

# Personality Disorders and Atherosclerotic Coronary Plaque

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## ABSTRACT

### Background

The association between the essential substrate of ischemic cardiovascular disease, atherosclerotic lesions, and psychosocial factors has been scarcely studied. No specific studies on the association between personality disorders defined according to international diagnostic criteria and presence of atherosclerotic plaque are found in the literature.

### Objectives

The purpose of this study was to analyze the association between personality disorders and presence of coronary atherosclerotic plaques, describing and comparing the personality of subjects with and without atherosclerotic plaque.

### Methods

A descriptive transverse design was used. Seventy-eight patients with ages ranging from 40 to 90 years who met the inclusion and exclusion criteria participated in the study. Data were acquired from a coronariography with 64-multislice computed tomography and the Salamanca Questionnaire for screening personality disorders. SPSS 12.0 was used to describe and compare personality disorders in the groups with and without coronary atherosclerotic plaque.

### Results

Seventy seven percent of the patients presented personality disorder and plaque, while 23% had plaque and no personality disorder. Statistically significant associations (at a two-tailed  $p < 0.05$ ) were found between coronary atherosclerotic plaque and: a) histrionic personality disorder, Spearman's rho: 0.250,  $p=0.027$ ; b) anxious or avoidant personality disorder, rho: 0.232,  $p=0.041$ , and c) number of personality disorders, rho: 0.286,  $p=0.011$ . Statistically significant differences were found between groups with plaque and without plaque for histrionic personality disorder (chi-square test 4.872, two-tailed  $p=0.027$ ) and anxious or avoidant personality disorder (chi-square: 4.181,  $p=0.041$ ).

### Conclusion

In the studied sample, the histrionic and anxious personality disorders showed statistically significant differences between the groups with and without coronary atherosclerotic plaque.

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**Key words >** Personality Disorders - Atherosclerotic plaque

## Abbreviations >

**APA** American Psychiatric Association  
**ICD** International Classification of Diseases

**DSM** Diagnostic and Statistical Manual of Mental Disorders  
**WHO** World Health Organization

## BACKGROUND

Development, progression and prognosis of cardiovascular diseases are commonly associated with the presence of negative emotions. (1-6) Although acute myocardial infarction has been one of the most stud-

ied ischemic cardiovascular pathologies from a psychosocial point of view, (7-13) the association between the essential substrate of ischemic cardiovascular pathologies, atherosclerotic lesions, and psychosocial factors has been less contemplated.

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Since the course of plaque development and progression takes time within a predisposing physiopathology, shaped both by biological and psychosocial processes, the question arises whether an enduring psychological structure, involving a permanent set of characteristics which describes the usual behavior of the subject, might predispose him to plaque development. In this case, we propose to specifically study personality disorders.

Even though many publications describe the association between cardiac pathologies and presence of a type A behavior pattern (competitiveness, temporal urgency and hostility) and more recently a type D personality (negative affective state and social inhibition), (14-19) few of these studies classify personality disorders according to international diagnostic criteria, such as the Diagnostic and Statistical Manual of Mental Disorders (DSM) following the American Psychiatric Association (APA) and/or the International Classification of Diseases (ICD) responding to the World Health Organization.

The last APA (DSM-IV) (20) and WHO (ICD-10) handbook editions (21) define personality disorders as permanent patterns of inflexible conducts which can be expressed both at cognitive, affective and social levels. The main characteristic of a personality disorder is a permanent pattern of internal experience and behavior which is markedly removed from the cultural expectations to which the subject belongs, and reveals itself in at least two of the following areas: knowledge, affection, interpersonal activity or impulse control. This persistent pattern is inflexible and extends to a wide range of personal and social situations, producing significant clinical distress or impairment of social, working or other important activities.

Despite conceptual similarities between the DSM-IV and ICD-10, there are also differences. In the DSM-IV, personality disorders are organized in three groups: A (eccentric-introverted), B (dramatic-impulsive) and C (anxious-fearful). Group A comprises paranoid, schizoid and schizotypal disorders. The ICD-10 acknowledges the paranoid and schizoid personality disorders, and places the schizotypal disorder within the psychoses, all with diagnostic criteria similar to the DSM-IV. In group B, the DSM-IV includes the histrionic, narcissistic, borderline and antisocial personality disorders. The ICD-10 does not include the narcissistic disorder and incorporates the emotional instability personality disorder which is subdivided into two types: impulsive and borderline. Moreover, it names the antisocial personality disorder, dissocial personality disorder. In group C, the DSM-IV groups all the obsessive-compulsive, avoidant and dependent personality disorders. The ICD-10 calls the avoidant personality disorder, anxious personality disorder, and the obsessive-compulsive personality disorder, anankastic personality disorder.

