TYPE A PERSONALITY, STRESS, ANXIETY AND HEALTH LOCUS OF CONTROL IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION

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SUMMARY

Background: The aim of this study was to define the level of patient exposure to stress in the previous 5 years before acute myocardial infarction (AMI), personality type A assessment, ways of coping with stressful situations, health locus of control and the grade of anxiety (as state and personality trait).

Subjects and methods: 118 patients who were consecutively hospitalized during 8 months in our Coronary care unit due to AMI, took part in the study. As controls we examined 103 healthy male volunteers (mean age 60.8±2.93 years).

Results: AMI patients presented with higher degree of behavior corresponding to type A personality (F=18.756, p=0.000), and also showed higher degree of anxiety, as state and personality trait (F=23.634, p=0.001; F=19.253, p=0.000), in comparison to healthy controls. Also, AMI patients were significantly more often coping emotionally in stressful situations than control subjects (F=21.354, p=0.000), and they had significantly higher external locus of control compared to healthy subjects (F=13.284, p=0.001). They often considered that they were not able to control their health, namely they evaluated their ability to control their health as weak and were much more often directed to cope with intense emotions (r=0.24, p=0.002).

Conclusions: The study showed that AMI patients psychologically differed from the healthy controls, indicating that they were prone to maladaptive behavioral patterns which could favor development and complicate course of coronary artery disease.

Key words: *acute myocardial infarction – AMI - type A personality – stress – coping - anxiety*

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INTRODUCTION

Stress has been implicated in the development and prognosis of cardiovascular disease. A number of studies have emphasized significant contribution of psychosocial factors in the development of coronary artery disease (CAD). Most frequently documented external risks include physical stress, emotional stress, sexual activity, meteorological changes, exposure to cold and cocaine consumption as acute risk factors. They all increase the tone of sympathetic system and elevate blood pressure which enhances proneness to rupture and subsequent thrombosis at the site of atherosclerotic plaque, especially at the site of coronary vasoconstriction (Nabel et al. 1988, Muller 1989, Hollander & Hoffmann 1992). They also raise heart rate and myocardial contractility, thus increasing myocardial oxygen consumption (Verrier et al. 1987, Boltwood et al. 1993, Abela et al. 1995, Gronholdt et al. 1998). Various physical, emotional and extrinsic triggers were identified in 37% of patients with ST-segment elevation myocardial infarction (STEMI), but multivessel CAD was mostly found in nontriggered STEMI, together with high rate of comorbidities (Ben-Shoshan et al. 2016). On the other hand, patients' personality traits and psychological states such as anxiety and depression, and their effect on acute coronary syndrome (ACS) development have been investigated in many studies. Although depression is a known risk factor for the development of cardiovascular disease, as well as an independent predictor of poor prognosis following a cardiac event, the mechanistic relationship between the two remains unclear. Postmyocardial infarction patients (post-MI) with a clinician-diagnosed depressive disorder or self-reported depressive symptoms carry a 2.0- to 2.5-fold increased relative risk of new cardiovascular events and cardiac mortality (von Känel & Begré 2006, Topic et al. 2013). Approximately 40% of post-MI patients have either major or minor depression (Carney & Freedland 2003, Kapfhammer 2011). In sensitive individuals, suddenly developed emotional states can be a significant causative factor for acute coronary event shortly after the stress, provoking a rapid patho-physiological responses in hemodynamic, hemostatic and neuroendocrine system (Kop 1999). On the other hand, exposure to „chronic" risk factors such as anxiety, depression, stress at workplace, social isolation, smoking and physical inactivity favor the development and gradual progression of the existing CAD (Strike & Steptoe 2005). Emotional responses in patients with

AMI differ in coping with one's disease. Patients oriented to emotional reaction have more difficulty in adjusting to new situations and more often develop negative attitude to their disease compared to patients oriented to task, with less degree of depression (Wrzesniewski et al. 1994). In a study by Wrzesniewski et al. (1994) 101 male patients were assessed with Coping Inventory for Stressful Situations (CISS) after the first uncomplicated AMI. Patients with high emotion oriented coping style had a tendency to strong negative emotions and unfavorable attitude toward the illness. On the other hand, patients with high task oriented coping style reacted with lower depression and favorable attitude toward the illness.

