Published in final edited form as:

Psychiatry Res. 2007 July 30; 152(1): 11–20.

Cholesterol and suicide attempts: A prospective study of depressed inpatients

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Abstract

Low cholesterol levels have commonly been associated with various suicide measures. We sought to examine suicide attempts in a prospective sample of depressed patients that on prior analysis demonstrated an association between low cholesterol and subsequent suicide completions. Seventy-four inpatients with Research Diagnostic Criteria unipolar major depression, bipolar depression or schizoaffective depression entered a prospective follow-up study from 1978 - 1981. Kaplan-Meier survival analysis and Cox regression were utilized to elucidate the relationship between cholesterol levels and subsequent severe suicide attempts as well as all suicide attempts regardless of severity. Attempts preceding index hospitalization and other lifetime attempts were evaluated cross-sectionally. Low serum cholesterol levels did not predict subsequent suicide attempts. Contrary to our hypothesis, the high cholesterol group was associated with increased risk of suicide attempts on survival analysis in those less than median age. Nonetheless, in cross-sectional analysis, the low cholesterol group had more suicide attempts preceding index hospitalization and more remote lifetime attempts. The results from this prospective dataset do not support an association between low cholesterol and subsequent suicide attempts despite replicating the retrospective findings of previous case-control and cross-sectional studies.

Keywords

adult; major depression; bipolar depression; suicide; prospective cohort study; risk factors

1. Introduction

Suicide was the fifth leading cause of death based on years of potential life lost before age 65 in the United States from 1999-2002, the most recent years for which data is publicly available (CDC, 2005). Depressive disorders are the diagnoses uncovered most often in psychological autopsy studies (Barraclough et al., 1974; Rich et al., 1986; Henriksson et al., 1993; Isometsa et al., 1994; Conwell et al., 1996) and extensive efforts have been employed to elucidate risk factors for suicide among depressed patients to aid clinical decisions regarding appropriate level of care (Goldstein et al., 1991; APA, 2003; Coryell and Young, 2005).

In the early 1990's, analysis of mortality rates in primary prevention clinical trials revealed associations between low cholesterol and unnatural death (Muldoon et al., 1990; Lindberg et

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al., 1992; Neaton et al., 1992). Subsequent analyses of data from non-interventional community studies replicated and clarified this relationship. Of large ($N > 5000$) studies that described suicide as a secondary outcome, five found an association between low cholesterol levels and subsequent suicides (Lindberg et al., 1992; Neaton et al., 1992; Zureik et al., 1996; Partonen et al., 1999; Ellison and Morrison, 2001). Two, however, found no difference (Smith et al., 1992; Tamosiunas et al., 2005) and two demonstrated an inverse association (Iribarren et al., 1995; Tanskanen et al., 2000).

Case-control and cross-sectional studies have demonstrated lower cholesterol levels in patients admitted following suicide attempts compared to those admitted without an attempt (Takei et al., 1994; Kunugi et al., 1997; Papassotiropoulos et al., 1999; Garland et al., 2000; Sarchiapone et al., 2001; Guillem et al., 2002; Kim et al., 2002; Lee and Kim, 2003). Comparisons of suicide attempters to well controls have yielded similar results (Gallerani et al., 1995; Alvarez et al., 1999; Sarchiapone et al., 2000; Atmaca et al., 2002b; Kim et al., 2002; Tripodanis et al., 2002; Lee and Kim, 2003). Some have found the association between low cholesterol and suicide attempts to be strongest among those with violent suicide attempts or with a history of such attempts (Alvarez et al., 2000; Bocchetta et al., 2001; Atmaca et al., 2003b; Vevera et al., 2003; Kim and Myint, 2004; Marcinko et al., 2005). Lower grey matter cholesterol has been demonstrated with violent suicide completers on autopsy (Lalovic et al., 2006) and it has even been suggested that a causal relationship exists between low cholesterol and violence in general (Golomb, 1998).

