

# LIPID PROFILE IN PATIENTS WITH MAJOR DEPRESSIVE DISORDER AND GENERALIZED ANXIETY DISORDER

Hamidreza Roohafza MD, Masoumeh Sadeghi MD, Hamid Afshar MD,  
Ghafor Mousavi MD, Shahin Shirani MD.

## ABSTRACT

**Introduction:** Several studies demonstrated an association between dyslipidemia and psychiatric disorder. The aim of this study is to evaluate the lipid profile of patients with comorbid generalized anxiety disorder and major depressive disorder.

**Method:** This is a descriptive analytic study of 100 patients (25 in each group: major depressive disorder, generalized anxiety disorder, comorbid anxiety and depressive disorder and control subjects according to DSM-IV). The demographic characteristics were recorded and blood sampling for lipid profile was performed. Beck and Kettle inventory questionnaires were completed.

**Results:** Seventy-five percent of patients were female. Total cholesterol, triglyceride and low-density lipoprotein cholesterol levels are significantly higher and high-density lipoprotein cholesterol level was lower in patients with comorbid anxiety and depressive disorder than the other groups.

**Discussion:** Dyslipidemia in patients with comorbid anxiety and depressive disorder is considerable high. Lipid profile screening in such patients is recommended.

**Keywords:** Lipid profile, Generalized anxiety disorder, Major depressive disorder.

ARYA Journal 2005, 1(1): 15-18

## INTRODUCTION

Psychiatric disorders such as mood and anxiety disorder as well as their relation to cardiovascular disease (CVD) have been a subject for research but as yet their relation is questionable<sup>1</sup>. Previous studies have reported an association between low cholesterol levels and major depressive disorder (MDD)<sup>2,4</sup>. In study, lipid levels correlated inversely with the suicidal attempt<sup>2,3,5</sup>. Horsten studied 300 females and showed that depressive symptoms were twice in total cholesterol (TC) lower than 180 mg/dl, but Blazer and Chen did not confirm this relation<sup>6-8</sup>.

Hayward et al. found that panic disorder (PD) patients had significantly higher cholesterol levels compared with MDD patients and healthy controls<sup>9</sup>. In addition, elevated total cholesterol, triglyceride (TG) and low-density lipoprotein

cholesterol (LDL-C) levels as well as reduced high-density lipoprotein cholesterol (HDL-C) levels have been reported in Vietnam veterans with chronic posttraumatic stress disorder (PTSD)<sup>10</sup>.

Few studies have examined the changes in lipid levels in patients with comorbid generalized anxiety disorder (GAD) and (Major Depressive Disorder) MDD, so the risk of atherosclerosis in this group of patients is questionable. This study examines the lipid profile in a series of patients with comorbid GAD and MDD.

## METHODS

In this descriptive-analytic study, all patients referred to psychiatric clinic for outpatient management, were studied. Twenty-five patients with GAD and MDD, 25 patients with MDD only and 25 patients with GAD only were included. All the 3 groups were diagnosed to have MDD and/or GAD according to the Structured Clinical Interview for DSM-IV, Patient Edition<sup>11</sup>. They had been diagnosed for at least 1 year of symptoms and being drug-free for 1 month. A careful diagnostic assessment was performed to rule out other major Axis I

### Corresponding Author:

Hamidreza Roohafza MD. Psychiatrist. Chief of Mental Health Research Unit, Isfahan Cardiovascular Research Center, Isfahan, Iran.  
PO. BOX: 81465-1148  
Email: roohafza@crc.mui.ac.ir

disorders, including schizophrenia, mania, substance abuse, and dementia. Additional exclusion criteria included diabetes, hypertension, renal diseases, obesity, cancer, pregnancy or lactation, and the use of oral contraceptives for females.

We selected 25 healthy controls without after being any medical or psychiatric diagnosis matched for sex, body mass index and age. All patients and control subjects gave informed consent to participate in the study.

All participants filled a questionnaire including age, sex, medical past history and smoking habit. The Beck Depression Inventory (BDI) and Kattel Anxiety Inventory were filled for them to assess the severity of their depression and anxiety.

