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# Serum Cholesterol Concentration and Structured Individual Psychoanalytic Psychotherapy in Suicidal and Non-suicidal Male Patients Suffering from Borderline Personality Disorder

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## ABSTRACT

*Findings from numerous studies suggest an association between low cholesterol levels and suicidal behavior in patients with different psychiatric diagnoses. The aims of this case-control study were to test whether cholesterol levels in male suicidal patients (N=20) with borderline personality disorder (BPD) are lower than in male non-suicidal patients (N=20) with BPD and male healthy control group (N=20), and to evaluate the influence of structured individual psychoanalytic psychotherapy on suicidal behavior. The groups were matched for age and body mass index (BMI). Results showed that serum cholesterol levels did not differ significantly between suicidal and non-suicidal BPD patients and healthy controls. The level of psychopathology (measured by Brief Psychiatric Rating Scale and Hamilton Depression Rating Scale) was significantly higher in the group of suicidal patients, which indicates the importance of evaluating particular clinical symptoms in BPD, in order to prevent suicidal behavior. Non-suicidal male patients suffering from BPD received more frequently structured individual psychoanalytic psychotherapy prior to the hospitalization than suicidal group. These results emphasized the role of this type of psychotherapy in preventing suicidal behavior in BPD patients.*

**Key words:** cholesterol, suicidality, borderline personality disorder, men, psychoanalytic psychotherapy

## Introduction

Borderline personality disorder (BPD) is one of the most widely researched mental disorders and by far the most extensively researched personality disorder. The BPD consists of a cluster of symptoms characterized by unstable, impulsive behavior – fear of abandonment, unstable interpersonal relationships, identity disturbance, impulsiveness, self-mutilation and/or suicide, affective instability, empty feelings, inappropriate anger, and dissociation (DSM-IV-TR – Diagnostics and Statistics Manual IV-Text Revised)<sup>1</sup>. Millon<sup>2</sup> has suggested that the appearance of BPD creates psychosocial epidemics. This

contrasts the fact that empirically based treatment research on suicidality of patients with BPD is sparse. The psychotherapeutic treatment of suicidal patients with BPD is one of the biggest challenges facing mental health professionals<sup>3-4</sup>. Suicidality in BPD peaks when patients are in their early 20s, but completed suicide is most common after 30 years of age and usually occurs in patients who fail to recover after many attempts or treatment<sup>5</sup>.

The neurobiology of suicide in patients with BPD is still unclear. Among the biological hypotheses of suicidality, low blood cholesterol levels have been extensively

explored. The relationship between serum cholesterol and suicidality does not seem to be limited to individuals with a certain psychiatric disorder. Our previous studies confirmed the role of cholesterol in suicidal behavior, showing lower cholesterol levels in suicidal patients with different forms of psychotic disorders<sup>6–10</sup> and bipolar affective disorder<sup>11</sup>, which are frequent comorbidities in patients with BPD<sup>12</sup>.

Only few papers in the literature evaluated neurobiology of suicidal behavior in BPD. The hypothesis of the present study was that serum cholesterol levels are lower in suicidal than in non-suicidal patients with BPD and in healthy controls. The aim of this case-control study was to compare serum cholesterol levels in male suicidal patients (N=20) with BPD with the values in male non-suicidal patients (N=20) with BPD and in male healthy control group (N=20) and to evaluate the influence of a prior structured individual psychoanalytic psychotherapy on suicidal behavior in these patients. The groups were matched for age and body mass index (BMI).

## Materials and Subjects

Participants were male patients, admitted to the Department of Psychiatry, University Hospital Zagreb, during the previous period of 12 months. The diagnosis of BPD was made according to diagnostic criteria of the International Statistical Classification of Diseases and Related Health Problems after structured diagnostic psychiatric interview for ICD-10 (WHO, 1996)<sup>13</sup>. The socio-demographic data are given in Table 1.

### *Inclusion and exclusion criteria*

All patients were free of all medications in the previous 3 weeks. Within patients, 20 patients were consecutively admitted suicidal men with diagnosis of BPD, and 20 patients were consecutively admitted men with BPD without suicidal behavior. Healthy male subjects (N=20) with no history of psychiatric illness and suicidal behavior were randomly selected as a control group. All subjects were closely matched for age. All subjects gave written informed consent to participate in the study. This study was approved by the Clinical Hospital Center Medical Ethics Committee. None of the patients or control subjects included in the study had used any cholesterol-lowering drugs before the sampling. The exclusion criteria were: hypertension, hypothyroidism, diabetes mellitus, disorders of the lipoprotein metabolism, including alcoholism and eating disorders.

