

Psychosomatic correlates of coronary heart disease during the socio-economic crisis of post-communist bulgaria

Research Article

Emilia Karaslavova^{1*}, Mariana Dyakova², Desislava Todorova³, Stoilka Tufkova⁴

¹ Department of Social Medicine, Medical University,
4001 Plovdiv, Bulgaria

² Department of Preventive Medicine, Faculty of Public Health,
Medical University, 1527 Sofia, Bulgaria

³ Department of Social Medicine, Medical University,
1000 Sofia, Bulgaria

⁴ Clinic of Toxicology, University Hospital "St. George",
4000 Plovdiv, Bulgaria

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Abstract: Post-communist Bulgaria has experienced the full impact of a socioeconomic disaster. Under prolonged and powerful stress the human body may exhaust its adaptive potential and a variety of pathophysiological symptoms may occur. The cardiovascular system is most vulnerable to stress. The aim of this study is to analyze the role of psychological factors correlating with Acute Myocardial Infarction (AMI) during the transition period in post-communist Bulgaria. A case-control epidemiological study was performed. 306 cases of acute myocardial infarction (AMI) and 210 controls were studied. Analysis of patients' records was made and a direct face-to-face interview was carried out. The study covers a 15-year transition period lasting from 1989 until 2005. The interview questions are based on W. Zung's standardized self-evaluation tests of anxiety and depression (Self Rating Depression Scale – SDS, 1965, SAS-Self Rating Anxiety Scale, 1976) and on a test of aggression, as a part of the Minnesota Multiphase personality inventory, adapted from A.A. Krilov and F. Korozii's FPI test. Average levels of anxiety and depression appear to be higher among patients suffering from coronary heart diseases than in control group members. Levels of aggression do not show a direct correlation with coronary heart disease. Both groups demonstrate symptoms of psychological disturbances caused, most probably, by the socio-economic instability of the transition period. In conclusion, certain socioeconomic factors significantly increase the level of anxiety and depression in the respondents. The AMI patients are considerably more anxious and depressed than the controls. The results provide evidence that high levels of anxiety and depression may correlate to and be interpreted as a potential risk factor for coronary heart disease.

Keywords: Myocardial Infarction • Aggression • Anxiety • Depression • Stress • Socioeconomic Factors

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1. Introduction

Post-communist Bulgaria has experienced the full impact of a socioeconomic crisis. In addition to the long-lasting negative factors of the transition period, a rapid restructuring of all spheres of life took place. This situation made it difficult for a large number of people to adapt to the new, fast-changing requirements of the social environment [1-3].

There are close links between stress, low social status and depressive conditions [4-8]. Depression leads to poor social adaptation [5,9,10] and is a precursor of coronary heart diseases [9,11]. Anxiety may often be augmented by an individual's incapacity to quickly and steadily adapt to modern society [12]. Anxiety and its devastating impact on human psychological and physiological health is a significant problem both for individuals and societies in our modern urbanized and dynamic world [12-14].

* E-mail: e_karaslavova@yahoo.com

The cardiovascular system is vulnerable to such stressors [11,15,16]. It has been proven that a lack of social adaptation correlates with atherosclerotic coronary heart disease. Other consequences of sustained stress could be anxiety, depression, aggression, etc. Aggression has a central role to play in cardiovascular psychosomatic conditions in terms of their aetiology, progression and treatment. Suppressing the destructive impulse, increased aggressive inclination coupled with inability to express it due to moral, ethical or social restrictions lead to channelling of the aggressive energy inwards, causing arterial spasms via the sympathetic nervous system. A continual repetition of this physiological process causes permanent blood vessel constriction, which may result in hypertension or significant coronary spasms [17].

A series of studies show that acute myocardial infarction (AMI) is sometimes preceded by long periods of persistent psychological abnormalities – aggression, anxiety, depression, social isolation, etc. [18,19]. Several prominent investigators have postulated that the leading cause of AMI in Eastern European countries after 1990 is neuropsychological tension due to socioeconomic instability [3,13,20-22].

The aim of the present study is to analyze the role of a number of psychological factors for AMI during the transition period in post-communist Bulgaria.

