TYPE D PERSONALITY IN PATIENTS WITH CORONARY ARTERY DISEASE

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SUMMARY

Background: *During the past decade studies have shown that Type D personality is associated with increased risk of cardiac events, mortality and poor quality of life. Some authors suggested that depression and Type D personality have substantial phenomenological overlap.*

Subjects and methods: *The sample consisted of non-consecutive case series of seventy nine patients with clinically stable and angiographically confirmed coronary artery disease (CAD), who had been admitted to the Clinic of Cardiology, University Clinical Centre, from May 2006 to September 2008. The patients were assessed by the Type-D scale (DS14), The Beck Depression Inventory (BDI), and provided demographic information. Risk factors for CAD were obtained from cardiologists.*

Results: *The findings of our study have shown that 34.2% patients with CAD could be classified as Type D personality. The univariate analysis has shown that the prevalence of Type D personality was significantly higher in individuals with unstable angina pectoris and myocardial infarction (MI) diagnoses (p=0.02). Furthermore, some components of metabolic syndrome were more prevalent in patients with Type D personality: hypercholesterolemia (p=0.00), hypertriglyceridemia (p=0.00) and hypertension (p=0.01). Additionally, the distribution of depression in patients with a Type D personality and a non-Type D personality were statistically significantly different (p=0.00).*

Conclusion: *To our knowledge, this study is the first one to describe the prevalence and clinical characteristics of the Type D personality in patients with CAD in this region of Europe. We have found that the prevalence of Type D personality in patients with CAD is in concordance with the other studies. We also have found that Type D personality and depression are two distinctly different categories of psychological distress.*

Key words: *Type D personality - coronary artery disease – stress - depression*

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INTRODUCTION

The distressed (Type D) personality, a relatively new personality construct, has shown particular promise as a potential risk factor for coronary artery disease (CAD). Type D personality has been described as the joint tendency towards negative affectivity (NA) and social inhibition (SI). High NA score exhibits tendency to experience negative emotions, while high score on SI shows tendency to inhibit self-expression in social interactions, because of the fear of disapproval or rejection by others (Denollet 1993). These personality traits have been found to be relatively stable over time and their combination gives rise to general propensity to psychological distress. In other words, the negative effect on health outcomes, including increased mortality rates, is believed to be rather the consequence of the combination of NA and SI in patients with established CAD, than of either of the two personality traits alone (Denollet et al. 2006). Indeed, during the past decade, the majority of studies have shown that Type D personality is associated with increased risk of cardiac events, mortality and poor quality of life (Pedersen et al. 2004, Denollet & Pedersen 2008).

Depression and Type D personality are believed to have substantial phenomenological overlap, and that a well-known construct such as depression has greater significance (Lespérance & Frasure-Smith 1996). Recent findings, however, have shown that Type D personality and depression represent separate constructs among distressed CAD patients (Schiffer et al. 2007, Denollet & Pedersen 2008). Moreover, it seems that type D personality is based on normal personality traits rather than psychopathology (Denollet 2005).

The aims of this study were the following: a) To investigate differences between the CAD patients with Type D personality and those with non-Type D personality with respect to sociodemographic characteristics and risk factors for CAD and b) To examine the correlation between Type D personality and severity of depression in the patients with CAD.

SUBJECTS AND METHODS

The sample consisted of the non-consecutive case series of 79 patients (63 male, 16 female, with mean age 52±8, ranging from 37 to 72). All the patients had clinically stable CAD diagnosed by a cardiologist, and were examined at the Clinic of Cardiology, University Clinical Centre of Serbia

The informed consent was obtained from all the subjects before the study and the acquired data were kept confidential. The study was approved by the Ethical Committee of Clinical Center. The patients were included in the study from May 2006 to September 2008.

For more details about the methods of the study and the procedure please see Stepanovic et al. (2012).

Measures

All participants completed the semi-structured questionnaire covering the socio-demographic characteristics (e.g. age, gender, marital status, etc.). Additionally, traditional risk factors for CAD (e.g. smoking, heredity, hypertension, cholesterol and triglycerides levels, etc.) were obtained from cardiologists. BMI was computed as weight divided by the square of height: kg/m^2.

The patients were asked to complete the Type D personality (DS14) questionnaire and the Beck Depression Inventory (BDI). It took about 30 minutes to complete the survey.