Nonetheless, many case control studies have found no relationship between cholesterol levels and recent or remote suicide attempts (Fritze et al., 1992; Engstrom et al., 1995; Seefried and Gumpel, 1997; Almeida-Montes et al., 2000; Huang and Wu, 2000; Huang, 2001; Roy et al., 2001; Tsai et al., 2002; Deisenhammer et al., 2004). One recent, large cross-sectional study demonstrated a relationship to elevated cholesterol and suicide attempts in the past year (Brunner et al., 2006) while another demonstrated an association between low high-density lipoprotein cholesterol and increased lifetime suicide attempts in women only (Zhang et al., 2005).

Case-control studies have also associated low cholesterol with other measures of suicidality including suicidal thoughts, suicidal intent, suicidal plan, or previous history of suicide attempts (Modai et al., 1994; Sullivan et al., 1994; Golier et al., 1995; Papassotiropoulos et al., 1999). An association between low cholesterol and suicidality is not limited to individuals with major depression but has also been described in patients with borderline personality disorder (Atmaca et al., 2002a); anorexia nervosa (Favaro et al., 2004); panic disorder (Ozer et al., 2004); and schizophrenia (Atmaca et al., 2003a).

Given the complex interplay of risk factors for suicide and the relative infrequency of suicide completions, the relationship between suicidality, suicide attempts, and suicide completions is not straightforward. Other variables associated with suicide attempts including the severity and timing of attempt (i.e. current episode versus remote) further complicate the comparison of studies.

Previous studies have not evaluated severity and timing broadly and have not integrated prospective and retrospective data. To our knowledge, there have been no prospective studies of cholesterol levels as a predictor of severe suicide attempts in a depressed cohort. The current report utilizes prospective data from the Iowa site of the National Institute of Mental Health (NIHM) Collaborative Study of Depression to extend to severe suicide attempts the results of an earlier analysis of the same population that demonstrated a relationship between low cholesterol and suicide completions (Coryell and Schlessner, in press).

2. Methods

2.1. Subjects

English-speaking, Caucasian adults who sought inpatient and outpatient treatment and met Research Diagnostic Criteria (RDC) (Spitzer et al., 1978) for major depressive disorder, mania, or schizoaffective disorder were recruited for the NIMH Collaborative Study of Depression (CSD) between the years 1978 and 1981 and were followed prospectively thereafter. The current analysis employs the sample used in an earlier report on completed suicide (Coryell and Schlessner, 2001). Four of 78 participants from this original sample did not have baseline cholesterol data and our current analysis was subsequently restricted to the 74 CSD participants at the Iowa site who had both a fasting cholesterol determination and a dexamethasone suppression test during their index admission. Data regarding use of cholesterol-lowering treatments during the time of intake is not available and likely negligible given an estimated 1980-1982 prevalence of use of 0.6% in women and 1% in men based on the Minnesota Heart Survey (Arnett et al., 2002).

2.2. Procedures

Initial diagnoses were based on the complete Schedule for Affective Disorders and Schizophrenia (SADS) (Endicott and Spitzer, 1978) and structured follow-up interviews using the Longitudinal Interval Follow-Up Evaluation (LIFE) (Keller et al., 1992). These occurred at six-month intervals for the first five years and yearly thereafter. The LIFE included characterizations of suicide attempts identical to the corresponding items in the SADS.

A serious attempt was operationally defined by the investigators prior to data analysis as a SADS suicidal intent or medical lethality score of ≥ 4 . Table 1 details these specific SADS items of interest. Secondary analyses of the data ascertained the relationship between cholesterol levels and any subsequent suicide attempts, suicide attempts preceding index hospitalization, and other lifetime suicide attempts. Since this study was not anticipated at the time of data collection, raters were not formally blinded to cholesterol levels; however, raters did not assess cholesterol data.

2.3. Data Analysis

Previous studies of cholesterol and subsequent suicide have divided cholesterol levels into two to five groups. To facilitate comparisons to a previous analysis of suicide completions in the same sample (Coryell and Schlessner, in press), cholesterol values were divided into two groups with the lower range consisting of values less than or equal to 190 mg/dl, representing approximately the lower tertile and selected from a receiver operator characteristic (ROC) curve.

