The Association Between Serum Cholesterol Levels and Suicidal Thoughts and Behaviors

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**Background:** Psychiatrists have the responsibility of assessing dangerousness. Patients are hospitalized, at times involuntarily, based on an evaluation of the patient’s risk of committing suicide, committing homicide or their ability to care for themselves. Although we have demographic indicators to gauge levels of risk, the prediction of dangerous behavior continues to generate a large number of false positive and negative results. As psychiatry evolves, there is a movement to understand mental health, not solely based on behaviors and subjective report, but based also on objective markers of illness. These markers are taking the form of functional imaging, genetic analysis and measurements of neurotransmitter levels. It is not surprising, therefore, that researchers are examining the correlation between behavioral manifestations of mental illness and objective laboratory values. In particular, several studies have focused on a relationship between serum cholesterol levels and aggressive behaviors including suicide.

Researchers identified a potential relationship between low cholesterol levels and suicidal behavior when examining the effect of lipid-lowering therapies on mortality. Even though the risk of death due to cardiac causes declined, there was noted to be an increase in death from non-cardiac causes (including accidents, murders and suicides). In an effort to delineate the relationship between cholesterol levels and suicide, studies have examined individuals with genetic mutations in cholesterol metabolism and individuals with various classifications of mental illness. With the growing evidence of a correlation between low cholesterol levels and increased rates of suicide, there is an attempt to identify the linking variable between the two. Researchers have hypothesized that low cholesterol levels lead to novelty-seeking behavior and increased impulsivity. Research has also focused on depression as the unifying variable. To date, the conclusions are controversial as to the connection as well as to the extent that cholesterol levels, and the clinical manipulation of those levels, impact suicidal behavior.

**Objectives:** In this study, we attempted to further analyze the association between suicidal ideation and behavior and total serum cholesterol levels. In addition, we hoped to delineate the relationship of suicidality with the various cholesterol components of the lipid profile.

**Methods:** A patient sample was selected from a database of patients that were admitted to the psychiatric inpatient units of the University of Massachusetts Medical School between July 2003 and December 2004. The database was generated to include only those patients with a discharge diagnosis included within the category of Mood Disorders, based on the criteria set forth in the Diagnostic and Statistical Manual, 4th edition. The following diagnoses were
included: major depressive disorder, single and recurrent episodes (296.2, 296.3); bipolar I disorder, most recent episode depressed (296.5); bipolar disorder NOS (296.80); bipolar II disorder (296.89); mood disorder NOS (296.90) and cyclothymic disorder (301.13). Patients were selected from the database if they had had a serum cholesterol level drawn within three months of their admission to an inpatient unit. Patients received a random identifier in order to ensure confidentiality. The subjects were stratified based on their presentation at time of admission into those with and without suicidal ideation and those with and without a suicidal attempt. Suicidal ideation was defined as any thoughts of suicide prior to admission; suicidal attempt was defined as any self-injurious action leading to admission. The data obtained was analyzed using SPSS statistical software to provide descriptive interpretation and parametric analysis of significance. A p-value of < 0.05 was accepted as statistically significant.

Results: The database generated a list of 792 patients that had been admitted to the psychiatric inpatients services at UMMHC between July 2003 and December 2004 with a discharge diagnosis within the category of Mood Disorders. Of these patients, 135 had lipid levels drawn within 3 months of their psychiatric admission as well as an electronic discharge summary of the hospitalization. Seventy-seven (57%) of the 135 sample population were women and 58 (43%) were men with ages ranging from 17 to 82 years. Within the sample, there were 34 (25%) subjects without suicidal ideation compared to 101 (75%) subjects with suicidal ideation. There were 111 (82%) subjects without a suicide attempt and 24 (18%) with a suicide attempt. The average total serum cholesterol for patients without a suicide attempt prior to admission was 200.58 +/- 48 and the average total cholesterol for patients with an attempt prior to admission was 182.67 +/-56. The average total serum cholesterol level for subjects without suicidal ideation was 213.53 +/- 50 and the average total cholesterol for subjects with suicidal ideation was 191.96 +/- 49. The comparison of total cholesterol levels between patients with and without suicidal ideation showed a significant difference between the two groups (p=.029) with those with suicidal thoughts having lower cholesterol levels than those without suicidal ideation. This significance was not demonstrated for other components of the cholesterol panel or for the comparison between those with suicide attempts and those without such attempts.

Conclusion: This retrospective chart review demonstrated a significantly lower average cholesterol level in subjects that had suicidal ideation compared to those without. This supports previous studies that have indicated this correlation. The statistical significance of the difference did not extend to those with attempts versus those without attempts, nor did it extend to the various components of the lipid profile; these associations may be evident in a study with increased power. Other limits of this study included potential subjective bias in chart interpretation, variable dates of cholesterol level sampling compared to psychiatric hospitalization, and potential confounding factors including medical illness, medications taken by study subjects, and alcohol use. Further investigation should stratify subjects based on the above criteria. Future studies would also benefit from distinguishing between those subjects with low cholesterol levels secondary to lipid-lowering medication versus those subjects not on any therapy.
The relevance of identifying the connection between cholesterol and suicidality extends not only to its predictive value or risk factor analysis but also to understanding the tendency towards suicidal behavior on a molecular level. Hypotheses concerning this molecular correlation have included that low central nervous system cholesterol in neuronal membranes could decrease serotonin receptor expression or change cell membrane configuration leading to increased risk. Given the various implications of the correlation between suicidality and cholesterol, further prospective investigation into this association is vital.