The personality assessment was carried out by the D-Scale 14 (DS14) as the standard measure of Type D personality. DS14 is self-administered and it takes only five minutes to complete it. The 14 items of this scale are answered on a five-point Likert scale (0–4), with a score range from 0 to 28 for each subscale. This scale comprises two 7-item subscales: negative affectivity (NA) (tendency to experience negative emotions; e.g. "I am often in a bad mood") and social inhibition (SI) (tendency to inhibit self expression; e.g. "I find it hard to start a conversation"). The presence of Type D personality is defined as having a cut-off score of ≥10 on both subscales (Denollet 2005). The Serbian version of the DS14 was translated using the procedure recommended by the World Health Organization: http://www.who.int/substance_abuse/research_tools/translation/en/index.html.

The BDI is a 21-item multiple-choice self-report inventory for measuring severity of depression during the past week. BDI items are answered on a four-point Likert scale (0-3), with a score range from 0 to 63. The total score of 0-13 is considered the minimal range, 14-19 is mild, 20-28 is moderate, and 29-63 is severe. Although originally developed as a measure for clinical populations, it is now also widely used as a measure of depression among non-clinical samples as well as in the research for subjects with medical problems (i.e. CAD). The first 14 items measure affective-cognitive depressive symptoms and the last 7 items measure somatic symptoms of depression (Beck et al. 1961).

Statistical analysis

The descriptive statistics for continuous variables (mean value - M and standard deviation - SD) and categorical variables (number - N and percentages - %), were used. Categorical variables were compared with the χ^2-test, whereas Student's *t*-test or ANOVA were used to compare continuous variables (normally or non-normally distributed variables, respectively). Pearson's correlation was used to examine relationship between continuous variables. Cross-tabulation was used to examine overlap between depression/Type D subgroups. Logistic regression was performed to assess the impact of the risk factors for CAD in patients with Type D personality. Significance levels were set at p <0.05 in all cases. All analyses were performed using the Statistical Package for Social Science (SPSS Version 18).

RESULTS

The mean values of NA and SI subscales were above cut-off scores (NA: 13.52 ±6.26 SD, ranging from 0 to 27 and SI: 11.09±6.25 SD, ranging from 0 to 25). In addition, the mean NA/SI scores were higher in female (13.59±6.18 and 11.65±5.54, respectively) than in male patients (12.60±7.38 and 10.94±6.46, respectively), but without statistically significant difference (F(1,77)=0.25; p=0.61 and F(1,77)=0.17; p=0.68, respectively).

By applying the recommended cut-off (NA ≥10 and SI≥10), we found that 27/79 (34.2%) patients could be classified as Type D personality. The patients with Type D personality were slightly older compared to non-Type D personality patients (55.44±8,41 vs. 53.13±8.49; F(1.79)=1.32; p=0.25). Additionally, they were more likely to be married (74.1% vs. 73.1%; χ^2(3)=1.05; p=0.78), but less likely to be employed (44.4% vs. 51.9; χ^2(2)=2.21; p=0,33), than non-Type D personality patients. The prevalence of subjects having secondary education was higher among Type D than among non-Type D personality patients, that is, 74.1% vs. 46.2% (χ^2(3)=5.80; p=0,12). However, there was no significant difference between Type D personality and non-Type D personality in gender distribution (i.e. male subjects: 38% vs. 24%; χ^2(1)=2.63; p=0.10). Accordingly, no statistically significant differences were found in terms of the aforementioned age, marital, employment and social status, or level of education. Socio-demographic characteristics of Type D vs. non-Type D personality patients are presented in Table 1.

The univariate analysis showed no difference between subjects with or without Type D personality having family history of hypertension and smoking status. In contrast, the prevalence of Type D personality was significantly higher in individuals with unstable angina pectoris and myocardial infarction (MI) diagnoses (22.6% and 67.7%; χ^2(1)=4.76; p=0.02) and χ^2(1)=5.04; p=0.02, respectively). Furthermore, some components of metabolic syndrome were more prevalent in patients with Type D personality: hyperchole-

sterolemia (58.1%; $\chi^2(1)=11.59$; p=0.00), hypertrigly-ceridemia (61.3%; $\chi^2(1)=5.45$; p=0.00) and hypertension (64.5%; ($\chi^2(1)=6.91$; p=0.01). On the other hand, there were no statistically significant differences in the prevalence of patients with type II diabetes mellitus (DM II)/BMI >30 kg/m^2 between Type D/non-Type D personality. Metabolic syndrome stratified by Type D personality is presented in Table 2.