Additionally, an ROC curve constructed to determine an optimal cholesterol cutoff point related to suicide attempts failed to select a superior cutoff. To facilitate clarity of communication, the groups representing the lower tertile and upper tertiles are referred to as the “low” and “high” cholesterol groups respectively.

Severe suicide attempts were operationally defined *a priori* as attempts that reached a score of ≥ 4 for either intent or medical lethality based on the SADS. A further *post hoc* analysis looked at all recorded suicide attempts (i.e. SADS ≥ 1). Higher and lower cholesterol groups were compared with nonparametric Kaplan-Meier survival analysis, which included censored data resulting from loss to follow-up. Median survival could not be reported in this sample as a median cumulative survival of 0.5 was not reached during follow-up. A Cox Regression Analysis was further performed to adjust for potential confounds.

Additionally, a cross-sectional analysis was performed to look at immediately preceding suicide attempts and other lifetime suicide attempts for comparison to previous case-control and cross-sectional studies. The cross-sectional data was analyzed using an independent samples t-test with cholesterol as a continuous variable and chi-square with cholesterol as a dichotomous variable. All statistical tests were two-tailed.

3. Results

Cholesterol concentrations increased significantly with age ($r = 0.5$, $P < 0.0001$) and age was subsequently used as a covariate in regression analyses. A comparison of clinical characteristics between the high and low cholesterol groups demonstrated a significant age difference between groups ($t = -3.8$, $df = 72$, $P = 0.0003$). The high cholesterol group also had more individuals with hypertension and hypothyroidism. No further significant differences were observed between groups.

3.1. Cholesterol and Future Severe Suicide Attempts

The mean (SD) total cholesterol concentration for the entire sample of seventy-four patients was 210.54 (44.67) mg/dl with a range of 109 to 360, consistent with published populations norms of the region and time period (Arnett et al., 2002). The 18 patients with serious suicide attempts had a mean (SD) cholesterol level of 213.4 (36.8) mg/dl and the remaining 56 patients had a mean (SD) cholesterol level of 209.6 (47.2) mg/dl ($t = -0.3$, $df = 72$, $P = 0.75$). A Kaplan-Meier survival analysis (Figure 1) did not support the predicted relationship between lower cholesterol levels and the likelihood of later suicide attempts. The cumulative survival estimation for those with low cholesterol concentrations was 83.3 % compared to 65.7% in the high cholesterol group. These survival rates precluded calculation of median survival time. The mean (SD) survival time for the high cholesterol group was 574 (45) weeks (95% confidence interval 485 – 663 weeks). The mean (SD) survival time for the low cholesterol group was 690 (50) weeks (95% confidence interval 593 – 787 weeks). The mean (SD) number of serious attempts per decade of follow-up were 0.73 (1.46) and 0.39 (1.13) for the high and low cholesterol groups respectively ($t = -1.0$, $df = 72.0$, $P = 0.32$; age-adjusted $F = 4.4$, $P = 0.04$).

In survival analysis of time until the first attempt adjusted for age, the high cholesterol group experienced more severe suicide attempts. (Hazard Ratio 7.82, 95% C.I. 2.00 – 30.77, $P = 0.003$). A significant interaction between age and cholesterol level was also observed ($P = 0.001$). The presence of prior severe attempts were nearly correlated with future severe attempts ($r = 0.2$, $P = 0.057$). With prior severe attempts, age, and the age-cholesterol interaction included as covariates, a significant age by cholesterol group interaction between the high and low cholesterol groups persisted ($P = 0.001$). When stratified by the median age of 32 years, the high cholesterol group remained at greater risk of suicide attempt in those below median age (Hazard Ratio 19.38, 95% C.I. 0.249 – 149.58, $P = 0.005$) while no significant differences were noted in those above median age (Hazard Ratio 0.16, 95% C.I. 0.02 – 1.14, $P = 0.007$). Admission body mass index, gender, hypertension, hyperthyroidism, marital status and psychiatric diagnosis did not result in any substantial changes in the hazard ratios when added as covariates.