The blood samples were drawn after a 12-hour fasting for detecting lipid profile. Serum TC and TG were measured by spectrophotometry in auto analyzer. HDL-C was measured by Dextran sulfate Mg<sup>2+</sup> precipitation procedure<sup>12</sup>. LDL-C was calculated using the Friedwald equation<sup>13</sup>. The body mass index (BMI) was computed by measuring weight and height<sup>14</sup>.

Chi-square analysis was performed to compare the sex differences between groups. The groups were compared on the mean scores of demographic and clinical variables using analysis of variance (ANOVA). Student's t-test was used for between-group comparisons.

## RESULTS

There was no significant differences in age, sex, smoking habit and BMI among the patients and control subjects (Table 1). Mean score of Beck depression and the Kattel anxiety score was 27.73- 31.25 in comorbid GAD and MDD, 28.43-8.31 in MDD only, 9.21-33.84 in GAD only and 7.21-6.18 in controls. We found no difference between comorbid GAD and MDD and MDD-only groups in mean BDI scores. The mean Kattel Anxiety Inventory scores did not differ between the comorbid GAD and MDD and GAD-only groups.

As ANOVA revealed, the mean TC, TG, HDL-C, and LDL-C levels differed significantly among the 4 groups ( $P < 0.001$ ) (Table2).

The mean TC concentration in patients with GAD and MDD was significantly higher than in MDD-only patients ( $P < 0.001$ ), in GAD-only patients ( $P = 0.001$ ), and in control subjects ( $P < 0.001$ ). Patients with GAD only had significantly higher serum TC levels than did the control subjects ( $P < 0.001$ ) and in MDD only had significantly lower than in control subjects ( $P < 0.02$ ).

Patients with both GAD and MDD also had significantly higher serum TG levels than did the GAD-only patients ( $P < 0.01$ ) and control subjects ( $P < 0.001$ ). The serum level of TG in patients with GAD-only was higher than in control subjects ( $P < 0.001$ ).

The patients with both GAD and MDD had significantly lower HDL-C levels than did GAD-only patients ( $P < 0.01$ ) and control subjects ( $P < 0.002$ ). The serum HDL-C level in patients with MDD only was also significantly lower than in patients with GAD only and control subjects.

The serum LDL-C level in comorbid GAD and MDD patients was significantly higher than MDD only ( $P < 0.01$ ), GAD-only patients ( $P < 0.005$ ), and the control group ( $P < 0.001$ ). We found that LDL-C concentrations in patients with GAD alone was higher than in control subjects ( $P < 0.001$ ).

## DISCUSSION

The main finding of this study is that patients with comorbid GAD and MDD have significantly higher serum cholesterol, triglyceride, and LDL-C levels and lower HDL-C levels compared with patients with either GAD or MDD alone and healthy control subjects.

We also found significant differences between the levels of serum cholesterol and triglyceride in patients with GAD and our control group; this finding is in line with Freedman findings<sup>15</sup>.

**Table 1.** Characteristics of Patients and Control Subjects

	GAD-MDD	MDD	GAD	Control
Sex Male: N (%)	6 (24)	5 (20)	7 (28)	7 (28)
Female: N (%)	19 (76)	20 (80)	18 (72)	18 (72)
Smoker: N (%)	5 (20)	6 (24)	7 (28)	6 (24)
Age (year): Mean (SD)	35.2 (7.9)	33.2 (6.1)	33.3 (8.2)	33.2 (7.7)
BMI (kg/m <sup>2</sup> ): Mean (SD)	27.2 (1.5)	27.62 (0.8)	27.73 (0.7)	27.26 (0.9)
Beck Depression Inventory Score: Mean (SD)	27.7 (5.3)	28.4 (4.2)		
Kattel Anxiety Inventory Score: Mean (SD)	31.25 (12.1)		33.84 (7.8)	