The post-hoc analysis revealed the statistically significant correlation between NA and SI scores with hypertension ($F(1,77)=5.62$; p=0.02; and $F(1,77)=8.78$; p=0.004, respectively) and hypertriglyceridemia ($F(1,77)=25.69$; p=0.000; and $F(1,77)=18.19$; p=0.000, respectively). Moreover, the correlation between SI score with hypercholesterolemia was statistically signi-ficant ($F(1,77)=12.81$; p=0.001). Additionally, patients with hypertension have shown a significantly higher

level of NA (14.73±7.02) and SI (12.58±6.07), than patients without hypertension. Also, mean values of NA subscale for the patients with hypertriglyceridemia and hypercholesterolemia were 16.50±7.21 and 14.74±12.05, respectively, while the mean values of SI subscale for those patients were 13.36±6.20 and 13.53±5.57. Ove-rall, our subjects having some components of metabolic syndrome (MetS) showed significantly higher NA and SI scores than subjects without MetS components.

Logistic regression was performed to assess the impact of age, gender, smoking status, family history of CAD, hypertension, hypercholesterolemia and hyper-triglyceridemia on the likelihood of presence of CAD in patients with Type D personality. Table 3 presents the results of logistic regression of predictors of CAD in the patients with Type D personality.

Table 1. Sociodemographic characteristics of Type D personality of both patients' groups (N=79)

	Non Type D personality	Type D personality	p
Age (yrs.) (M±SD)	53.13±8.49	55.44±8,41	NS*
Gender (male)	38 (73.1%)	24 (88.9%)	NS[+]
Married	38 (73.1%)	20 (74.1%)	NS[+]
Education (secondary school)	24 (46.2%)	20 (74.1%)	NS[+]
Employed	27 (51.9%)	12 (44.4%)	NS[+]
Socioeconomic status (middle)	28 (53.8%)	15 (55.6%)	NS[+]

Legend: M - mean value; SD - standard deviation; NS - Not significant; * t-test; [+] χ^2 test.

Table 2. Clinical characteristics of Type D personality of both patients' groups (N=79)

	Non Type D personality (%)	Type D personality (%)	p
Family history of hypertension	56.5	61.3	NS
Smoking	53.6	58.1	NS
Unstable angina pectoris	7.2	22.6	0.02
Myocardial infarct	43.5	67.7	0.02
Metabolic syndrome (MetS)			
BMI >30*	23.0	22.6	NS
Hypercholesterolemia	23.2	58.1	0.00
Hypertriglyceridemia	36.2	61.3	0.00
Hypertension	36.2	64.5	0.01
Diabetes mellitus	14.5	25.8	NS

Legend: *BMI – body mass index

**Table 3.** Predictors of CAD in patients with Type D personality

	B	S.E.	Wald	df	p	Exp(B)	95.0% C.I. for EXP(B)	
							Lower	Upper
Age	0.063	0.025	6.178	1	0.013	1.064	1.013	1.118
Gender	1.356	0.363	13.964	1	0.000	3.879	1.905	7.897
Smoking	0.645	0.383	2.841	1	0.092	1.906	0.900	4.036
Family history of CAD	0.508	0.333	2.323	1	0.127	0.602	0.313	1.156
Hypertension	0.615	0.509	1.459	1	0.227	0.541	0.199	1.466
Hypercholesterolemia	2.822	0.618	20.871	1	0.000	0.060	0.018	0.200
Hypertriglyceridemia	3.153	0.707	19.896	1	0.000	23.407	5.857	93.547
Constant	4.222	1.398	21.121	1	0.000	0.015		

Legend: CAD - Coronary Artery Disease

The relationship between Type D personality and depression - dimensional and categorical analyses

The second objective of this study was to examine potential overlap of depression and Type D personality. The mean depression score (Beck Depression Inventory, BDI) established for the sample as a whole was 9.84±7.16 (range from 0 to 40). Further analysis indicated higher mean scores on the cognitive-affective subscale (5.53±3.56), relative to somatic subscale (4.1±2.2), but without statistically significant differences. In addition, the mean value of BDI was found to be significantly higher in Type D personality patients (9.35±5.63, ranging from 2 to 12), than in non-Type D personality patients (6.26±5.00; ranging from 0 to 21) (t(78) =11.50; p=0.00).