3.2. Cholesterol and All Future Suicide Attempts

The twenty-three patients with any future suicide attempt had a mean (SD) cholesterol level of 213.6 (33.4) mg/dl and the remaining fifty-one patients had a mean (SD) cholesterol level of 209.2 (49.2) mg/dl ($t = -0.4$, $df = 72$, $P = 0.70$). A Kaplan-Meier survival analysis (Figure 2) was performed and demonstrated increased suicide attempts in the high cholesterol group, contrary to the prediction of a greater frequency of severe suicide attempts in the low cholesterol

group. The cumulative survival estimation for those with low cholesterol concentrations was 84.4% compared to 54.1% in the high cholesterol group. These survival rates precluded calculation of median survival time. The mean (SD) survival time for the high cholesterol group was 511 (47) weeks (95% confidence interval 418 – 603 weeks). The mean (SD) survival time for the low cholesterol group was 675 (56) weeks (95% confidence interval 565 – 785 weeks). There were significantly more attempts per decade of follow-up in the high cholesterol group number with a mean (SD) of 1.67 (3.56) attempts per decade compared to 0.42 (1.19) attempts per decade in the low cholesterol group ($t = -2.3$, $df = 68.4$, $p = 0.028$; age-adjusted $F = 5.8$, $P = 0.019$).

In survival analysis of time until the first attempt adjusted for age, the high cholesterol group experienced more suicide attempts. (Hazard Ratio 6.85, 95% C.I. 1.85 – 25.38, $P = 0.004$). A significant interaction between age and cholesterol was again observed (Hazard Ratio 0.84, 95% C.I. 0.73 – 0.97, $P = 0.017$). Prior attempts did not correlate with future severe attempts ($r = 0.04$, $P = 0.76$). When stratified by the median age of 32 years, the high cholesterol group remained at greater risk of suicide attempt in those below median age (Hazard Ratio 18.51, 95% C.I. 2.38 – 144.14, $P = 0.005$) while no significant differences were noted in those above median age (Hazard Ratio 0.52, 95% C.I. 0.11 – 2.52, $P = 0.42$). Admission body mass index, gender, hypertension, hyperthyroidism, marital status and psychiatric diagnosis did not result in any substantial changes in the hazard ratios when added as covariates.

3.3. Cholesterol and Recent Suicide Attempts

A cross-sectional study was performed on this cohort of 74 subjects of which 20 had a severe suicide attempt and 27 had any suicide attempt during the index depressive episode prior to admission or within the past year if the index depressive episode exceeded one year in duration. The 20 patients with severe preceding suicide attempts had a mean (SD) cholesterol level of 187.8 (46.3) mg/dl and the 54 without preceding severe suicide attempts had a mean (SD) cholesterol level of 219.0 (41.4) mg/dl ($t = 2.8$, $df = 72$, $P = 0.007$), which retains significance when age is included as a covariate ($F = 4.6$, $P = 0.035$). The 27 patients with any preceding suicide attempt had a mean (SD) cholesterol level of 191.9 (42.4) mg/dl and the 47 patients without any preceding suicide attempt had a mean (SD) cholesterol level of 221.2 (42.8) mg/dl ($t = 2.8$, $df = 72$, $P = 0.006$), which retains significance when age is included as a covariate ($F = 5.2$, $P = 0.026$).

Ten of 23 (43.8%) patients in the low cholesterol group and 10 of 51 (19.6%) patients in the high cholesterol group had a severe suicide attempt as defined by our aforementioned criteria preceding index admission and during the index depressive episode, resulting in a statistically significant difference between groups ($\chi^2 = 4.6$, $df = 1$, $P = 0.032$), which retains significance when age is included as a covariate (Hazard Ratio 8.77, 95% C.I. 1.80 – 41.67, $P = 0.007$). Data regarding the total number of severe suicide attempts during index depressive episode per subject could not be extrapolated from the data set.

