conducted a study in 2018 in which plasma levels of total cholesterol, triglycerides, and high-density lipoprotein cholesterol (HDL-c) and low density lipoprotein cholesterol (LDL-c) were determined in 261 MDD patients meeting the DSM-5 criteria for major depressive disorder (MDD), 59 of whom had undergone an episode of suicide attempt, and 206 healthy controls. A significant decrease in total cholesterol, LDL-cholesterol, VLDL-cholesterol and triglyceride serum levels was observed in the groups of MDD patients and suicide attempt compared to those without suicidal behavior ($p < 0.05$).

In 2000, Rabe-Jabłońska & Poprawska, conducted a study on 102 patients with recurrent major depression to determine the level of total cholesterol and LDL-cholesterol in blood samples, in which putative correlations between the level of total cholesterol and severity of depressive symptoms and between total serum cholesterol and LDL-cholesterol and suicidal risk were evaluated. . The level of total cholesterol 160 mg/dl or less and the level of LDL-cholesterol 100 mg/dl or less were observed in persons with suicidal behavior only (S+ and AS). Low total cholesterol and LDL-cholesterol levels in persons in the acute period of major depression provided a useful parameter of suicide risk.

A significant statistical correlation between the low level of total cholesterol and suicidal ideation was also found ($r = 0.82$, $p < 0.05$) as well as between the low level of serum total cholesterol and severity of depression, as evaluated by HAMD-S ($r = 0.27$, $p < 0.05$). (Rabe-Jabłońska & Poprawska, 2000).

As per study by Maes et al., lower serum HDL-C levels are a marker for major depression and suicidal behaviour in depressed men. Lower serum HDL-C levels are probably induced by the immune/inflammatory response in depression and there is impairment of reverse cholesterol transport from the body tissues to the liver (Maes et al., 1997).

Mechanism of Association of Lipids And Suicide

The above finding i.e the relationship between low cholesterol levels and suicidality in depression, is explainable by the cholesterol-serotonin hypothesis. In 1992 Engelberg, hypothesized that a reduced serum cholesterol level may be accompanied by changes in viscosity and function of serotonin receptors and

transporters as well as by decreased serotonin precursors that may cause an increase in suicide ideation (Engelberg et al., 1992).

Experimental evidence indicates that the lipid fluidity markedly modulates the binding of serotonin (5-HT); therefore, with low cholesterol levels, the cellular membrane fluidity increases and 5-HT receptors are less exposed to 5-HT in the synaptic cleft. There is also evidence for an association between reduced 5-HT activity and suicide (Asberg et al., 1976).

However, certain studies that did not find an association between cholesterol and suicidality in depressive patients (Deisenhammer et al., 2004; Bartoli et al., 2017).

LIMITATIONS

There is lack of longitudinal follow-up.
There is lack of assessment of the effect of lifestyle factors, physical activity, dietary factors all of which can confound the lipid levels. Baseline assessment was not matched.

CONCLUSION

When depression patients were divided into two groups on the basis of suicidality it was seen that suicidal depression patients had lower lipid levels as compared to controls but non-suicidal depression patients didn't had lower lipid levels as compared to contols.

Furthermore when both the groups were compared, suicidal depression patients were found to have lower lipid levels than non-suicidal depression patients, thus stating that suicidality contributed to the lower lipid levels in depression patients. Thus lipid levels can serve as a potential marker of suicidal behaviour in depression patients. Further studies needs to be done to substantiate the role of serum cholesterol as a potential biomarker of suicde.