2. Material and Methods

The risk assessment for AMI was carried out in the second biggest city of Bulgaria – Plovdiv – during the period: 1st of January 2004 - 31st of June 2005. The case study involved 306 patients with acute myocardial infarction (AMI) hospitalized in 6 cardiological clinics and 210 controls without AMI, from 2 surgical clinics in Plovdiv Hospital and from two homes for the elderly in the city.

2.1. Selection criteria

The AMI patients from the case group had at least two of the MONICA diagnostic criteria for acute myocardial infarction (what are these?). The controls had no diagnosis of AMI and no oncological disease. The two groups were stratified by age and sex.

2.2. Study methods

Patients underwent a face-to-face interview and hospital records were reviewed (disease history and laboratory test results). A structured standardized questionnaire was given to patients to collect personal data including clinical data, social and economic status, family status,

work, behavioural and psychosomatic information. To improve validity of the initial information, the questionnaires gathered from the AMI patients had the disease history record attached.

The sociological part of the study is retrospective - it spans the period from 1989 to 2005. It examines in detail the risk factors typical for the transition period. More than 100 medical, social and psychosomatic factors have been examined and weighted. This article presents a part of the results indicating a correlation between psychosomatic factors and AMI.

In its psychological part the questionnaire is based on standardized self-evaluation depression tests (Self Rating Depression Scale – SDS, 1965) and W. Zung anxiety test (SAS-Self Rating Anxiety Scale, 1976) [23]. A test of aggression, as a part of the Minnesota Multiphase personality inventory (S.R. Hathaway, J.S. McKinley -1951), adapted from A.A. Krilov and F. Korozhi's FPI test [24] was also used. The respondents themselves determine the frequency of depression symptom manifestation on a four-point scale: 1 - if the symptom appears very rarely or does not appear at all; 2 – the symptom appears occasionally; 3 – the symptom appears often; 4 – the symptom is constantly present. Similarly, levels of depression (anxiety) were marked on a four-point scale: 1 – “Never or very rarely” corresponds to level 1 of depression (anxiety); level 2 corresponds to momentary depression (anxiety) symptoms, level 3 corresponds to intermediate depressive states, and level 4 corresponds to permanent depressive symptoms.

The psychosomatic symptoms are characterized on a four-point scale of symptom manifestation (1 – the symptom appears very rarely; 2 – sometimes; 3 – often; 4 – very often). Grade 1 and 2 correlate to momentary stress (slight psychological disturbances) while grade 3 and 4 correlate to severe psychological disorders.

2.3. Statistical analysis

The results were analyzed with variational, alternative, non-parametric correlation and graphic methods with cue validity of (Ho) $P=0.05$. A computerized database was formed using the Microsoft Excel 2003 programme (Microsoft Corporation, Redmond, WA, USA). The level of statistical significance was set at $P<0.05$. Statistical analysis was performed with SPSS for Windows, version 13.0 (SPSS Inc., Chicago, IL, USA).

Table 1. Correlation between displayed aggression characteristics and AMI.

Statements	Group	Yes			No			N	%	χ^2	P
		N	%	Sp	N	%	Sp				
I like to show others their faults	Controls	101	49.5	3.50	103	50.5	3.50	204	100.0	0.20	>0.05
	Cases	152	51.5	2.91	143	48.5	2.91	295	100.0		
I do not forgive insults	Controls	71	35.3	3.37	130	64.7	3.37	201	100.0	0.90	>0.05
	Cases	117	39.5	2.84	179	60.5	2.84	296	100.0		
I cannot trust people completely; I do not believe them	Controls	117	56.3	3.44	91	43.8	3.44	208	100.0	5.18	<0.05
	Cases	198	66.2	2.74	101	33.8	2.74	299	100.0		
I can resort to violence, if I have to defend my interests	Controls	57	27.4	3.09	151	72.6	3.09	208	100.0	12.84	<0.001
	Cases	127	43.1	2.88	168	56.9	2.88	295	100.0		
I believe the goal justify the means	Controls	58	27.8	3.10	151	72.2	3.10	209	100.0	0.99	>0.05
	Cases	71	23.8	2.47	227	76.2	2.47	298	100.0		
I do not avoid people who are spoiling for a fight	Controls	68	32.9	3.27	139	67.1	3.27	207	100.0	14.73	<0.001
	Cases	53	18.0	2.24	242	82.0	2.24	295	100.0		
If a friend is insulted I will try to avenge it	Controls	53	25.5	3.02	155	74.5	3.02	208	100.0	14.63	<0.001
	Cases	36	12.2	1.91	258	87.8	1.91	294	100.0		
I'd rather force people to do what I want than ask them	Controls	70	33.8	3.29	137	66.2	3.29	207	100.0	6.16	<0.05
	Cases	70	23.7	2.48	225	76.3	2.48	295	100.0		
I try to behave in a way that others should feel scared to displease me	Controls	45	21.5	2.84	164	78.5	2.84	209	100.0	4.15	<0.05
	Cases	88	29.6	3.17	209	70.4	3.17	297	100.0		
I often have conflicts with others because of my tenacity	Controls	83	39.9	3.40	125	60.1	3.40	208	100.0	12.51	<0.001
	Cases	166	55.9	2.88	131	44.1	2.88	297	100.0		