The aim of this investigation was to determine the degree of exposure to stressful events in the previous five years, ways of coping with stress, health locus of control and the degree of anxiety (as state and personality trait) in patients with CAD, primarily acute ST-segment elevation myocardial infarction.

SUBJECTS AND METHODS

Subjects

The investigation included 118 patients, average age 65.3 years (65.3±3.79), hospitalized in the Coronary Care Unit of the University Hospital Centre Zagreb, Croatia, for acute ST-segment elevation myocardial infarction. The studied patients were all males because the number of hospitalized female patients was relatively small (n=23). Therefore, we considered it justified to exclude female patients from the study so that gender variable would not interact with the results. The sample of patients with CAD was fixed (hospitalized in the University Hospital Centre Zagreb during our investigation), while the sample of participants without health complaints was randomly chosen. Control group consisted of the healthy males (n=103) without any type of chronic diseases, tumours, psychiatric and cardiovascular diagnoses, who visited their family practitioner. The two groups were not significantly different in the age status (65.3±3.79 vs. 60.8±2.93, p>0.05).

All human studies have been approved by the Ethic committee of the University Hospital Centre Zagreb, Croatia, and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. Authors have no conflicts of interests. All patients enrolled in the study gave informed consent, patient anonymity was preserved and the obtained data were used exclusively for scientific purposes.

Measures

The following psychological measurement instruments have been used in this research:

- *Holmes-Rahe life stress inventory* - a list of 41 stressful life events that can contribute to illness.

Respondent has the task to mark the events he was exposed to in the last five years.

- *Bortner Type A scale* - has 14 items each consisting of two phrases, placed at opposite ends of a continuum ranging of extreme TABP (type A behavior pattern) to the absence of TABP. Respondents are asked to rate each of 14 items on 11 point scale.

- *Spielberger State-Trait Anxiety Inventory* – has 40 items; first 20 items measure anxiety as state and second 20 items refer to anxiety as trait. The State-Trait Anxiety Inventory (STAI) is instrument for measuring anxiety in adults. The STAI clearly differentiates between the temporary condition of "state anxiety" (STAITS) and the more general and long-standing quality of "trait anxiety" (STAIT). The essential qualities evaluated by the STAIS-Anxiety scale are feelings of apprehension, tension, nervousness, and worry. On the STAIT-Anxiety scale, consistent with the trait anxiety construct, psychoneurotic and depressed patients generally have high scores.

- *Coping Inventory for Stressful Situations (CISS)* – has 48 items and respondents are asked to rate each of them on a five point Likert-type rating scale ranging from (1) "Not at all" to (5) "Very much." Respondents are asked to "indicate how much you engage in these types of activities when you encounter a difficult, stressful, or upsetting situation. CISS measures three coping styles: task-oriented efforts aimed at solving the problem, cognitively restructuring the problem, or attempts to alter the situation. The main emphasis is on the task or planning, and on attempts to solve the problem; emotional reactions are self-oriented. The aim is to reduce stress (but this is not always successful). Reactions include emotional responses (e.g., blame oneself for being too emotional, get angry, become tense), self-preoccupation, and fantasizing (daydreaming reactions). In some cases the reaction actually increases stress (e.g., become very upset, become very tense). The reaction is oriented towards the person; avoidance describes activities and cognitive changes aimed at avoiding the stressful situation. This can occur via distracting oneself with other situations or tasks (task oriented) or via social diversion (person oriented) as a means of alleviating stress.

- *Multidimensional Health Locus of Control Scales* - MHLC Scales - contains three subscales: internal HLC; powerful others externality (PHLC); and chance (CHLC). Each subscale measures individual's tendency to believe that health outcomes are due mainly to one's own behavior (IHLC), or to powerful others such as medical professionals of family (PHLC) or to chance (CHLC). PHLC and or CHLC are classified as "external" belief, and IHLC as "internal" belief.

