Those Who Perceive Their Disease as a Physiological or Psychological Risk Factor Experience More Anxiety at the Beginning of the Cardiac Rehabilitation Program

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Abstract

Background: In a cardiac patient, anxiety is the result of the individual's perception of the treatment and is characterized by inability to predict, control, or achieve the desired treatment outcomes.

Objectives: This study was carried out to investigate the extent of clinical anxiety in patients who underwent a cardiac rehabilitation program with different attitudes toward the disease risk factors.

Patients and Methods: The administrative data of this retrospective study were obtained from the database of the cardiac rehabilitation department of a hospital in Iran. The demographic and clinical information of 603 patients from April 2006 to April 2011 was collected using compiled forms of this database, the Beck anxiety inventory, and the structured clinical interview for axis I disorders. The univariate analysis of variance and the Bonferroni post-hoc analysis were used for data analysis.

Results: After controlling for gender and educational level, we observed statistically significant differences in the modified means between the patients who considered the behavioral risk factors and those who considered the physiological risk factors (P = 0.012, MD = 5.03) and between the patients who regarded the behavioral risk factors and those who regarded the psychological risk factors (P = 0.0005, MD = 5.32) as the underlying cause of their cardiac condition, which means that the level of anxiety in the physiological and psychological groups was higher than that in the behavioral group.

Conclusions: The anxiety of patients can be controlled through alteration in their attitudes toward the disease risk factors on the grounds that psychological or physiological factors per se do not trigger the occurrence of the disease, whereas behavioral risk factors, as the controlling agent, significantly influence its occurrence.

Keywords: Anxiety, Risk Factors, Patients, Attitude, Cardiac Rehabilitation

1. Background

Cardiovascular diseases are among the most common chronic diseases in Iran insofar as they affect about 15 million people in the country (1). Vast proportions of general populations across the globe are incognizantly subject to the risk factors of these diseases (2). These risk factors are divided into five categories, viz. biological (gender, age, and family history), environmental (smoke, toxic materials, and polluted air), physiological (diabetes mellitus, hypertension, hyperlipidemia, and obesity), behavioral (unhealthy diet, smoking, drug abuse, physical inactivity, and physical work stress), and psychological (depression, anger, stress, and anxiety) (3).

Evidently, anxiety is a common psychological risk factor and plays a crucial role in the development of cardiovascular diseases. For instance, 22% of the patients in two previous studies reported anxiety to be the main cause of their illness (2, 3). Indeed, anxiety is considered one of the most primary and common reactions to a cardiac event (4), and it can lead to increased blood pressure, tachycardia, and raised cardiac output. In a cardiac patient, this risk factor decreases the physical function and exerts negative effects on the quality of life (5). Furthermore, high levels of this psychological disorder amplify the risk of sudden cardiac death up to threefold (5) and can adversely affect the patient's contribution and adherence to cardiac rehabilitation programs (6). In a cardiac patient, anxiety is the result of the individual's perception of the treatment and is characterized by inability to predict, control, or achieve the desired treatment outcomes (7). However, anxiety can be the result of a patient's attitude toward risk factors.

The findings of two studies showed a significant association between risk factors and the patients' causal attitudes toward their cardiac condition (8, 9). Based on a report by Hirani (2005), at all the stages of experiencing a disease, a patient's cognitions or in other words, perception of the symptoms, search for the attributes of the underlying cause, and behavioral changes to influence the course and development of the illness, has a significant effect on the progression of the disease (10). It has also been demonstrated that patients with more maladaptive beliefs about risk factors are more anxious and have a weaker physical performance than other patients (11). It can, thus, be argued that patients' health is allied to behaviors arising from knowledge and awareness (10) and that their beliefs about risk factors may even determine their health behavior (12).

2. Objectives

We sought to evaluate the extent of clinical anxiety at the beginning of cardiac rehabilitation programs in cardiac patients with different attitudes toward the risk factors of their disease.

3. Patients and Methods

3.1. Study Design

The design of the study was retrospective. The administrative data were obtained from the cardiac rehabilitation center of Imam Ali hospital in Kermanshah, Iran. The database of this governmental specialized cardiac center comprises information on patients registered in cardiac rehabilitation programs after suffering a cardiac event. The information includes procedures (esp. coronary artery bypass graft surgery [CABG] and percutaneous coronary intervention [PCI]) and diseases (esp. myocardial infarction [MI] and valvular heart disease [VHD]). In addition, the patients' demographic and clinical characteristics such as psychological condition and comorbidities as well as their attitudes toward risk factors are registered in the database. The registration forms were designed by heart and health specialists and experts under the supervision of Kermanshah university of medical sciences. The accuracy of the data is assessed by the inspection unit of the university twice a year. Also in this center, the psychological state of the patients such as anxiety and depression is evaluated via standard tools such as the Beck anxiety inventory and structured clinical interview for axis I disorders for comorbidities at the beginning and at the end of a rehabilitation program. For the purposes of the present study, the patients were asked one question by the psychologist

