

## PSYCHOLOGICAL REACTIONS AND HEALTH BEHAVIOR FOLLOWING ACUTE MYOCARDIAL INFARCTION

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Psychological reactions, risk health behavior and cardiac parameters can influence rehospitalization after acute myocardial infarction.

The aim of the paper was to determine the presence of psychological reactions and risk health behavior in patients with acute myocardial infarction on admission as well as the differences after six months.

The research included thirty-three patients of both sexes, who were consecutively hospitalized due to acute myocardial infarction. A prospective clinical investigation involved the following: semi-structured interview, Mini International Neuropsychiatric Interview (M.I.N.I) for psychiatric disorders, Beck Anxiety Inventory (BAI) for measuring the severity of anxiety, Beck Depression Inventory (BDI) for measuring the severity of depression, KON-6 sigma test for aggression, Holms-Rahe Scale (H-R) for exposure to stressful events, and Health Behavior Questionnaire: alcohol consumption, cigarette smoking, lack of physical activity. Measurement of the same parameters was done on admission and after six months. The differences were assessed using the t-test and chi-square test for  $p < 0.05$ .

On admission, anxiety (BAI=8.15±4.37) and depression (BDI=8.67±3.94) were mild without significant difference after six months in the group of examinees. Aggression was elevated and significantly lowered after six months (KON-6 sigma =53,26±9, 58:41,42±7.67,  $t=2,13$ ) for  $p < 0.05$ . Exposure to stressful events in this period decreased (H-R=113.19±67.37:91,65±63,81,  $t=3,14$ ) for  $p < 0.05$ ; distribution of physical activity was significantly higher compared to admission values (54.83%: 84.84%.  $\chi^2=5.07$ ) for  $p < 0.01$ .

In the group of examinees with acute myocardial infarction in the period of six months, anxiety and depression remained mildly increased, while the levels of aggression and exposure to stressful events were lowered. Risk health behavior was maintained, except for the improvement in physical activity. In the integrative therapy and rehabilitation of patients after myocardial infarction there should be considerable psychoeducation of patients with the aim to reduce their risk health behavior. *Acta Medica Medianae 2011;50(2):18-23.*

**Key words:** *psychological reactions, risk health behavior, acute myocardial infarction*

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### Introduction

Psychological reactions and health behavior following myocardial infarction can influence the prognosis (1). Literature data demonstrate that distressful reactions in the form of intensified anxiety and/or depression impact morbidity and mortality after acute coronary event (2). Risk health behaviors, such as alcohol consumption, cigarette smoking and lack of physical activity contribute to the development and progression of coronary heart disease, and the change of these habits is a part of the therapy for coronary syndromes (3). The researches by Dierker L.C. from 2002 demonstrated that behavioral habits

are equivalents and mediators of the influence of psychological factors on prognosis of acute coronary events (4).

Our experience from consultative work points to unfavorable emotional reactions in the patients with acute coronary syndromes as well as the presence of risk health behaviors, in spite of having been informed about their harmful effect on the course of disease.

The aim of the paper was to determine the presence of unfavorable emotional reactions, risk health behavior, exposure to stressful life events 7-10 days after the first myocardial infarction as well as the changes in the parameters analyzed after six months.

### Patients and methods

The research was conducted at the Clinic for Cardiology and Clinic for Mental Health Protection of the Clinical Center Niš in 2009. The

prospective study involved the examinees of both sexes chosen by the method of consecutive admission over a six-month period, at the Clinic for Cardiology, Clinical Center Niš.