Table 1. Prevalence of type A personality and exposure to stressful situations in the previous five years and ways of coping with stress, health locus of control, and anxiety as state and personality trait for patients with coronary artery disease and healthy controls subjects

		Healthy control		Patients with coronary artery disease	
		Mean	Standard deviation	Mean	Standard deviation
Degree of exposure to stressful situations		152.67	5.764	153.98	6.646
Type A personality		151.40	32.67	165.80	36.93
CISS[1]	Assignment-centered	101.40	12.89	50.70	13.45
	Emotion-centered	82.60	13.56	119.30	11.23
	Avoidance	65.50	12.43	71.50	12.71
MHLC[2]	Internal locus of control	22.40	6.02	18.80	5.59
	Powerful others externality	17.96	6.92	28.50	5.54
	Chance externality	18.84	5.78	30.90	4.98
STAI[3]	Anxiety as state	35.70	7.89	56.40	8.12
	Anxiety as trait	42.40	6.35	67.70	9.98

[1]Coping Inventory for Stressful Situations;   [2]Multidimensional Healthy Locus of Scales;   [3]State-Trait Anxiety Inventory

Statistical analysis

The results were expressed as mean ± SD. All data were evaluated using one-way analysis of variance (ANOVA) followed by a Scheffe's multiple comparison test. When two groups were compared, Student's t-test was used. Significance was accepted when $p<0.05$. Statistical analyses were performed with the statistical package SPSS version 17 for Windows.

RESULTS

The obtained distributions of results for the observed variables (degree of exposure to stressful situations, Type A behavior, ways of coping with stressful situations, health locus of control and anxiety) for both groups (patients with CAD and participants without health complaints) did not differ with statistical significance from the normal distributions. Therefore, we used parametric statistics in results analysis. Table 1 shows results of descriptive statistics (mean and standard deviation) for the observed variables. The investigation also showed that both groups were almost equally exposed to stressful situations in the previous five years and no statistically significant differences were found (t-test=0.189; p>0.005; both groups were exposed to stressful events of moderate intensity). However, it was observed that patients hospitalized for CAD showed higher grade of type A personality behavior compared to healthy controls (t-test=18.756, p=0.000) (Table 1).

Patients with CAD showed higher grade of anxiety as state and personality trait compared to healthy controls (F=23.634, p=0.001; F=19.253, p=0.000) (Figure 1). Further, differences were found between the participants in the ways of coping with stress. CAD patients statistically significantly more often used emotion-centered coping in stressful situations compared to control group (F=21.354, p=0.000), what is shown in (Figure 2). CAD patients were more often prone to self-accusation, in stressful situations more often overwhelmed by emotions,
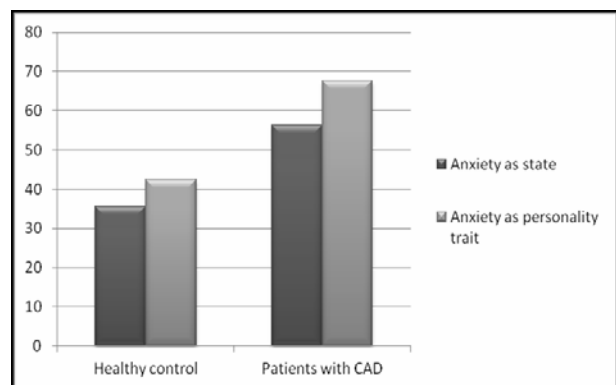

Figure 1. Spielberger State-Trait Anxiety Inventory scale (STAI) for coronary artery disease (CAD) patients and healthy control group
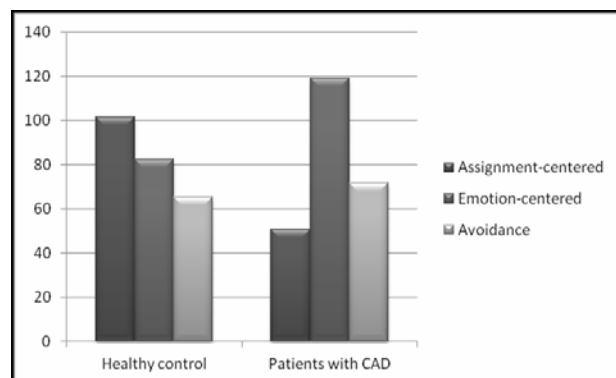