on their attitude toward the cause of their disease. The question was "What do you think about the main cause of your illness?" These attitudes were recorded in five categories: 1) biological (gender, age, and family history); 2) environmental (smoke and toxic substances, passive smoking, dust, and war); 3) physiological (overweight, hypertension, diabetes mellitus, and hyperlipidemia; 4) behavioral (nutrition, physical inactivity, physical work stress, smoking, and substance abuse); and 5) psychological (stress, depression, mourning, anger and rage, and spouse abuse). The patients' selection of one component of each of these categories as the primary underlying cause determined their categorization into one of these five groups. For instance, those who identified heredity, age, and family history as the underlying causes of their disease were assigned to the biological group. For the illiterate patients, the self-report questionnaires were read by the rehabilitation ward's clinical psychologist, who also recorded the answers.

3.2. Inclusion Criteria

The inclusion criteria were comprised of age between 30 and 80 years, having no addiction to illicit drugs, and having no psychotic disorder.

3.3. Participants

Totally, 720 patients participating in cardiac rehabilitation programs in a 5-year period between April 2006 and April 2011 were identified. Twenty-five patients were excluded for failing to meet the inclusion criteria, and the data on the remaining patients were entered into the analysis. However, there was some missing information on some components of the five categories, resulting in the omission of 92 individuals by statistical package for the social sciences (SPSS, version 21.0). The sample size was, therefore, minimized to 603 patients.

3.4. Instruments

3.4.1. Structured Clinical Interview for Axis I Disorders

This instrument evaluates axis I psychological disorders and contains six parts for the assessment of the diagnostic criteria of the 38 disorders in Axis I, incorporating mood disorders, anxiety, and psychosis (13).

3.4.2. The Beck Anxiety Inventory

This questionnaire, designed by Beck in 1988, is a 21-item self-report inventory. Each question has the same set of four-choice answers, viz. NOT AT ALL (0 points), MILDLY: It did not bother me much. (1 point), MODERATELY: It was very unpleasant, but I could stand it. (2 points), and SEVERELY: I could barely stand it. (3 points). The total score

of this exam is varied from 0 to 63. A score between 0 and 7 denotes the absence of anxiety, between 8 and 15 mild anxiety, between 16 and 25 moderate anxiety, and ultimately between 26 and 63 severe anxiety. The inventory has an internal consistency coefficient (Cronbach's alpha) of 0.92, test-retest reliability over 1 week of 0.75, and inter-item consistency of 0.30 to 0.76. Five narrative types of content, , component, , were assessed for this exam, all of which indicated the high efficiency of the tool to measure anxiety (14).

3.5. Statistical Analysis

The nominal variables, including comorbidities, were compared via the $\chi 2$ test among the cardiac patients with different attitudes toward their disease risk factors. The percentages relevant to the distinct variables were also reported. For the continuous variables, mean and its standard deviation (SD) were reported. In addition, the univariate analysis of variance and the Bonferroni post-hoc analysis were used to compare the condition of the dependent variables between the groups. The application of the variance analysis using SPSS helped control the effect of gender and education level (as fix factors). A P value < 0.05 was considered statistically significant.

4. Results

There were 603 patients, comprised of 442 (73.3%) males and 181 (26.7%) females. The mean (SD) age was 50.3 ($\pm$ 11.3) in the biological group, 62.3 ($\pm$ 7.1) in the environmental group, 56.6 ($\pm$ 9.9) in the physiological group, 58.1 ($\pm$ 8.9) in the behavioral group, and 57.7 ($\pm$ 7.1) in the psychological group. The age ranges of the groups were 30 - 75, 50 - 75, 32 - 80, 32 -7 8, and 32 - 78 years, respectively. Moreover, 95% of the patients underwent CABG and 5% received PCI or had MI or VHD. The conditions of the other demographic variables of the sample study and the levels of anxiety are depicted in Table 1. Also, the conditions of the groups' comorbidities are shown in Table 2.

As is illustrated in Table 2, there was no significant difference between the groups regarding comorbidities. The Univariate analysis of variance was used to compare the anxiety grades between the groups by controlling gender and educational level; the results are demonstrated in Table 3. A lack of meaningful interactions between group and gender and group and education as well as the interaction between these three variables showed the ineffectiveness of variables such as gender and education on the patients' anxiety levels in the different groups.

The calculated amount of F for the effect of group was 3.205, denoting a significant difference in the anxiety grades at least between two groups out of the five groups (P

< 0.05). Thus, the Bonferroni procedure of post-hoc analysis was employed to determine in which groups the difference in the anxiety grades was significant. The results are shown in Table 4.