The differences in psychological and behavioral parameters in the group of cardiac patients were compared with the diagnosis of acute myocardial infarction on two occasions: 7-10 days after admission to hospital (initial measurement) and after six months (final measurement). All the patients were examined by cardiologist and psychiatrist. Diagnosis of acute myocardial infarction was set by cardiologist in a hospital setting based on positive signs of cardiac ischemia: anamnestic data, physical examination, electrocardiogram, echocardiogram, and blood biochemical parameters of myocardial ischemia (5,6). Psychiatric assessment was carried out by the administration of the semistructured interview, self-rating scales for anxiety and depression, scales for exposure to adverse life events, and risk behavior questionnaire. The research inclusion criteria were: age 18-60 years, first hospitalization due to coronary heart disease, elementary education at least; the exclusion criteria were the presence of the diagnosis of psychotic disorder and/or organic psychosyndrome of confusing-delirious type after myocardial infarction. The examined group involved thirty-three patients of both sexes; all the patients were informed about the aim and form of the research, and gave their written consent to participate in the research. The final measurement was undertaken six months after the initial one at the Clinic for Mental Health Protection, by the administration of the same instruments for the assessment of psychological parameters and risk behavior. The following instruments were applied: M.I.N.I. (Mini International Neuropsychiatric Interview) for making the diagnosis of psychiatric disorder (7) which was confirmed by being compared with the ICD-10 classification criteria (8). The presence and intensity of anxiety and depression were determined by using the self-rating scales, such as BAI (Beck Anxiety Inventory) and BDI (Beck Depression Inventory); the values  $\geq 8$  were considered increased (7). Using KON-6 sigma self-rating scale, the presence and intensity of aggression was measured; the values  $\geq 50$  were taken as elevated (9). H-R (Holms-Rahe) self-rating scale demonstrated the exposure to stressful life events in the year before. The score  $\geq 100$  predisposes anxious reaction, and  $\geq 300$  a possibility of psychosomatic disease (10). The presence of risk health behavior was registered by the questionnaire: alcohol consumption in the form of socially allowed drinking without the diagnosis of alcoholism (2-3 times per week, consuming 1-2 alcohol units per day) (11), cigarette smoking at least 20 cigarettes per day in the course of the last year), and the lack of physical activity (having a walk in duration of one hour three times per week).

## Statistical analysis

The differences between the initial and final measurements were calculated by parametric statistics using the Student's t-test and non-parametric statistics applying the chi-square test. The values  $p < 0.05$  were considered statistically significant.

By using logistic regression, the predictive values of rehospitalization parameters were calculated. The association between predictor variables (demographic, cardiac, behavioral and psychological) and criterion variable (rehospitalization) was determined using a regression analysis algorithm from statistical package STATISTICA 5.0 for Windows where predictor variables were included into a regression equation one by one. The variables whose F value were lower than 1 were not included into the regression equation, as their contribution to the explanation of criterion variable was not statistically significant.

## Results

At the time of the first myocardial infarction, the patients of both sexes were in the sixth decade; there were no examinees under the age of forty, although the literature data have frequently shown that the disease starts more and more earlier, in the fourth decade of life (Table 1).

Table 1. Demographic characteristic of the groups

Parameters		Group n=33%	
Education	Elementary	7	21.21
	Middle	22	66.67
	High	4	12.12
Employment	Unemployed	8	24.24
	Employed	8	24.24
	Pension	7	21.21
	Manager	7	21.21
Marital	Single	2	6.06
	Married	31	93.94
Sex	Male	26	78.79
	Female	7	21.21
Age	<45god	3	11
	46-55	25	75.75
	56-65	5	15.15

The use of the M.I.N.I Questionnaire did not confirm the presence of psychiatric disorder, psychological symptoms were syndromal and did not meet criteria for psychiatric diagnosis. At the baseline, the level of depression was borderline (BDI=8,67 $\pm$ 3,94), level of anxiety was mild (BAI=8,15 $\pm$ 4,37) as well as the level of aggression (KON-6 sigma =53,26 $\pm$ 9,58:41). After six months, there were no changes compared to the levels of anxiety and depression which remained mildly increased, while the level of aggression significantly decreased (KON-6 sigma =53,26 $\pm$ 9,58:41,42 $\pm$ 7,67,  $t=2,13$ ), for  $p < 0,05$ .

The score on the scale for exposure to adverse effects in the year before was of medium value, but significantly lowered after six months ( $H-R=113,19\pm 67,37:91,65\pm 63,81$ ,  $t=3,14$ ), for  $p<0.05$  (Table 2).