The correlation analyses have shown the statistically significant correlation between NA and SI subscales and the total BDI score (r=0.568; p<0.01 and r=0.420; p<0.01, respectively). Additionally, the cross-tabulation was used to examine the overlap between depression/Type D subgroup of patients - depressed Type D (41.2%), depressed non-Type D (12.9%) and non-depressed Type D (58.8%) ($\chi^2(1)$=6.93; p=0.00). These findings have shown that Type D personality and depression most probably are two distinctly different categories of psychological distress (Figure 1).
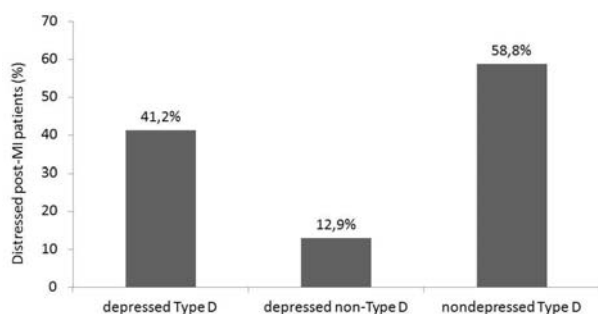
Figure 1. Percentage of distressed CAD patients (n=79), stratified by depressive disorder and Type D personality

DISCUSSION

We think that our study for the first one concerning prevalence of Type D personality in patients with CAD, at this region in Europe. Our findings have shown that 34.2% of the examined patients with CAD could be classified as Type D personality, which are in concordance with the results of a study by Denollet (2005). However, a large body of literature examining the prevalence of Type D personality has produced inconsistent findings. For example, de Jonge et al. (2007) found that 18.6% of patients with IM had a Type D personality, while Denollet (2005) reported about 53% of patients with hypertension with Type D personality. Indeed, Type D personality is prevalent from 21 to 53%

of patients across different diagnostic categories (e.g. acute coronary syndrome, hypertension, chronic heart failure, peripheral arterial disease, etc.). Nonetheless, Williams et al. (2008) consider cultural differences in regard to prevalence of this construct, indicating that the prevalence of Type D personality among patients with CAD is higher in Great Britain and Ireland than in Italy (Gremigni & Sommaruga 2005), Germany (Grande et al. 2004) and China (Jian-Xin 2006). Furthermore, we found no gender differences in the prevalence of Type D personality in the sample used in our study, which is in line with the recent findings of Williams et al. (2011).

Our findings have shown that average scores on both subscales (NA/SI) are above cut-off values in patients with CAD. These results are similar with those reported in other studies (Williams 2011). The higher mean score on the NA subscale (i.e. tendency to experience negative emotions) in our patients was consistent with previous findings that negative affectivity predicts long-term cardiac-related morbidity in patients with CAD (Frasure-Smith & Lespérance 2003). Also, our patients tended to inhibit self-expression in social interactions, which is consistent with previous studies (Brosschot & Thayer 1998). It should be stressed that inhibition of negative emotions might be related to higher CAD risk. Namely, the maladaptive emotion regulation strategy combined with vulnerability to interpersonal stress is by itself disease-promoting (Gross 2002). The combined effect of negative affectivity with inhibition may further exacerbate the cardiac morbidity and mortality risk (Schiffer et al. 2006).

According to the available literature, this is the first study investigating the connection between Type D personality and some components of metabolic syndrome (MetS) in patients with CAD. Our findings have shown that there is no difference between the subjects with or without Type D personality having family history of hypertension and smoking status. In contrast, the prevalence of Type D personality was significantly higher in individuals with unstable angina pectoris and myocardial infarction along with some components of metabolic syndrome (i.e. hypercholesterolemia, hypertriglyceridemia and hypertension). This is consistent with the previous findings that demonstrated the correlation between the Type D personality and poor prognosis, as well as cardiac morbidity and mortality risk (Pedersen & Denollet 2003). Recently, Mommersteeg et al. (2010) published the first study exploring the relation between Type D personality and metabolic syndrome in healthy subjects. They found that individuals with Type D personality had a twofold increased risk of having metabolic syndrome as well as that the increased risk for MetS in people with Type D may be attributed to the hypertension and hypertriglyceridemia, but not to diabetes. Some studies on cardiac risk factors confirmed positive correlation between Type D personality and MetS components (BMI as well as a hypertriglyceridemia - Einvik et al. (2011).