Figure 2. Coping Inventory for Stressful Situations (CISS) for showing ways of coping with stress in patients with coronary artery disease (CAD) and healthy control - coronary artery disease patients often used emotion-centered coping in stressful situations.

more tense and petulant, and often inclined to getaway in fantasy. Some differences were found in health locus of control: CAD patients had statistically significantly higher external locus of control than healthy controls (F=132.84, p=0.001). CAD patients more often think that their health is not under their control, i.e. they estimate their possibility of control as low, therefore

they are more often centered on coping with emotions (r=0.24, p=0.002). CAD patients more often consider that their behavior cannot contribute to recovery and that it cannot prevent the development of disease.

DISCUSSION

Exposure to stress

Stress is in its essence an arousal which can be either positive or negative. In general, stress is related to both external and internal factors. External factors include physical environment, including your job, your relationships with others, your home, and all the situations, challenges, difficulties, and expectations you're confronted with on a daily basis. Internal factors determine your body's ability to respond to and deal with, the external stress-inducing factors. Exposure to stressful situations is not sufficient to impair normal functioning of an individual, but reactions to stress, i.e. ways of coping with stressful situations cause pathological disorders in the organism. Our investigation showed that CAD patients and healthy individuals were almost equally exposed to stressful situations in the previous five years (MCAD=153.98 vs M=152.67; t=0.189, p>0.005).

Coping with stress and personality type

However, there were some differences in the ways of coping with stress and personality traits between the two groups. Patients hospitalized for CAD showed higher degree of Type A behavior, which is in accordance with earlier psychological theories. In some psychological theories, the Type A personality is a set of characteristics that includes being impatient, excessively time-conscious, insecure about one's status, highly competitive, hostile and aggressive, and incapable of relaxation (Friedman & Rosenman 1974). Type A individuals are often highly achieving workaholics who multi-task, drive themselves with deadlines and are unhappy about the smallest of delays. Many are also capable of "couching" some of these behavior attributes with proper treatment and medication. Those who do not seek treatment have been described as stress junkies, and often display some characteristics such as: intrinsic insecurity or insufficient level of self-esteem, which is considered to be the root cause of the syndrome; time urgency and impatience, which causes irritation and exasperation; free floating hostility, which can be triggered even over little incidents (Friedman 1996). Gallacher et al. (2003) found that high Bortner scores were associated with increased risk of coronary event at 5 years of follow-up. Patients treated with percutaneous coronary intervention were more likely to have type A personality and type D personality, they were more anxious and depressed and had negative coping styles and this tendency was associated with myocardial injury (Du et al. 2016, Vukovic et al. 2014). In study by Bass & Wade (1984), Bortner test was used to assess Type A personality and incidence of diagnosis of CAD in patients presenting with chest pain. Higher Type A score was found in men with normal or near-normal coronary arteries than in those with significant occlusions, suggesting «complaint behavior» in raised Type A score. However, some studies have shown that Type A personality is not directly related to the development of heart disease. According to research by Williams RB (2001), the hostility component of Type A personality is the only significant risk factor. Thus, it is a high level of expressed anger and hostility, not the other elements of Type A behavior, that constitutes the problem.

Several studies have suggested that chronic anxiety is associated with an increased risk of CAD (Weissman et al. 1990, Coryell et al. 1982), which is in accordance with our result regarding the role of pronounced trait and state anxiety linked to CAD. Kawachi I et al.(1994) found an association between anxiety and fatal CAD, in particular sudden cardiac death. The effect of stress is directly linked to coping. Our investigation showed that CAD patients are more emotion oriented in coping with stressful situations compared to control group. High emotion and low task oriented coping style is specific for AMI patients and this result is in accordance with the study of Wrzesniewski et al. (1994). Messerli-Brugy et. al. (2015) also proved that low task-oriented coping and high depressive symptoms had a strong association with adverse cardiac outcomes, independently of demographic, clinical and behavioral covariates.

Health locus control

Locus of control is a personality trait which is formed during socialization and is manifested as inclination to attribute our behavior to external circumstances or internal factors. The health locus of control refers to people's beliefs that their health is or is not determined by their own behavior. The investigation showed that CAD patients have higher external locus of control (chance externality and powerful others externality) compared to healthy controls.