### *Biochemical determination*

Blood samples were collected from all subjects at 8.00 a.m. after an overnight fasting, and serum concentration of cholesterol was determined enzymatically, immediately after the blood collection. The assays were done using commercial kits (Olympus Diagnostic GmbH, Hamburg, Germany) on Olympus AU 600 automatic analyzer. Body mass index (BMI) was used as a marker of the dietary habits.

**TABLE 1**  
SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE THREE GROUPS OF PARTICIPANTS

	Suicidal men with diagnosis of borderline personality disorder (N=20)	Non-suicidal men with diagnosis of borderline personality disorder (N=20)	Healthy control group (N=20)
Family status			
Living alone	7	7	5
Living with family	13	13	15
$\chi^2 = 0.616$ ; df = 2; p = 0.735			
Marital status			
Married	6	6	9
Unmarried	12	11	11
Divorced-separated	2	2	0
Widower	0	1	0
$\chi^2 = 4.916$ ; df = 6; p = 0.555			
Education			
Primary school	1	2	0
Secondary school	14	12	10
University level	5	6	10
$\chi^2 = 4.667$ ; df = 4; p = 0.323			
Employment			
Employed	2	6	10
Unemployed	8	8	5
Retired	4	2	1
Student	6	4	4
$\chi^2 = 8.762$ ; df = 6; p = 0.187			
Family history of suicidal behavior			
Negative history	8	14	
Violent history	6	2	
Non-violent history	2	1	
Violent and non-violent history	1	0	
Completed suicide in family	3	3	
$\chi^2 = 4.970$ ; df = 4; p = 0.290			

### *Clinical evaluations*

The trained psychiatrists performed clinical evaluation. The Brief Psychiatric Rating Scale – BPRS<sup>14</sup> was administered to assess a broad range of psychopathology. Patients were classified as suicidal at the hospital admission if a suicidal ideation, or a suicide attempt, or both,

were present. Suicidality was defined if patients had 2 or more scores on the BPRS, on the item 4 (item on suicide). Non-suicidal patients had score 1 on the BPRS item 4. Hamilton Depression Rating Scale<sup>15</sup>, HDRS-17 (Hamilton, 1960) was applied to assess depressive symptoms. Structured individual psychoanalytic psychotherapy prior to the hospitalization (during the previous 6 months) was detected in every patient, as well as the family history of suicidal behavior.

### Statistical analysis

The results were expressed as  $X \pm SD$ . All data were evaluated using one-way analysis of variance (ANOVA) followed by a Scheffé's multiple comparison test. When two groups were compared, Student's t-test was used. Because age and BMI might influence cholesterol levels, these variables were included as covariates within analysis of covariance (ANCOVA) in the comparison of serum cholesterol levels. The differences in the socio-demographic variables between suicidal and non-suicidal groups were assessed using a Chi square ( $\chi^2$ ) test. A significance was accepted when  $p < 0.05$ . Statistical analyses were performed with the statistical package SPSS version 10 for Windows.

## Results

The socio-demographic characteristics of the subjects are shown in Table 1. There were no significant ( $\chi^2$  test) differences in the occurrence of the socio-demographic variables: in the family status, marital status, degree of education, employment and family history of suicidal be-

havior between suicidal and non-suicidal patients (Table 1). Suicidal patients, compared to non-suicidal patients, reported more cases of family history of suicidal behavior, but these differences were not significant (Table 1). Age of the patients and BMI did not differ significantly (ANOVA) between suicidal and non-suicidal patients and healthy control groups (Table 2). Serum cholesterol levels were not significantly different (ANOVA) between suicidal and non-suicidal ( $p = 0.155$ , Scheffé's test) patients, or suicidal compared to healthy ( $p = 0.100$ , Scheffé's test) subjects (Table 2). Serum cholesterol values were slightly reduced (by 8%) in suicidal patients, but these differences were not significant. These results remained the same after controlling for age and BMI (ANCOVA).

The HDRS-17 scores were significantly (Student's t-test) higher in suicidal compared to non-suicidal patients (Table 3). The BPRS scores were also significantly (Student's t-test) higher in suicidal compared to non-suicidal patients (Table 3). Seven out of 24 symptoms on BPRS were significantly higher in suicidal patients, compared to non-suicidal patients – anxiety, depression, suicidality, grandiosity, tension, excitement and motor hyperactivity (Table 3). There was no significant correlation between cholesterol and each symptom of the BPRS. There was a significant ( $\chi^2$ -test) difference in the frequency of the structured individual psychoanalytic psychotherapy received prior to the hospitalization between suicidal and non-suicidal patients with BPD. Non-suicidal male patients with BPD received more frequently ( $\chi^2$ -test) structured individual psychoanalytic psychotherapy prior to the hospitalization than suicidal group (Table 4).