3. Results

3.1. Comparative manifestation and frequency of aggression symptoms

From the ten correlations between symptoms of aggression and AMI, seven were significant (Table 1). Nevertheless, in three of the correlations the control group exhibits higher frequency of aggression symptoms than the cases. "If a friend is insulted I will try to avenge it", "I would rather force people to do what I want than ask them" and "I do not avoid people who are spoiling for a fight" score $P < 0.001$. A possible explanation for this result is the lack of external expression of aggression in patients who suppress the destructive impulse and direct it 'inwards'. Anxiety may suppress, block or reject the intended aggressive act thus causing a series of complications. The proportional distribution of the relative shares of aggressive characteristics: "I cannot trust people completely; I do not believe them", "I can resort to violence, if I have to defend my interests", "I try to behave in a way that others should feel scared to displease me" and "I often have conflicts with others because of my tenacity" confirms the alternative (H_1) hypothesis for the presence of significantly higher

manifestation frequency of aggression symptoms in the cases than the controls ($P < 0.05$), Table 1.

3.2. Comparative manifestation and frequency of depression symptoms

Ten depressive characteristics from the immediate living environment as well as from the broader social context were analysed (Table 2). Weak but direct cause-end effect relationships between depressive symptoms and socioeconomic factors were found. Four risk factors show statistically significant correlations with the state of affect. They have a more intensive effect on the patients and have a significant correlation with AMI. They are also persistent over time, which results in chronic stress for the informants.

The analysis of the mean level of depression in the two groups indicates that seven out of ten depressive symptoms correlate with AMI and only one parameter exhibits a negative correlation with AMI, *i.e.* "I lost weight" ($P < 0.01$, $r_s = -0.16$) (Table 3). Several of the risk characteristics confirm the alternative hypothesis (H_1) at a high level of validity ($P = 99.99\%$). Comparative analysis of the depressive levels in the two groups corresponds to the studied effects of most depressive symptoms on heart and artery diseases. The most significant difference between the two groups appears in the symptoms "I felt

Table 2. Correlation between socio-economic factors and depression symptoms.

Risk factors	Correlation matrix	Depression symptoms									
		I feel depressed, sad and gloomy	Suddenly I would start crying; I often felt like crying	I did not sleep well	I lost weight	I had constipation	My heart would beat faster	I felt tired for no obvious reason	I felt nervous and I could not stand still	I became more irritable and anxious than usual	What I was doing did not bring pleasure or joy
Disparity between work and payment	r_s	0.26	0.15	0.19	0.10	0.11	0.17	0.29	0.18	0.22	0.20
	P	<0.01	<0.01	<0.01	>0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01
	N	499	499	500	495	493	499	494	500	497	488
Difficulties in bringing up children	r_s	0.22	0.23	0.15	0.04	0.18	0.14	0.18	0.21	0.19	0.22
	P	<0.01	<0.01	<0.01	>0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	N	495	495	496	491	490	496	491	496	493	484
Unfavourable economic situation	r_s	0.21	0.14	0.12	0.05	0.07	0.16	0.12	0.21	0.18	0.15
	P	<0.01	<0.001	<0.01	>0.05	>0.05	<0.01	<0.05	<0.01	<0.01	<0.01
	N	500	500	502	495	494	500	496	501	498	490
No money to afford a weekend or summer holiday	r_s	0.22	0.11	0.19	0.09	0.08	0.22	0.15	0.28	0.16	0.20
	P	<0.01	<0.05	<0.01	>0.05	>0.05	<0.01	<0.01	<0.01	<0.01	<0.01
	N	499	500	500	494	494	499	494	500	498	489

Table 3. Mean levels of depression in relation to the characteristics of the groups.