A work studying the presence of personality disorders in cardiovascular pathologies following the DSM-III diagnostic criteria was published in 2010.

Two hundred and forty-four patients with ages ranging between 18-64 years participated in this study. A statistically significant association was found between cardiovascular pathologies and presence of group B personality disorders (histrionic, antisocial, borderline, and narcissistic). Results show that personality disorders are an independent risk factor for the incidence of cardiovascular pathologies. (22)

As no specific study was found on the relationship between type of personality, defined according to international diagnostic criteria (APA and/or ICD), and presence of atherosclerotic coronary plaques, the aim of this study was to investigate this association, describing and comparing the personality of patients with and without atherosclerotic plaque.

## METHODS

A transverse descriptive design was used. A consecutive sample was obtained from patients who attended the Hospital Universitario Fundación Favaloro to have a coronariography with 64-slice computed tomography and fulfilled the inclusion/exclusion criteria. The following inclusion criteria were used: adults from both sexes between 40 and 90 years, referred by their physician to have a coronariography. The exclusion criteria included: patients without informed consent, allergy to contrast iodine, pregnant or with suspected pregnancy women, patients with diagnosis of renal failure, or untreated hypothyroidism. In addition, patients with irregular cardiac rhythm, heart rate over 60 beats per minute after oral or intravenous administration of beta blockers according to protocol procedure for the performance of coronariography with 64-slice computed tomography, were also excluded. The coronariography determined the presence or absence of coronary atherosclerotic plaques. Non-calcified plaques were defined as lipid plaques with density < 30 Hounsfield Units (HU) and as fibrolipid plaques with densities between 30 and 150 HU. Calcified plaques were defined as those with densities > 150 HU.

Among the multiple tests following different theories and personality models to evaluate personality disorders, we chose the "Salamanca Questionnaire for screening personality disorders", as it is a technique that: a) follows the mentioned international diagnostic criteria (DSM-IV and ICD-10) (Table 1), b) is simple, involving a brief administration period, and c) has adequate sensitivity and specificity. (23) The Salamanca Questionnaire for screening personality disorders by Pérez, Urdaniz A; Rubio, Larrosa V; Gómez, Gazol E., 2004 is a 22 item early diagnostic tool for 11 personality disorders. According to the DSM-IVTR nomenclature, personality disorders are classified as: paranoid, schizoid, schizotypal, histrionic, antisocial, narcissistic and dependent, and according to the ICD-10 as: impulsive subtype emotional instability disorder, and borderline, anankastic and anxious subtype emotional instability disorder. Each disorder is assessed by means of two questions with four possible responses (false: 0 points, sometimes true: 1 point, frequently true: 2 points, always true: 3 points). The established cut-off point for each disorder is 2/3.

## Statistical analysis

Descriptive statistics and correlations were calculated using SPSS 12.0.1 for Windows (SPSS Inc., Chicago, Ill, USA). Relative frequencies were calculated and relationships and correlations were assayed between variables obtained from the coronariography study and the personality question-

**Table 1.** Groups of personality disorders using the Salamanca Questionnaire built following a mixed approach (DSM-IV/ICD-10)

GROUP A	Paranoid (A1)
	Schizoid (A2)
	Schizotype (A3)
GROUP B	Histrionic (B1)
	Antisocial (B2)
	Narcissistic (B3)
	impulsive subtype emotional instability disorder (B4)
	borderline subtype emotional instability disorder (B5)
GROUP C	Anankastic (C1)
	Dependent (C2)
	Anxious or avoidant (C3)

naire. Spearman's rank correlation coefficient ( $\rho$ ) was calculated from ordinal or nominal variables. The chi-square test was used to compare personality questionnaire results of patients with or without coronary atherosclerotic plaque. A  $p$  value  $< 0.05$  (two-tailed) was considered statistically significant.

## RESULTS

Seventy-eight adult patients participated in the study, 72% of whom were men and 28% women, mostly under 65 years of age (72%).

The most frequent maximum educational level was complete tertiary education (46%), followed by complete university education (24%) and incomplete tertiary education (11%).