GAD: Generalized Anxiety Disorder, MDD: Major Depressive Disorder

**Table 2.** Lipid Profile of Patients and Control Groups: Mean (SD)

	GAD-MDD	MDD	GAD	Control
Total cholesterol (mg/dl)	226.7 (45.3)	193 (40.2)	214.7 (34.2)	199.8 (30.8)
Triglyceride (mg/dl)	189.3 (69.8)	170.5 (51.4)	181.9 (49.9)	172.6 (45.4)
High-density lipoprotein cholesterol (mg/dl)	45.5 (10.7)	45.1 (8.8)	51.1 (11.8)	49.1 (10.2)
Low-density lipoprotein cholesterol (mg/dl)	150.3 (36.6)	130 (35.4)	145.6 (30.2)	135.9 (32.2)

Our results are not consistent with Kuczmierczyk study, who reported that serum cholesterol and triglyceride levels in GAD patients with comorbid MDD were lower than in patients with GAD only<sup>16</sup>. Similarly, the results do not agree with Agargun findings that serum cholesterol levels were significantly lower in patients with comorbid PD and MDD compared with PD patients only<sup>17</sup>. They suggested that coexistent depression in patients with anxiety had a protective effect with regard to cholesterol and triglyceride levels and that a low serum cholesterol level might serve as a biological marker of depression in patients with PD.

Our results suggest that serum cholesterol and triglyceride levels might not be reduced in mixed GAD and MDD. This finding is in line with the study of sevincok et al.<sup>18</sup>. Therefore, the hypothesis of a protective effect with associated depression in anxiety patient might not be valid. Comorbid anxiety in patients with depression may increase the levels of circulating catecholamines and increase in lipoprotein lipase activity, thus elevating the serum cholesterol and triglyceride concentrations<sup>19, 20</sup>. However, additional studies in larger samples are required.

In present study, the serum cholesterol level in the MDD group was significantly lower than controls, but the serum triglyceride level had not significant difference although it was lower in controls. This is may be due to sample size limits. Maes and others suggested that MDD may be accompanied with reduced formation of cholesterol esters and by impaired reverse cholesterol transport<sup>21</sup>.

We found that HDL-C, a protective factor against the development of atherosclerosis and CAD<sup>22</sup> was significantly lower in patients with both GAD and MDD than in GAD-only patients controls. We also found that the patients with MDD only had lower HDL-C compare with GAD only and healthy controls. This finding is consistent with the studies that have found lower serum HDL-C levels to be a marker for MDD<sup>21</sup>.

In this study, we found an increased level of LDL-C in comorbid GAD and MDD patients compared with the other groups. The LDL-C was also higher in patients with either GAD or MDD alone than in healthy control subjects. These results are consistent with previous studies reporting an elevated concentration of LDL-C in several anxiety disorders<sup>10, 23</sup>. Since the combined low HDL-C and high LDL-C levels suggest a risk for CAD, patients with comorbid GAD and MDD should be evaluated for this risk, but further studies on larger samples are required to confirm this hypothesis.

Fava and colleagues proposed that patients with both anxiety and depression may have a greater risk of mortality from CAD than do patients with either depression or anxiety alone<sup>24</sup>. They suggested a possible relation between CAD risk factors and anger and anxiety in patients with depression. These findings suggest that patients with both anxiety and depression be at greater risk for CAD than are patients with anxiety or depression alone.

According to our results, evaluation of lipid profile in psychiatric patient is essential for detection and prevention of atherosclerosis in first phase to reduce chance of cardiovascular disease.

## REFERENCE

- 1- Vaccarino V. The association between depression and coronary heart disease incidence. *Drugs Today (Bare)* 2000; 36 (10):715-24.
- 2- Brunner J, Parhofer K.G, Schwandt P, Bronisch T. Cholesterol, essential fatty acids, and suicide. *Pharmacopsychiatry*.2002; 35:1-5.
- 3- Manfredini R, Caracciolo S, Salmi R, Boari B, Tomelli A, Gallerani M. The association of low serum cholesterol with depression and suicidal behaviors: new hypotheses for the missing link. *Journal of International Medical Research* 2000;28: 247-257.
- 4- Borgherini G, Dorz S, Conforti D, Scarso C, Magni G. Serum cholesterol and psychological distress in hospitalized depressed patients. *Acta Psychiatrica Scandinavica*; 2002; 105:149-152.
- 5- Ellison LF, Morrison HI. Low serum cholesterol concentration and risk of suicide. *Epidemiology* 2001; 12:168-172.
- 6- Horsten M, Wamala S, Vingerhoets A, Orth-Gomer K. Depressive symptoms, social support, and lipid