Characteristics	Groups	No	$\bar{X} \pm S_{\bar{x}}$	Sx	U	Pu
I feel depressed, sad and gloomy	Controls	207	2.15 $\pm$ 0.05	0.78	6.20	<0.001
	Cases	299	2.59 $\pm$ 0.05	0.87		
Suddenly I would start crying; I often felt like crying	Controls	208	1.92 $\pm$ 0.06	0.87	5.23	<0.001
	Cases	298	2.33 $\pm$ 0.06	0.96		
I did not sleep well	Controls	208	2.16 $\pm$ 0.06	0.86	4.40	<0.001
	Cases	299	2.53 $\pm$ 0.06	0.97		
I lost weight	Controls	207	2.06 $\pm$ 0.07	1.74	3.56	<0.001
	Cases	294	1.74 $\pm$ 0.06	0.91		
I had constipation	Controls	207	1.77 $\pm$ 0.06	0.82	1.50	>0.05
	Cases	293	1.89 $\pm$ 0.05	0.90		
My heart would beat faster	Controls	208	2.09 $\pm$ 0.06	0.83	5.13	<0.001
	Cases	298	2.50 $\pm$ 0.05	0.82		
I felt tired for no obvious reason	Controls	204	2.18 $\pm$ 0.06	0.86	1.13	>0.05
	Cases	297	2.09 $\pm$ 0.06	0.96		
I felt nervous and I could not stand still	Controls	208	2.07 $\pm$ 0.05	0.76	6.19	<0.001
	Cases	299	2.51 $\pm$ 0.05	0.85		
I became more irritable and anxious than usual	Controls	207	2.25 $\pm$ 0.06	0.81	4.88	<0.001
	Cases	297	2.64 $\pm$ 0.05	0.87		
What I was doing did not bring pleasure or joy	Controls	204	1.91 $\pm$ 0.06	0.81	3.38	<0.001
	Cases	291	2.24 $\pm$ 0.05	0.90		

Table 4. Correlation between socio-economic factors and anxiety symptoms.

Risk factors	Correlation matrix	Anxiety symptoms				
		I became easily worried	My legs and hands were shaking	I felt pain in the neck, head and back	I experienced attacks of vertigo	I had stomach aches and indigestion
Disparity between work and payment	r_s	0.29	0.06	0.16	0.19	0.07
	P	<0.05	>0.05	<0.05	<0.05	>0.05
	N	494	500	499	496	491
Difficulties in bringing up children	r_s	0.20	0.10	0.25	0.19	0.22
	P	<0.05	>0.05	<0.05	<0.05	<0.05
	N	495	501	499	496	492
Unfavourable economic transition	r_s	0.20	0.08	0.17	0.14	0.15
	P	<0.05	>0.05	<0.05	<0.05	<0.05
	N	495	501	500	497	492
No money to afford a weekend or summer holiday	r_s	0.19	0.14	0.21	0.26	0.08
	P	<0.05	<0.05	<0.05	<0.05	a>0.05
	N	495	500	499	496	493

Table 5. Levels of anxiety in the groups.