**TABLE 2**  
AGE, BMI AND CHOLESTEROL ( $X \pm SD$ ) IN MALE SUICIDAL AND NON-SUICIDAL PATIENTS SUFFERING FROM BORDERLINE PERSONALITY DISORDER AND IN HEALTHY CONTROL SUBJECTS

	Suicidal BPD group (N=20)	Non-suicidal BPD group (N=20)	Control group (N=20)	F	p
Age	29.00±6.54	29.85±7.57	32.10±7.23	1.009	0.371
BMI	24.64±1.79	25.32±2.36	25.20±2.13	0.595	0.555
Cholesterol mmol/L	4.88±0.96	5.28±0.96	5.32±0.85	1.560	0.219

**TABLE 3**  
HDRS-17 AND BPRS ( $X \pm SD$ ) IN MALE SUICIDAL AND NON-SUICIDAL PATIENTS SUFFERING FROM BORDERLINE PERSONALITY DISORDER

Scale	Suicidal BPD group	Non-suicidal BPD group	Student t-test	p
HDRS-17	30.15±9.09	16.55±10.55	4.367	0.000
BPRS	72.10±8.09	55.40±9.06	6.145	0.000
Items on BPRS, significantly differ between groups – 7 items:				
Anxiety	4.95±1.05	3.00±0.91	6.253	0.000
Depression	5.10±0.71	2.65±0.67	11.149	0.000
Suicidality	4.75±0.44	1.00±0.00	37.749	0.000
Grandiosity	4.85±0.81	2.40±0.50	11.466	0.000
Tension	4.20±0.76	2.00±0.56	10.341	0.000
Excitement	3.15±1.26	2.35±1.13	2.101	0.042
Motor hyperactivity	3.10±1.33	2.30±0.97	2.163	0.038

**TABLE 4**  
STRUCTURED INDIVIDUAL PSYCHOANALYTIC PSYCHOTHERAPY  
PRIOR TO THE HOSPITALIZATION FOR MALE SUICIDAL AND  
NON-SUICIDAL PATIENTS SUFFERING FROM  
BORDERLINE PERSONALITY DISORDER

	Suicidal BPD group	Non-suicidal BPD group
Psychotherapy	5	17
Without psychotherapy	15	3

$\chi^2=14.545$ ;  $df=1$ ;  $p=0.000$

## Discussion and Conclusion

Among the biological hypotheses of suicidality, low blood cholesterol level has been extensively explored. Numerous studies have shown an association between low cholesterol levels and suicidal behavior. On the other hand, this association has been questioned; and some studies have found a relation between high cholesterol levels and increased suicidal risk<sup>16</sup>, while others found no association between cholesterol and suicidal behavior<sup>17</sup>. In order to evaluate the underlying neurobiology of suicidal behavior in borderline patients, we hypothesized that male suicidal patients suffering from BPD will have lower serum cholesterol than non-suicidal patients. Results of this study did not confirm this hypothesis and our previous results showing reduced cholesterol levels in suicidal psychiatric patients. This study shows a lack of significant differences in total serum cholesterol levels between suicidal borderline patients compared to non-suicidal patients with BPD and healthy control subjects. The discrepancies among studies are in accordance with the theory that biologic basis of BPD as well as pharmacologic treatment of BPD remains incompletely studied compared to other psychiatric disorders. The core of the treatment for BPD is still psychotherapy. According to World Federation of Societies of Biological Psychiatry (WFSBP) Guidelines for Biological Treatment of Personality Disorders<sup>18</sup>, no class of pharmacological agents improves BPD psychopathology in general, although the majority of studies have incorporated measurements of global functioning in addition to targeting special aspects of psychopathology. In addition, there is no conclusive evidence that antidepressants reduce impulsive, aggressive or self-harming behaviors in BPD. According to the highly cited Engelberg's hypothesis<sup>19</sup>, low serum cholesterol levels may be associated with reduced lipid micro-viscosity in the brain-cell-membrane and may decrease the exposure of various serotonergic receptors on the membrane surface, resulting in decreased serotonergic receptor function and inhibited serotonergic neurotransmission, which may lead to a poorer suppression of impulsive or suicidal behavior. Our results show that cholesterol might not be used to distinguish between suicidal from non-suicidal BPD: this finding might be associated with the mentioned biologic theory of a poorer response of BPD patients to antidepressants acting via serotoner-

gic system compared to the patients with the other diagnostic categories<sup>20</sup>.