CAD patients report that their health is not under their control and influence, but that they depend on external factors. This implies that persons with external locus of control more often believe that they cannot contribute to their recovery. The recovery depends, for example, on physicians, God or some accidental factors. Thus, individuals with external locus of control are less ready to undertake preventative and curative measures to improve their health. Individuals scoring high on the internality scale were more likely to participate in a greater number of health behaviors. Those who believed that chance and fate played a large role in their health status were less likely to engage in preventative health behaviors. A strong belief in powerful others was found to be related to performance of fewer health behaviors, reflecting the belief in the ability of the medical professional to cure illness and protect health. Norman

et al. (1998) and Sturmer et al. (2006) performed a prospective cohort analysis of MHLC and chronic disease development in a German study population of men and women aged 40-65. The findings revealed that individuals with high internal locus of control had lower risk of myocardial infarction, most likely related to willingness to participate in preventative health behaviors. Accordingly, CAD patients with higher external locus of control will not be willing, or will be less willing, to undertake activities and adopt healthy behavior to cure consequences of primary disease (coronary artery disease) than those with higher internal locus of control. Therefore, CAD patients included in our investigation represent a high-risk group.

Moreover, our investigation showed that patient with AMI showed higher level of anxiety as a state, as well as anxiety as trait. State anxiety is identified as an unpleasant emotional stimulation that occurs when a person is comes into contact with frightening stressors or dangers, which AMI definitely is. Trait anxiety is regarded as a fixed stage of anxiety, which is undergone by a person who has the propensity to become extra anxious and persistently displays unhealthy responses when he encounters stimuli that provokes him. This form of anxiety is a relatively stable aspect of the personality. In their behaviour, individuals who present an anxiety trait will tend to have an attitude reflecting their perception of certain environmental stimuli and situations as dangerous or threatening. In practice, the anxious perceptive style of these person will eventually become pervasive, extending to and influencing other areas of experience, and in effect finally becoming a characteristic of the personality.

Those who show a more developed anxiety trait are much more prone to reacting to a large number of stimuli and will tend to worry also in situations which for most individuals would not represent a source of threat. These individuals are more likely to present state anxiety in circumstances with low anxiety-generating potential, such as normal day-to-day activities, and will probably experience higher levels of state anxiety in the presence of anxiety-generating stimuli.

Shen et al. (2008) in their study demonstrated that anxiety characteristics independently and prospectively predicted AMI incidence and anxiety characteristics were the strongest predictor of AMI among psychologic variables. It is plausible that highly anxious individuals are more likely to experience elevated levels of stress repeatedly and chronically, thereby exposing them to higher risk for AMI. High stress, as well as depression, were associated with 3-fold increased risk of 30-day readmission after ACS (Edmondson et al. 2014). A number of pathophysiologic pathways, mostly implicating exaggerated stress reactivity, have been speculated to explain how psychosocial factors may confer higher risk for AMI. These include dysregulated hypothalamic-pituitary-adrenal axis and autonomic nervous system, excessive inflammatory process, and disturbed platelet activation.

CONCLUSIONS

Despite several limitations, this study showed that AMI patients psychologically differed from the healthy controls, indicating that they were prone to maladaptive behavioral patterns which could favor development and complicate course of coronary artery disease.

Conflict of interest: None to declare.

Contribution of individual authors:

Davor Miličić participated in the design of the study, analyzed the data results and interpretation of data.

Lovorka Brajković participated in the design of the study, literature searches and analyses, in statistical analyses and interpretation of data.

Jana Ljubas Maček participated in patient enrollment and questionnaire distribution, in literature searches, analyzed the data results, took part in interpretation and formatting of data.

Adriana Andrić participated in patient enrollment and questionnaire distribution, literature searches and interpretation of data.

Žarko Ardalić participated in patient enrollment and questionnaire distribution, literature searches and interpretation of data.

Tina Buratović participated in patient enrollment and questionnaire distribution, literature searches and interpretation of data.

Darko Marčinko participated in design of the study, analyzed the data results and interpretation of data.

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