Eighty-seven percent of the patients presented one or more conventional cardiovascular risk factors: dyslipidemia (53%), hypertension (51%), family history of cardiovascular disease (50%), ex-smoker (47%), obesity (22%), diabetes (6%) and current smoking (5%).

In the studied sample, 56% of the cases had coronary atherosclerotic plaque and 44% did not present this condition. In the group with atherosclerotic plaque, 56% presented calcified plaque and 18% non-calcified plaque. In the group with non-calcified plaque, 12% were lipid and 6% fibrolipid plaques.

Seventy-three percent of the patients obtained scores above the established cut-off point (2/3) for each disorder. Fifty-one percent presented group C, 39% group A and 36% group B personality disorders.

In the plaque group, 43% presented group A personality disorders, 41% group B and 61% group C. The most frequent combinations were: 21% groups A, B and C, 14% groups A and C, 14% groups B and C, and 2% groups A and B.

In the plaque group, the different personality disorders were distributed as follows: 21% A1, 30% A2, 7% A3, 41% B1, 9% B2, 9% B3, 14% B4, 7% B5, 43% C1, 23% C2, and 23% C3.

In the non-plaque group, 32% of the cases presented group A personality disorder, 29% group B and 38% group C, and the distribution of personality disorders

was: 6% A1, 23% A2, 3% A3, 18% B1, 0% B2, 12% B3, 9% B4, 0% B5, 26% C1, 9% C2, and 6% C3.

Statistically significant correlations were found between personality disorders and plaque, calcium score, and cardiovascular risk factors.

Presence of plaque was significantly associated with: a) B1 personality ( $\rho$ : 0.250,  $p=0.027$ ); b) C3 personality ( $\rho$ : 0.232,  $p=0.041$ ), and c) number of personality disorders ( $\rho$ : 0.286,  $p=0.011$ ).

The calcium score was significantly associated with: a) B1,  $\rho$ : 0.227,  $p= 0.045$  and b) C2,  $\rho$ : 0.270,  $p= 0.017$ .

Statistically significant associations were found between the number of personality disorders and the number of conventional cardiovascular risk factors ( $\rho$ : 0.268,  $p=0.017$ ).

Finally, statistically significant differences were found for B1 (chi-square: 4.872,  $p=0.027$ ) and C3 (chi-square: 4.181,  $p=0.041$ ) personality disorders.

## DISCUSSION

The studied population was mostly male, with ages ranging between 50 and 70 years, and high educational level (tertiary-university). As in other studies, men over 40 years are most frequently referred for coronariography with computed tomography.

More than half of the participants (56%) presented plaque, and the most frequent was calcified plaque (56%).

Most participants (73%) obtained higher scores than the established cut-off point (2/3) for each personality disorder. The most frequent personality disorder belonged to group C (51%) followed by group A (39%) and group B (36%). In 51% of the cases, anxiety and/or inhibition was dominant, in 39% cognitive distortion and in 36% impulsiveness and affective instability.

Although in the plaque group and in the group without plaque, personality disorders were observed in the three groups (C, A, and B), their distribution was different. The percentages of personality disorders in the plaque group were higher than in the group without plaque. In this last group, there were no cases of antisocial personality disorder (B2) or of borderline subtype emotional instability (B5), although there was no significant difference with the plaque group.

Presence of plaque was significantly associated with B1 (histrionic) and with C3 personalities (anxious). A person with histrionic personality disorder (B1), characterized by being highly emotional and attention-seeking or with anxious or avoidant personality disorder (C3), characterized by constant and deep feelings of emotional stress and fear and hypersensitivity to rejection and criticism, will probably present plaque.

Presence of plaque was also significantly associated with the number of personality disorders. The greater the number of personality disorders in a single person, the greater the probability he/she had of

having plaque. In this case, personality disorders may be thought not only as influencing factors in plaque development and progression, but also as factors that when coexisting in the same person might potentiate each other influencing plaque development.

The histrionic personality disorder (B1) and the dependent personality disorder (C2) were significantly associated with the calcium score. In the studied sample, the greater the calcium score, the greater the probability of having B1 personality disorder or C2 dependent personality disorder, characterized by a general and excessive need of having others take care of him/her, submissive behaviour and fear of separation.

Moreover, statistically significant associations were found between the number of personality disorders and the number of cardiovascular risk factors. This can be related to personality disorders as factors which would favor the adoption of unhealthy conducts or habits leading to conventional cardiovascular risk factors, later promoting the development of cardiovascular diseases. The simultaneous presence of several personality disorders in the same person would increase the probability of a greater number of conventional cardiovascular risk factors and hence the possibility of increased morbidity.