The HDRS-17 and BPRS scores were significantly higher in suicidal compared to non-suicidal patients and this finding could suggest that suicidal behavior is associated with the higher levels of psychopathology. Seven out of 24 symptoms on BPRS were significantly higher in suicidal patients, compared to non-suicidal patients. These non-psychotic symptoms included anxiety, depression, suicidality, grandiosity, tension, excitement and motor hyperactivity. On the other hand, psychotic symptoms in BPRS did not differ significantly between suicidal and non-suicidal BPD patients. These results suggest that anxiety, depression, grandiosity, tension, excitement and motor hyperactivity are associated with development of suicidal behavior. The other hypothesis of the study was that structured individual psychoanalytic psychotherapy during the course of BPD and prior to development of suicidal behavior might reduce suicidal behavior in BPD patients. Our results have confirmed that structured individual psychoanalytic psychotherapy prior to the hospitalization significantly decreased suicidal behavior, since non-suicidal male patients suffering from BPD, who received more frequently this psychotherapy, did not show suicidal behavior. This finding suggested that although patients with BPD were matched for age, BMI, socio-demographic characteristics and serum cholesterol levels, the use of structured individual psychoanalytic psychotherapy prior to the hospitalization elicited a basic distinction between suicidal and non-suicidal groups. The role of structured individual psychoanalytic psychotherapy is to enhance patient's personality and to help patient to better cope with BPD symptoms. This therapy might also help patients to better control symptoms of anxiety, depression, grandiosity, tension, excitement and motor hyperactivity, which were presented more severely in suicidal patients with BPD, and to control suicidal symptoms, in order to prevent suicidal behavior. Limitations of this study were a relatively small patient sample, and the lack of information on patients' nutritive habits, which we plan to perform in one of our further investigations that will include a larger number of patients. In the present study there were no data available regarding several other factors that may contribute to the alterations in serum cholesterol levels in suicidal patients, such as genetic factors and cigarette smoking. A better understanding of the neurobiology and psychological factors of suicidal behavior in BPD patients, and the use of structured individual psychoanalytic psychotherapy prior to hospitalization can facilitate the detection of patients who have a higher risk to attempt suicide, in order to develop better treatment interventions for these patients, and to prevent suicide.

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## KONCENTRACIJA KOLESTEROLA I STRUKTURIRANA INDIVIDUALNA PSIHOANALITIČKA PSIHOTERAPIJA KOD SUICIDALNIH I NESUICIDALNIH MUŠKIH BOLESNIKA OBOLJELIH OD GRANIČNOG POREMEĆAJA OSOBNOSTI

### SAŽETAK

Rezultati istraživanja brojnih studija upućuju na povezanost niske razine kolesterola i suicidalnog ponašanja kod bolesnika iz različitih dijagnostičkih kategorija. Cilj ovog istraživanja bio je ustanoviti jesu li vrijednosti serumskog kolesterola kod suicidalnih muških bolesnika s graničnim poremećajem osobnosti (N=20) niže u odnosu na nesuicidalne muške bolesnike s graničnim poremećajem osobnosti (N=20) i kontrolnu skupinu zdravih muških ispitanika (N=20) i provjeriti utječe li strukturirana individualna psihoanalitička psihoterapija na suicidalno ponašanje. Skupine su bile usklađene s obzirom na dob i indeks tjelesne mase (BMI). Rezultati istraživanja pokazuju da nema značajnih razlika u vrijednosti serumskog kolesterola između suicidalnih i nesuicidalnih muških bolesnika s graničnim poremećajem osobnosti i kontrolnih zdravih muških ispitanika. Razina psihopatologije (mjerena skalama Brief Psychiatric Rating Scale i Hamilton Depression Rating Scale) bila je značajno naglašenija kod suicidalnih bolesnika u odnosu na nesuicidalne bolesnike, što upućuje da je u praksi bitno prepoznati određene kliničke simptome kod bolesnika s graničnim poremećajem osobnosti s ciljem da se prevenira suicidalno ponašanje. Nesuicidalni bolesnici značajno su čeće primili strukturiranu individualnu psihoanalitičku psihoterapiju prije hospitalizacije nego suicidalni bolesnici. Ti rezultati naglašavaju ulogu ovog oblika psihoterapije u preveniranju suicidalnog ponašanja u bolesnika s graničnim poremećajem osobnosti.