Table 2. Differences in psychological parameters

Psychological parameters	Initial n=33 X±SD	Final n=31 X±SD	T	P
Anxiety	8.15±3.94	9.71±3.93	-1.74	n.s
Depression	8.67±3.94	8.74±4.13	0.04	n.s
Aggression	53.06±9.53	41.42±7.67	2.13	<0.05
Stressful events	113.19 ±67.37	91.65±63.81	3.14	<0.01

Risk health behavior was present among the majority of examinees at the initial measurement. Physical inactivity in the year before hospitalization was reported in 80% of patients, while one half of them consumed alcohol and cigarettes. After six months, the expected change of health behavior did not occur as more than one half of the patients consumed tobacco, and one third consumed alcohol. The expected change of risk health behavior reflected in: complete cessation of tobacco and alcohol consumption, physical activity being practised three times per week and walking in duration of one hour. A positive change which did not reach the level of statistical significance was a higher distribution of physical activities (Table 3).

Table 3. Health behavior

Health behavior	Initial n=33	Final n=31	$\chi^2$	P
Smoking	20 (60.60%)	12 (38.70%)	0.00	n.s
Alcohol	17 (51.52%)	11 (35.48%)	2.12	n.s
Physical activity	28 (84.84%)	17 (54.83%)	1.47	0.051

After six months, eleven patients (33,3 %) were rehospitalized due to deterioration of disease, of which two patients (6,07%) died for cardiac reasons, so that the total number of examinees in the group was 31. One third of the able-bodied patients returned to their jobs within the six-month period (32,25%).

## Discussion

Our experience in the work with cardiac patients points to increased anxiety and depression after myocardial infarction, which is in accord with the literature data (12) which confirm the presence of mild anxiety after acute cardiac events and other life-threatening diseases. The result differs from the finding of Albert MC from 2005, who describes the existence of phobic fear of panic intensity which leads to cardiac arrhythmias and increases the risk of cardiac

mortality by 2-5 times (13). In our literature, Adamović has described the syndrome of "silent panic" in the first three days following a myocardial infarction (14). As for our patients, anxiety was very low even though the myocardial infarction was life-threatening. It manifested as restless legs syndrome, sweating, waves of chill and trembling, and stomach "nervousness". Almost all the patients took the benzodiazepine anxiolytic drug in the dose of 2-10mg as a regular therapy, which partly explains such result. A low level of anxiety can be the consequence of insufficient BAI instruments' sensitivity for somatized anxiety of cardiac patients, or the consequence of marked psychological negation mechanism which an individual uses to defend against a panic attack (15,16).

Depression is a recognized risk factor for coronary heart disease by the European Society of Cardiology (17). The presence of co-morbid major depression is three times more common in cardiac patients compared to healthy individuals, and our findings point to the presence of increased depression, i.e. depression symptoms without the diagnosis of depression. In literature, it is emphasized that depression higher than 10 on BDI bears higher risk of death or rehospitalization in the year to follow, while depression lower than 10 carries a considerably lower risk (18). Increased mild depression is associated with bad compliance, giving up rehospitalization program and maintaining unhealthy lifestyle: smoking, lack of physical activity, alcohol consumption (19). Our result of mildly increased depression is in keeping with such findings, which was explained by the mechanisms of negation and exaggerated contra phobic optimism of some patients. Five examinees under the age of 50 planned intensive recreational activities in order to "strengthen" their heart and prove their endurance. Somatic depression symptoms are hard to differ from the symptoms of coronary heart disease; therefore, the assessment of depression is based on the affective and cognitive symptoms, which makes BDI and adequate rating instrument (18). Depression syndrome, which was determined in one third of our patients, manifested as worry, reticence, disinterest in conversations and events in the family, frequent waking up at night, loss of appetite, negative predictions related to health condition. After six months, there were no cardiac patients with the diagnosis of major depression; only two individuals sought psychiatric help for subsyndromal complaints in this period (20). This is not in keeping with the literature data demonstrating that every fifth individual suffering from acute myocardial infarction has suffered from the major depression disorder, which further increases the risk of morbidity (rehospitalization, cardiac surgery, reinfection, arrhythmia) and mortality (21). The follow-up of a larger number of patients in the long-term period should confirm the importance of depression for myocardial infarction prognosis.

Aggressive behavior of cardiac patients, described as A type (cognitive-behavioral personality traits) involved hastiness, competitiveness, lack of time, aversion to idleness, and consciously controlled aggression (22). Hostility of cardiac patients is associated with increased cardiovascular reactivity to interpersonal stressors and the present risk health behavior (23). Increased aggression occurs parallel to the risk health behavior habits, which can be an accidental finding or the way to decrease tension. Mildly interpreted aggression was rather interpreted as a reaction to the conditions of disease and hospitalization than specific presence of psychological disposition, taking into consideration that the premorbid assessment lacks. The estimation of the aggression level in a large number of hospitalized patients before and after hospitalization would verify this interpretation.