Therefore, further studies are needed to investigate whether it is the traditional cardiovascular risk factors that trigger the correlation between the Type D personality and the etiopathogenesis and prognosis of CAD.

The mean BDI depression score of participants in our study are broadly similar to the results reported by Crawford et al. (2001) in large non-clinical adult samples. Our findings have also shown that total BDI scores were higher in women, subjects with low socio-economic status (SES), and middle aged subjects. Further analysis indicated higher mean scores on cognitive-affective subscale relative to somatic subscale, but without statistically significant differences. A growing body of research suggests that depression is a risk factor for cardiac events and post-MI mortality (e.g. Frasure-Smith et al. 1993, Carney et al. 2004).

The Beck Depression Inventory (BDI) is one of the most widely used instruments for measuring the severity of depressive symptoms (Beck et al. 1961). When used on patients with CAD this instrument may lead to exaggeration of scores in BDI's items of physical symptoms, due to the symptoms of illness, rather than depression. For that reason, we took into account Beck & Steer's (1993) distinction between somatic and affective-cognitive BDI subscales. Recently, de Jonge et al. (2006) showed that only the somatic-affective BDI subscale was associated with cardiac-related readmissions and cardiovascular death during an average follow-up of 2.5 years in post-MI patients. It is unclear which features of depression are associated with CAD status and prognosis. Therefore, further studies are needed to investigate this relationship.

Many authors also assert that various instruments, such as BDI and DS14, do not measure distinct concepts (i.e. depression, negative affectivity, etc.), but instead, reflect a higher-order construct. The findings of our study indicate that NA and SI subscales are statistically significantly correlated with total BDI score. These findings are in concordance with the results of a study by Pelle et al. (2009), which included the sample of patients with ischemic heart disease. They have shown that none of the BDI items loaded on the DS14 factors, which confirms that the DS14 and the BDI measure two distinct constructs. Additionally, the DS14 and the BDI were supposed to represent a higher-order construct. These data confirm assertion that "social inhibition moderates the effect of negative affectivity on clinical outcome" (Pedersen & Denollet 2006).

In our study, the mean BDI values of patients with Type D personality were statistically significantly higher than in patients with non-Type D personality. Lespérance & Frasure-Smith (1996) consider that Type D personality and depression have significant phenomenological overlap. Conversely, assertion of Denollet & Pedersen (2008) that Type D personality and depression represent a different form of distress has been confirmed in our study. Namely, we found that more than 50% of patients with Type D personality had no depression (BDI<10), while 12.9% of non-Type D personality patients met criteria for mild depression. We also found that distribution of depression patients (BDI>10) with a Type D personality and a non-Type D personality were statistically significantly different. Denollet & Pedersen (2008) suggested that Type D personality and depression were distinct concepts, because social inhibition (SI) represented the core characteristic of Type D but not of depression and that they also differ in their conceptualization as either a disorder (depression) or a personality trait (Type D personality).

This study has a number of limitations: first, this is the case-control study design; second, we used self-report measures to assess depression. However, its strengths include the large sample size and the inclusion of multiple covariates.

CONCLUSION

To our knowledge, this study is the first one to describe the prevalence and clinical characteristics of the Type D personality in patients with CAD in this region of Europe. Type D personality had a prevalence of 34.2% in this sample, which is in concordance with the results of a study by Denollet (2005). Furthermore, patients with type D personality reported a significantly higher frequency of some components of metabolic syndrome (i.e. hypercholesterolemia, hypertriglyceridemia and hypertension). We have also found that type D personality and depression are two distinctly different categories of psychological distress, i.e. that distribution of depressed patients with or without a type D personality were statistically significantly different. The presence of depression and Type D personality in CAD patients should be carefully diagnosed in order to prevent consequences such as adverse cardiac events and poor compliance in patients with CAD. Interdisciplinary collaboration (behavioural cardiology) should be further developed, which is one of our activities in the recent years.

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