The group with plaque and the group without plaque were significantly different in B1 and C3 personality disorders. Although there are few reports on the physiopathological bases of personality disorders, the present finding suggests possible relationships between these personality disorders (B1 and C3) and plaque presence. While the histrionic personality is characterized by cholinergic and adrenergic hyperactivity and serotonergic hypoactivity, the anxious personality shows postsynaptic serotonergic receptor hyperactivity, GABA system decrease on central nervous activity, hyperactivity of the corticotrophin-releasing hormone regulatory system, and high degrees of cortical and autonomic activation. (24-25) All these physiological alterations, associated to histrionic and anxious personality disorders, indicate the prevalence of sympathetic over parasympathetic activity and the increase in catecholamine levels, which are also physiopathological substrates of ischemic cardiovascular pathologies.

This study suggests some of the possible relationships between essential substrates of ischemic cardiovascular pathologies and a group of characteristics that define a permanent psychosocial performance along time, namely personality disorders. The anxious and histrionic personality disorders can be assumed as possible risk factors for the development of atherosclerotic plaque, as influencing factors in its progression and as factors favoring the adoption of a series of unhealthy habits and behaviours.

In the consultation, the cardiologist may find trouble in establishing a relationship with patients suffering personality disorders. These difficulties and the personal characteristics of the patient can negatively impact on therapeutic adherence, the diagnosis pro-

cesses and treatment. In the histrionic personality disorder, the physician may feel frustrated due to the complex therapeutic management and the tendency of the patient to suffer symptoms which are difficult to control. In the anxious or avoidant personality disorder, hypersensitivity to negative evaluations may generate avoidant behaviours to physician comments, leading to complete interruption of the visits or to consultation with another physician.

The evaluation of the study results presents certain limitations related on one hand with the studied sample characteristics and number and, on the other, with the fact that the employed questionnaire is a personality disorder screening. Nevertheless, this research is an original contribution as it studies personality taking into account international criteria for the diagnosis of personality disorders and their relationship with plaque presence/absence.

## CONCLUSIONS

A significant difference was found between plaque and non-plaque groups for the presence of histrionic and anxious or avoidant personality disorders. This result suggests that it would be more convenient to study a larger sample with temporal follow-up.

## RESUMEN

### Trastornos de la personalidad y placa aterosclerótica coronaria

#### Introducción

Como no encontramos estudios específicos sobre la asociación entre los trastornos de personalidad siguiendo los criterios diagnósticos internacionales y la presencia de placas ateroscleróticas coronarias, nos propusimos investigar dicha asociación, describir la personalidad de las personas con placa, describir la personalidad de las personas sin placa y comparar estadísticamente los mismos.

#### Métodos

Estudio descriptivo transversal. Participaron 78 personas entre 40 y 90 años que cumplieron con los criterios de inclusión e exclusión. Para la recolección de datos se utilizaron la coronariografía mediante tomografía computarizada multicorte y se administró el Cuestionario Salamanca para el screening de los trastornos de personalidad. Mediante el SPSS 12 se describieron y compararon los trastornos de personalidad del grupo con y sin placa aterosclerótica.

#### Resultados

77% presentaron trastorno de personalidad y placa. 23% tenían placa y no presentaban trastorno de personalidad. La presencia de placa se asoció de manera estadísticamente significativa, a nivel 0,05 bilateral, con: a) el trastorno de personalidad histriónico, Rho de Spearman: 0,250, sig. 0,027; b) el trastorno de personalidad ansioso o por evitación, Rho de Spearman: 0,232, sig. 0,041, c) el número de trastornos de personalidad, Rho de Spearman: 0,286, sig. 0,011. Se hallaron diferencias estadísticamente significativas entre el grupo con placa y el grupo sin placa para los trastornos de personalidad histriónica (chi-cuadrado: 4,872, sig.bilateral: 0,027) y ansioso o por evitación (chi-cuadrado: 4,181, sig.bilateral: 0,041).

#### Conclusiones

En la muestra estudiada, el grupo con placa se diferenció de manera estadísticamente significativa del grupo sin placa

por la presencia de trastorno de personalidad histriónico y por la presencia del trastorno de personalidad ansioso por evitación.

**Palabras clave** > Trastornos de la personalidad - Placa aterosclerótica

#### Conflicts of interest

None declared.

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