After six months, the level of aggression decreased compared to the initial measurement, which may be the result of a more peaceful lifestyle following myocardial infarction and lesser exposure to stressful circumstances, as recommended by cardiologist.

The exposure to adverse life events in the year prior to hospitalization is a potential source of chronic distressful reaction, which can influence the cardiac function (24). The acute myocardial infarction group was exposed to: loss of job or someone close, and financial problems, with the score on the H-R scale predisposing anxious reactions, while the score higher than 300 which predisposes psychosomatic disorders was not reported in any of the cardiac patients. A higher score on the scale poses the question about the role of stressful lifestyle in the occurrence of myocardial infarction. After six months, the level of exposure to stressful events was significantly lower. What is needed is the researches involving a larger sample, conducted with more precise research instruments which would measure the intensity and physiological changes of distressful responses preceding an acute coronary event to determine their etiologic importance. If the influence of other factors on the development of coronary syndrome could be controlled, we could, more precisely and reliably, determine the level of the life events' influence on coronary heart disease and their importance for secondary prevention.

Risk health behavior habits (alcohol consumption, tobacco smoking, and lack of physical activity) were reported in the majority of examinees in the hospital setting. Researches on the relationship between emotional state and smoking have demonstrated that smoking is an attempt to pacify dysphoric mood (25). The findings of Brumett point to the influence of smoking, sedentary behavior and depression on the prognosis of depressed compared to non-depressed infarction patients: smoking does not pacify but worsens dysphoria by intensifying

attention towards negative cognition (26) and stands for an independent predictor of post-myocardial depression and anxiety. Our result indicates that smoking was present in one half of myocardial infarction patients, associated with mildly expressed anxiety and depression reactions, which tells about a widespread smoking habit which is not always a defense mechanism in distress. Alcohol consumption without the diagnosis of alcoholism was found in the majority of examinees convinced in the beneficial effects of alcohol on the circulation and blood vessels. Irrespective of cardiologist's advice, risk behaviors were not significantly changed after six months, except for physical activity which was more distributed as a result of the rehabilitation program following myocardial infarction and regular physical exercises. Literature data have confirmed that smoking cessation reduces a relative risk of mortality by 36% in cardiac patients, while regular physical activity reduces the risk of anxiety and depression after myocardial infarction (27,28). The result indicates that behavior changes are insufficient as this is a common way to relieve tension and achieve satisfaction orally. The harmfulness of such behavior is likely to be neglected for these reasons.

After six months, there were 11 rehospitalizations of cardiac patients, of which two ended lethally and four patients underwent cardiac surgery. According to mortality rate, cardiac outcome was within the European average limits (29). Using regression analysis, we determined the predictor importance for coronary variables documented from patient's history (family susceptibility to coronary heart disease, elevated total cholesterol) and risk health behavior (alcohol consumption). Our results were obtained on a small sample of examinees, so that a valid conclusion cannot be drawn; however, literature findings confirm the importance of cardiac parameters for myocardial infarction prognosis (30, 31). The result about the influence of risk behavior is in keeping with the findings of Aguilaer et al. (2004) related to negative influence of alcohol consumption on rehospitalization (32). Alcohol exerts toxic and not vasodilatory effects on atherosclerotic blood vessels, and wrong beliefs about beneficial effects of small amounts of alcohol (1-2 alcohol units) on cardiac disorders just contribute to disease worsening. In the research, we did not determine the influence of depression, anxiety and aggression, as well as the exposure to stressful events, on rehospitalization. Research on a larger sample could possibly confirm the literature findings (Albert MC, 2005) about the influence of anxiety and panic crisis on ventricular arrhythmia and cardiac death in these patients (15).