- profile in healthy middle-aged women. *Psychosom Med.* 1997; 59: 521–8.
- 7-Blazer DG, Burchett BB, Fillenbaum GC. APOE epsilon4 and low cholesterol as risks for depression in a biracial elderly community sample. *American Journal of Geriatric Psychiatry.* 2002;10: 515–520.
- 8-Chen CC, Lu FH, Wu JS, Chang CJ. Correlation between serum lipid concentrations and psychological distress. *Psychiatry Research.* 2001;102:153–162.
- 9-Hayward C. Anxiety disorders and serum lipids. In: Hillbrand M, Spitz RT, editors. *Lipids, health, and behavior.* Washington DC: American Psychological Association; 1997: 69–79.
- 10-Kagan BL, Leskin G, Haas B, Wilkins J, Foy D. Elevated lipid levels in Vietnam veterans with chronic posttraumatic stress disorder. *Biol Psychiatry* 1999; 45:374–7.
- 11-Kaplan HI, Sadock BJ, Grebb TA. *Synopsis of Psychiatry.* Williams & Wilkins; 2000, 524-645.
- 12-arnick GR, Benderson J, Albers JJ. Dextran sulfate Mg<sup>2+</sup> precipitation procedure for quantitation of high-density lipoprotein cholesterol. *Clinical Chemistry* 1982; 28(6): 1379-88.
- 13-Friedewald WT, Levy RI, Fredrickson DS. Estimation of the concentration of low-density lipoprotein cholesterol in plasma, without use of the preparative ultracentrifuge. *Clinical Chemistry* 1972; 18: 499-502.
- 14-National Institutes of Health. *The practical guide identification, evaluation and treatment of overweight and obesity in adults.* NIH Publication 2000; 9.
- 15-Freedman DS, Byers T, Barrett DH, Stroup NE, Eaker E, Monroe-Blum H. Plasma lipid levels and psychologic characteristics in men [see comments]. *Am J Epidemiol* 1995; 141:507–17.
- 16-Kuczmierczyk AR, Barbee JG, Bologna NA, Townsend MH. Serum cholesterol levels in patients with generalized anxiety disorder (GAD) and with GAD and comorbid major depression. *Can J Psychiatry* 1996; 41:465–8.
- 17-Agargun MY, Algun E, Sekeroglu R, Kara H, Tarakcoglu M. Low cholesterol level in patients with panic disorder: the association with major depression. *J Affect Disord* 1998; 50:29–32.
- 18-Sevincok L, Buyukozturk A, Dereboy F. Serum lipid concentrations in patients with comorbid generalized anxiety disorder and major depressive disorder. *Can J Psychiatry* 2001; 46:68–71
- 19-Charney DS, Redmond EE. Neurobiological mechanisms in human anxiety: evidence supporting central noradrenergic hyperactivity. *Neuropharmacology* 1983; 22:1531–6.
- 20-Villacres EC, Hollifield M, Katon WJ. Sympathetic nervous system activity in panic disorder. *Psychiatry Res* 1987; 21:313–21.
- 21-Maes M, Smith R, Christophe A, Vandoolaeghe E, Van Gastel A, Neels H. 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 Psychiatr Scand* 1997; 95:212–21.
- 22-Castelli WP, Garrison RJ, Wilson PW, Abbott RD, Kalousdian S, Kannel WB. Incidence of coronary heart disease and lipoprotein cholesterol levels. *The Framingham Study.* *JAMA* 1986; 249:747–50.
- 23-Goebel PN, Peter H, Mueller SK, Hand I. Neuroticism, other personality variables, and serum lipid levels in patients with anxiety disorders and normal controls. *Int J Psychiatry Med* 1998; 28:449–62.
- 24-Fava M, Abraham M, Pava J, Shuster J, Rosenbaum J. Cardiovascular risk factors in depression. *The role of anxiety and anger.* *Psychosomatics* 1996; 37:31–7.