Characteristics	Group	N	$\bar{x} \pm S_{\bar{x}}$	Sx	u	Pu
I became worried easily	Control	206	2.14 ± 0.06	0.86	3.45	<0.001
	AMI	295	2.43 ± 0.06	0.94		
My legs and hands were shaking	Control	208	1.70 ± 0.06	0.82	1.79	>0.05
	AMI	299	1.84 ± 0.05	0.91		
I had pains in the neck, head and back	Control	207	2.12 ± 0.06	0.81	5.64	<0.001
	AMI	299	2.56 ± 0.05	0.83		
I experienced attacks of vertigo	Control	204	1.90 ± 0.06	0.81	4.36	<0.001
	AMI	299	2.24 ± 0.05	0.94		
I had stomach aches and indigestion	Control	200	1.89 ± 0.06	0.83	1.67	>0.05
	AMI	298	2.02 ± 0.05	0.92		

nervous and could not stand still" and "I felt depressed, sad and gloomy" ($P<0.001$). According to these characteristics the mean control group score was at the second level of depression while the study group scored at the third level. A similar difference appears with other symptoms – "I became more irritable and anxious than usual", "My heart would beat faster" and "I did not sleep well" ($P<0.001$). Although both groups had a mean score at level two for "Suddenly I would start crying; I often felt like crying" the difference between them is significant as there is a higher degree of affective disorder among the patients in the case group than among the healthy control group ($P<0.001$) (Table 3).

3.3. Comparative manifestation and frequency of anxiety symptoms

The impact of several social risk factors on anxiety symptoms was analysed and presented in Table 4. The analyzed social characteristics had considerably higher

frequency of manifestation and a greater negative and persistent impact in the case group than in the control group. The established cause-end effect relationship between the social risk factors for stress and the displayed anxiety characteristics had low but direct influence.

Five affective symptoms of anxiety and four peripheral anxiety symptoms were studied. These peripheral anxiety symptoms- "I did not sleep well at night", "I lost weight", "I had constipation" and "My heart would beat faster" some authors classify as 'depression' as well. The comparative analysis of anxiety levels determined by the five symptoms in the studied groups show significant differences (Table 5). The marked differences in the mean anxiety levels for the symptoms "I became worried easily", "I experienced attacks of vertigo" and "I had pains in the neck, head and back" are highly significant ($P<0.001$). For the last symptom in Table 5 the control group scores level two (short-lasting anxiety symptoms) while the AMI patients score level three (intermediate manifestation of anxiety symptoms).

4. Discussion

The main results imply that a number of psychological factors are risks for development of coronary heart disease. The development of anxiety and depressive disorders is also related to the surrounding socioeconomic reality in the studied period in Bulgaria. People who suppress their aggression towards others very often develop psychological conditions and psychosomatic disorders such as hypertension, AMI, or diabetes [12] or redirect the impulse of aggression towards themselves, resulting in problems such as suicide, masochism, and unhealthy habits [25]. These unhealthy habits, such as smoking, unhealthy diet, sedentary life, alcohol abuse, are proven risk factors for vascular and heart diseases [26]. The analysis of behavioural factors in the present research reveals that patients with coronary heart disease (CHD) have a more frequent manifestation of unhealthy habits and a lower relative share of healthy practices than the control group members. According to some of the indicators, the AMI patients were more prone to aggression than the controls. However, the results of the presented study do not show conclusively that aggression can be significantly linked to CHD. On the other hand, anxiety and depression appear to correlate with CHD. Several socio-economic factors significantly increase the level of anxiety and depression in the respondents. The AMI patients were considerably more anxious and depressed than the control group. Higher depression and anxiety levels indicate a lower degree of adaptation in the AMI patients compared to the non-AMI informants.

Our results correspond directly to the results of the MONICA study and other studies. The correlation between a number of psychosocial factors and the development of psychosomatic disorders during the socioeconomic transition in Bulgaria or other social crises in different societies, is clearly shown. The latter are often precursor events of coronary incidents [2,5,21,27]. The relation between stress / distress and acute myocardial infarction is a subject of many epidemiological studies, revealing that myocardial infarct can be easily triggered by external (environmental, social) factors, such as heavy physical and mental work load, violence etc [28-32].

Clearly the small number of patients and controls is not enough for more generalized nation-wide conclusions. Nevertheless, the accuracy of the study and the strong statistical correlations for some of the examined characteristics tend to prove our hypothesis (H_1). The established correlations between some socioeconomic risk factors and the psychological status of the population can be accepted as an indicator of the social destabilization in the country. The higher stress levels apparently led to a number of psychosomatic disorders in the Bulgarian population during the transition period. A higher rate of these conditions is considered by many authors to be the leading determinant for the rise of chronic diseases and extremely high cardiovascular mortality in the last two decades [20].

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