Thirteen of 23 (56.5%) patients in the low cholesterol group and 14 of 51 (27.5%) of the patients in the high cholesterol group had any suicide attempt prior to admission during the same depressive episode, resulting in a statistically significant difference between groups ($\chi^2 = 5.8$, $df = 1$, $P = 0.016$), which retains significance when age is included as a covariate (Hazard Ratio 7.25, 95% C.I. 1.69 – 31.25, $P = 0.008$). There was also a significant difference in the number of total attempts between groups ($\chi^2 = 10.4$, $df = 4$, $P = 0.035$; age-adjusted $F = 0.58$, $P = 0.019$).

3.4. Cholesterol and Remote Lifetime Suicide Attempts

A cross-sectional study was again performed on this cohort of 74 subjects of which 12 had a serious suicide attempt and 24 had any suicide attempt in their lifetime prior to the index depressive episode or prior to the past year if the index depressive episode exceeded one year in duration. The 12 patients with severe remote lifetime suicide attempts had a mean (SD) cholesterol level of 193.4 (52.7) mg/dl and the 62 without a history of such attempts had a mean (SD) cholesterol level of 213.9 (42.6) mg/dl ($t = 1.5$, $df = 72$, $P = 0.15$; age-adjusted $F = 0.26$, $P = 0.61$). The 24 patients with any remote lifetime suicide attempt had a mean (SD) cholesterol level of 200.4 (43.7) mg/dl and the 50 patients without such history had a mean (SD) cholesterol level of 215.4 (44.7) mg/dl ($t = 1.4$, $df = 72$, $P = 0.18$; age-adjusted $F = 0.23$, $P = 0.64$).

Six of 23 (26.1%) patients in the low cholesterol group and 6 of 51 (11.8%) patients in the high cholesterol group had a remote lifetime severe suicide attempt as defined by our aforementioned criteria ($\chi^2 = 2.4$, $df = 1$, $P = 0.12$; age-adjusted $P = 0.65$). Data regarding the total number of remote lifetime severe suicide attempts per subject could not be extrapolated from the data set.

Ten of 23 (43.5%) patients in the low cholesterol group and 14 of 51 (27.5%) of the patients in the high cholesterol group had any remote suicide attempt ($\chi^2 = 1.9$, $df = 1$, $P = 0.17$; age-adjusted $P = 0.62$). The low cholesterol group had a significantly greater number of lifetime suicide attempts prior to index depressive episode ($\chi^2 = 12.1$, $df = 5$, $P = 0.034$; age-adjusted $F = 4.6$, $P = 0.035$).

4. Discussion

In this prospective sample of depressed patients, an association was not found between severe suicide attempts and low cholesterol levels. This finding is in contrast with a previous analysis of the same data set demonstrating an association between low cholesterol levels and suicide completions (Coryell and Schlessner, in press). The current analysis not only fails to support the initial hypothesized association between low baseline cholesterol levels and subsequent severe suicide attempts, it suggests the contrary, a finding which persists when extended to include all suicide attempts. Exploration of a cholesterol group by age interaction further reveals that the high cholesterol group has more suicide attempts in only those below median age.

Some studies have suggested that low cholesterol is a consequence of depression, perhaps secondary to diminished appetite or weight loss, and that this accounts for the observed association (Law et al., 1994). However, later studies controlled for weight (Golier et al., 1995), serum total protein (Kunugi et al., 1997), or excluded significant weight loss in the month prior to admission (Garland et al., 2000) and nevertheless linked low cholesterol concentrations to suicidal behavior. Lower serotonergic function may mediate this link (Golomb et al., 2002) and depletion of membrane cholesterol has been demonstrated to adversely effect serotonin transporter activity (Scanlon et al., 2001). Additionally, cholesterol may influence illness and behavior via its important role as a component of the myelin sheath, a precursor for steroid hormone synthesis, and a constituent of cell membranes with subsequent roles in transmembrane exchange, enzyme function, and neurotransmitter receptor expression (Golomb et al., 2004).