REFERENCES:

1. Ainiyet, J., & Rybakowski, J. (1996). Low concentration level of total serum cholesterol as a risk factor for suicidal and aggressive behavior. Psychiatriapolska, 30(3), 499-509
2. Asberg, M., Traskman, L., Thoren, P. (1976). 5-HIAA in the cerebrospinal fluid. A biochemical suicide predictor?. Archive of General Psychiatry. 33, 1193-7.
3. Asellus, P., Nordström, P., & Jokinen, J. (2010). Cholesterol and CSF 5-HIAA in attempted suicide. Journal of affective disorders, 125(1-3), 388-392.
4. Bartoli, F., Crocamo, C., Dakanalis, A., Riboldi, I., Miotto, A., Brosio, E., ...&Carrà, G. (2017). Association between total serum cholesterol and suicide attempts in subjects with major depressive disorder: exploring the role of clinical and biochemical confounding factors. Clinical biochemistry, 50(6), 274-278.
5. Deisenhammer, E. A., Kramer-Reinstadler, K., Liensberger, D., Kemmler, G., Hinterhuber, H., & Fleischhacker, W. W. (2004). No evidence for an association between serum cholesterol and the course of depression and suicidality. Psychiatry Research, 121(3), 253-261.
6. Diaz-Sastre, C., Baca-Garcia, E., Perez-Rodriguez, M. M., Garcia-Resa, E., Ceverino, A., Saiz-Ruiz, J., ...& De Leon, J. (2007). Low plasma cholesterol levels in suicidal males: a gender-and body mass index-matched case-control study of suicide attempters and nonattempters. Progress in Neuro-Psychopharmacology and Biological Psychiatry, 31(4), 901-905
7. Engelberg, H. (1992). Low serum cholesterol and suicide. The Lancet, 339(8795), 727-729
8. Ghaemi, S. N., Shields, G. S., Hegarty, J. D., & Goodwin, F. K. (2000). Cholesterol levels in mood disorders: high or low?. Bipolar Disorders, 2(1), 60-64.
9. Huang, T. L. (2005). Serum lipid profiles in major depression with clinical subtypes, suicide attempts and episodes. Journal of affective disorders, 86(1), 75-79.
10. Lee, B. H., & Kim, Y. K. (2011). Potential peripheral biological predictors of suicidal behavior in major depressive disorder. Progress in Neuro-Psychopharmacology and Biological Psychiatry, 35(4), 842-847.
11. Lee, H. J., & Kim, Y. K. (2003). Serum lipid levels and suicide attempts. Acta Psychiatrica Scandinavica, 108(3), 215-221.
12. Maes, M., Smith, R., Christophe, A., Vandoolaeghe, E., Gastel, A. V., Neels, H., ... & Meltzer, H. Y. (1997). Lower serum high-density lipoprotein cholesterol (HDL-C) in major depression and in depressed men with serious suicidal attempts: relationship with immune-inflammatory markers. Acta Psychiatrica Scandinavica, 95(3), 212-221
13. Mathew, B., Srinivasan, K., Pradeep, J., Thomas, T., & Mandal, A. K. (2018). Suicidal behaviour is associated with decreased esterified cholesterol in plasma and membrane fluidity of platelets. Asian journal of psychiatry, 32, 105-109
14. O'connor, E., Gaynes, B. N., Burda, B. U., Soh, C., & Whitlock, E. P. (2013). Screening for and treatment of suicide risk relevant to primary care: a systematic review for the US Preventive Services Task Force. Annals of internal medicine, 158(10), 741-754
15. Olié, E., Picot, M. C., Guillaume, S., Abbar, M., &Courtet, P. (2011). Measurement of total serum cholesterol in the evaluation of suicidal risk. Journal of affective disorders, 133(1), 234-238.
16. Rabe-Jabłońska, J., &Poprawska, I. (2000). Levels of serum total cholesterol and LDL-cholesterol in patients with major depression in acute period and remission. Med SciMonit, 6(3), 539-547.
17. Segoviano-Mendoza, M., Cárdenas-de la Cruz, M., Salas-Pacheco, J., Vázquez-Alaniz, F., La Llave-León, O., Castellanos-Juárez, F., ... & Méndez-Hernández, E. (2018). Hypocholesterolemia is an independent risk factor for depression disorder and suicide attempt in Northern Mexican population. BMC psychiatry, 18(1), 7.