Secondary prevention of coronary heart disease depends on subjective experience of disease and convictions about necessary drugs' intake and changes in risk behavior. Byrn M., in

the epidemiological study, emphasizes that only 29% of over 700 cardiac patients change their health behaviors even though being aware that they are responsible for the coronary heart disease (3). This is in accord with our results and points to a possibility that other factors contribute to maintaining risk behavior and that informing patients is not sufficient for secondary prevention of coronary heart disease. The lack of symptoms such as pain in the chest, laboured breathing, fatigue can decrease the motivation for behavior changes after survived myocardial infarction. It is necessary to investigate which factors can improve the motivation for behavior changes in the chronic phase of the disease.

Our results would certainly gain in importance if covered a larger sample of examinees and longer time period following a myocardial infarction, which is the lack of the research. If the same parameters were evaluated in the subjects with risk health behavior and followed in the long-term period in those having sustained the myocardial infarction, the assessment of certain

factors' influence on rehospitalization of cardiac patients would be quiet possible.

## Conclusion

The patients having sustained the first myocardial infarction in the hospital setting exhibited mild psychological parameters: increased anxiety, depression and aggression. The exposure to adverse events in the year prior to hospitalization was documented to the level predisposing anxious reactions. Risk health behavior (consumption of alcohol and tobacco and lack of physical activity) was demonstrated in more than half of the examinees. After six months, mildly expressed anxiety and depression were still reported; the level of aggression was lower as well as the exposure to stressful events. There were no changes in risk health behaviors, except for higher distribution of physical activity. In the integrative therapy and rehabilitation of patients after myocardial infarction there should be considerable psychoeducation of patients with the aim to reduce their risk health behavior.

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## PSIHOLOŠKE REAKCIJE I ZDRAVSTVENO PONAŠANJE NAKON AKUTNOG INFARKTA MIOKARDA

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Psihološke reakcije, rizično zdravstveno ponašanje i koronarni parametri mogu imati uticaj na rehospitalizaciju nakon akutnog infarkta miokarda.

Cilj rada bio je utvrditi prisustvo psiholoških reakcija i rizičnog zdravstvenog ponašanja kod bolesnika sa akutnim infarktom miokarda na prijemu i njihove razlike nakon 6 meseci.

Ispitana su 33 bolesnika oba pola, koji su konsekutivno hospitalizovani zbog akutnog infarkta miokarda. U kliničkom prospektivnom ispitivanju primenjeni su: semistrukturirani intervju, Mini neuropsihijatrijski intervju (M.I.N.I) za psihički poremećaj, Beck Anxiety Inventory (BAI) za nivo anksioznosti, Beck Depression Inventory (BDI) za nivo depresivnosti, KON-6 Sigma test za agresivnost, Holms-Rahe Scale (H-R) za izloženost stresnim događajima i upitnik za zdravstveno ponašanje: konzumiranje alkohola, pušenje cigareta, odsustvo redovne fizičke aktivnosti. Izvršeno je merenje istih parametara na prijemu i nakon 6 meseci. Razlike su ispitane t-testom i hi kvadrat testom za  $p < 0.05$ .

Na prijemu su anksioznost (BAI=8,15±4,37) i depresivnost (BDI=8,67 ±3,94) bili blagi, bez značajne razlike nakon 6 meseci u grupi ispitanika. Agresivnost je povišena i značajno niža nakon 6 meseci (KON-6 sigma=53,26 ±9,58:41,42±7,67,  $t=2,13$ ), za  $p < 0,05$ . Izloženost stresnim događajima manja je u ovom periodu (H-R=113,19±67,37: 91,65± 63,81,  $t=3,14$ ), za  $p < 0,05$  a zastupljenost fizičke aktivnosti značajno veća nego na prijemu (54.83%: 84,84%.  $\chi^2=5,07$ ), za  $p < 0,01$ .

U grupi ispitanika sa akutnim infarktom miokarda unutar šest meseci anksioznost i depresivnost ostaju blago povišeni, dok se nivo agresivnosti i izloženost stresnim događajima snižavaju. Rizično zdravstveno ponašanje održava se, osim poboljšanja fizičke aktivnosti. U integrativnoj terapiji i rehabilitaciji bolesnika nakon infarkta miokarda mogla bi biti značajna psihoedukacija bolesnika sa ciljem redukcije njihovog rizičnog zdravstvenog ponašanja. *Acta Medica Medianae* 2011;50(2):18-23.

**Ključne reči:** psihološke reakcije, rizično zdravstveno ponašanje, akutni infarkt miokarda.