The present study is limited by its sample size, limited observations of suicide attempts, and lack of cholesterol data during follow-up. Additionally, the subjects studied were all recruited as inpatients. While this may limit the generalizability, the sample arguably represents a population with a higher suicide risk and subsequently greater applied predictive value for

suicide prediction measures (Qin et al., 2003; Sinclair et al., 2005). Furthermore, while data collection regarding time to first attempt is generally accurate, our data related to the total number of attempts may underestimate total attempts. During some periods of observation, protocols recommended reporting only the most severe subsequent attempts for each specific follow-up period. Age presented a significant confound for comparison between high and low cholesterol groups. The positive correlation between cholesterol levels and age is consistent with other studies (Fritze et al., 1992; Garland et al., 2000; Bocchetta et al., 2001) and the natural history of hyperlipidemia with age as a non-modifiable risk factor (Nestrick and Davignon, 1986). Analyses were subsequently controlled for age.

The use of a prospective cohort of depressed subjects in the current study poses several advantages. The predictive value of a screening measure is largely influenced by prevalence. Given the higher rate of suicide in patients with mood disorders compared to the general population, this study concerns precisely the population to which predictors of suicide are most often applied. Furthermore, the use of a prospective sample, with cholesterol levels determined prior to any suicide attempts, allows for a temporal relationship to be established with cholesterol levels preceding attempts. Cross-sectional studies are hindered by measuring cholesterol levels after suicide attempts. The results of cross-sectional studies, therefore, cannot be applied as readily to a prediction model and cannot differentiate low cholesterol levels which precede the outcome measure from those which are the result of the outcome or underlying condition associated with the outcome.

These unexpected results of our current analysis are difficult to reconcile with the aforementioned findings of previous studies, particularly those of the case-control and cross-sectional studies. This motivated the cross-sectional analysis, which ultimately replicated previously published findings by demonstrating lower cholesterol levels among those admitted following suicide attempt. Within this same prospective data set the following associations have been found: 1) low cholesterol levels with subsequent suicide completions, 2) high cholesterol levels with subsequent suicide attempts, including severe suicide attempts in those less than median age, and 3) prior suicide attempts with low cholesterol levels. While these results may simply be an artifact of dichotomization, the contrasting findings compel further explanation. A variety of potential explanations may be posed for these seemingly discordant findings. The above analyses include the use of different suicide outcome measures in association 1 (suicide completions) versus associations 2 and 3 (suicide attempts). These suicide outcome measures and suicidality markers are not directly interchangeable. The above analyses also subsume different temporal relationships between the measurement of cholesterol and assessed outcome in association 3 (retrospective) versus associations 1 and 2 (prospective). Thus cross-sectional findings may not apply prospectively, suggesting that low cholesterol may potentially result from or be an epiphenomenon of suicide attempts or, more likely, the underlying pathology motivating suicide attempt. This is further supported by the greater magnitude of association between low cholesterol and recent attempts versus remote attempts. Admittedly, this explanation does not completely address the association between low cholesterol and subsequent suicide completions. It is furthermore not clear why association 2 appears restricted to the younger half of the sample.

These findings illustrate the difficulty inherent to the study of the spectrum of suicidality and suicidal behaviors. While intuitively suicidal ideation may serve a surrogate for suicide attempts and subsequently completed suicides, this association is a weak one (Young and Coryell, 2005). A 21 year follow-up study of 785 patients with affective disorders showed that while completed suicide was more likely in those with a history of suicide attempts than in those without such history (8.5% versus 3.5%), the vast majority of completions were committed by those without a history of prior attempts. Furthermore, 97 of 106 attempters did not go on to complete suicide (Coryell and Young, 2005).

The current findings may, in part, explain some of the controversy in the literature regarding the relationship of cholesterol and other biological markers to suicide. The disparity in the relationship between cholesterol and suicide completions versus suicide attempts is not without precedent. A parallel may be drawn to gender differences in suicidal behaviors with more attempts by women and more completions by men (Kuo et al., 2001; APA, 2003). Our findings caution the at times reflexive substitution of suicidal thoughts or suicide attempts as a surrogate for risk of completed suicide. A contemporaneous example of this may include the debate over the risk of suicide with antidepressants in children and adolescents (Brent, 2004; Ryan, 2005). Nevertheless, this caution applies to any inductive argument linking an association of a variable with suicidality to suicide completions solely based on the association between suicidality and suicide completions.

Acknowledgements

We would like to thank Dr. Joseph E. Cavanaugh from the University of Iowa, College of Public Health, Department of Biostatistics for lending his statistical expertise and Dr. Valerie Forman Hoffman from the University of Iowa, Iowa Scholars in Clinical Investigation Program for her epidemiological expertise in review of the manuscript. We would also like to thank Carol A. Moss and Barbara M. Robb for their assistance with data management. This study was funded by NIMH grant MH 25416.

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Cholesterol Values and Subsequent Severe Suicide Attempts

Figure 1. Kaplan-Meier Survival Analysis comparing cumulative survival based on occurrence of severe suicide attempt for high and low total cholesterol groups over 15 years (780 weeks) of follow-up.

Cholesterol Values and Subsequent Suicide Attempts

Figure 2. Kaplan-Meier Survival Analysis comparing cumulative survival based on occurrence of any suicide attempt for high and low total cholesterol groups over 15 years (780 weeks) of follow-up.

Table 1**SADS Items Related to Suicide Attempts**

The specific wording of the relevant SADS items for severity of suicide attempts. The *a priori* cutoff for severe attempts is delineated.

Suicidal Intent: Seriousness of suicidal intent to kill self as judged by overall circumstances including likelihood of being rescued, precautions against discovery, action to gain help during or after attempt, degree of planning and the apparent purpose of attempt, degree of planning and the apparent purpose of attempt (manipulative versus killing self)	0 No information
	1 Obviously no intent, purely manipulative gestures
	2 Not sure or only minimal intent
	3 Definite but very ambivalent
	------(cutoff)-----
	4 Serious
	5 Very Serious
Medical Lethality: Actual medical threat to life or physical condition following the most serious suicide gesture, taking into account the method (gunshot wound more serious than knife wound), impaired consciousness at or during time of rescue, seriousness of lesion, toxicity of ingested materials, reversibility (amount of time expected for complete recovery), and amount of treatment required.	6 Extreme (every expectation of death)
	0 No information
	1 No danger, e.g., no effects, held pills in hand
	2 Minimal, e.g., scratch on wrist
	3 Mild, e.g., took 10 aspirins, mild gastritis
	------(cutoff)-----
	4 Moderate, e.g., took 10 Seconals, had brief unconsciousness
	5 Severe, e.g., cuts throat
	6 Extreme, e.g., respiratory arrest or prolonged coma

Table 2**Demographic and Clinical Characteristics at Baseline by Total Cholesterol Level**

Demographic and clinical characteristics of high and low cholesterol groups. The high cholesterol group contains cholesterol levels > 190 mg/dL. Independent samples t-tests and chi-square tests were utilized to assess differences between groups. No statistically significant differences were found other than age at baseline, prevalence of hypertension, and prevalence of hypothyroidism.

Characteristic	High Cholesterol (N=51)		Low Cholesterol (N=23)	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Length of follow-up (weeks)	538	278	542	299
Age at baseline (years) ^a	39.8	14.8	27	8.5
	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>
Female Gender	34	66.7%	14	60.9%
<u>Intake Psychiatric Diagnosis:</u> ^b				
Major depressive disorder	37	72.5%	15	65.2%
Bipolar type II, depressed	6	11.8%	3	13.0%
Bipolar type I, depressed	5	9.8%	5	21.7%
Schizoaffective disorder, depressed	3	5.9%	0	0.0%
History of Alcohol Abuse	13	25.5%	9	39.1%
History of Illicit Drug Abuse	2	3.9%	1	4.3%
Anorexia Nervosa	1	2.0%	1	4.3%
<u>Medical Co-morbidities at Intake:</u>				
Diabetes mellitus	1	2.0%	0	0.0%
Hypertension ^c	10	19.6%	0	0.0%
Hypothyroidism ^c	8	15.7%	1	4.3%
History of Myocardial Infarction	1	2.0%	0	0.0%

^a Statistically significant $p < 0.001$.

^b Diagnoses made with the Schedule for Affective Disorders and Schizophrenia.

^c Statistically significant $p < 0.05$.