As is shown in Table 4 there were significant statistical differences in the modified means between the patients who considered the behavioral risk factors and those who considered the physiological risk factors (P = 0.012, DM = 5.03) and between the patients who regarded the behavioral risk factors and those who regarded the psychological risk factors (P = 0.0005, MD = 5.32) as the underlying cause of their disease, which means that the level of anxiety in the physiological and psychological groups was higher than that in the behavioral group. Nonetheless, there was no significant difference between the modified means of the other groups (Figure 1).
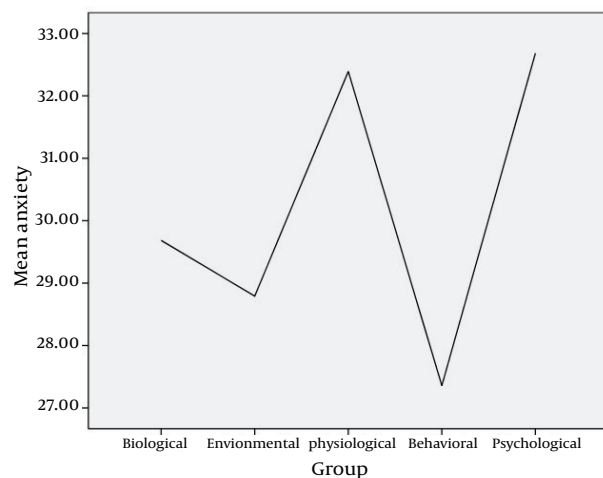

Figure 1. Comparison of Anxiety Between Groups

5. Discussion

The present study assessed the extent of clinical anxiety at the beginning of cardiac rehabilitation programs in cardiac patients with different attitudes toward the risk factors of their disease. The results demonstrated that those who regarded physiological and psychological factors as the cause of their disease showed more anxiety than those who considered behavioral factors as the reason for their disease. This finding can be clarified by a theory proposed by Michie et al. (2005), who argued that in patients with MI, increased perceived control over the cardiac condition decreases anxiety and depression (15). Along the same lines, among our study population, it seems that the individuals who identified the behavioral risk factors such

Table 1. Demographic Features and Anxiety of the Five Study Population Groups

Variable	Biological Factors 19 (3.2%)	Environmental Factors 24 (4%)	Physiological Factors 69 (11.4%)	Behavioral Factors 207 (34.3%)	Psychological Factors 284 (47.1%)
Gender					
Male	14 (2.3)	17 (2.8)	42 (7)	183 (30.3)	166 (27.5)
Female	5 (0.8)	7 (1.2)	27 (4.5)	24 (4)	188 (31.2)
Marital status					
Married	17 (2.8)	20 (3.3)	60 (9.9)	191 (31.7)	239 (39.6)
Widowed/Divorced	2 (0.3)	4 (0.7)	9 (1.5)	16 (2.7)	45 (7.5)
Educational level					
Illiterate	2 (0.3)	12 (2)	26 (4.3)	63 (10.4)	114 (18.9)
Junior school	7 (1.2)	7 (1.2)	21 (3.5)	80 (13.3)	81 (13.4)
High school diploma	3 (0.5)	3 (0.5)	11 (1.8)	39 (6.5)	51 (8.5)
University degree	7 (1.2)	2 (0.3)	11 (1.8)	25 (4.1)	38 (6.3)
Occupation					
Clerk	2 (0.3)	1 (0.2)	9 (1.5)	28 (4.6)	28 (4.6)
Market	7 (1.2)	10 (1.7)	19 (3.1)	94 (15.6)	86 (14.3)
Retired	5 (0.8)	6 (1)	15 (2.5)	62 (10.3)	62 (10.3)
Housewife	5 (0.8)	7 (1.2)	26 (4.3)	23 (3.8)	108 (17.9)
Anxiety	29.7 ± 15.4	28.8 ± 11.3	32.4 ± 9.9	27.4 ± 12.1	32.7 ± 11.4

Table 2. Comorbidities of the Five Study Population Groups

Comorbidity	Biological Factors	Environmental Factors	Physiological Factors	Behavioral Factors	Psychological Factors	$\chi 2$ Test	P Value
Mental conditions						60.83	0.19
Mood disorders	0	3	14	18	44		
Anxiety disorders	5	4	13	17	44		
Mood/Anxiety	1	1	4	13	30		
Physical conditions							
Diabetes mellitus	3	4	13	18	21	8.18	0.09
Hypertension	4	4	18	19	19	9.04	0.06
Hyperlipidemia	6	7	15	25	27	6.53	0.07
Addiction	5	6	8	41	36	3.15	0.57
Smoking	7	7	18	49	98	3.67	0.45
Drinking	1	2	2	9	8	7.45	0.06

as unhealthy diet and physical inactivity as the underlying cause of their cardiac condition were no longer worried

Table 3. Test of Between-Subjects Effects

Effect	SS	df	MS	F	P Value	Partial Eta
Group	1580.175	4	395.044	3.205	0.013*	0.022
Group Gender	841.612	4	210.403	1.707	0.147	0.012
Group Educational level	3176.291	17	186.841	1.516	0.084	0.044
Group Gender Educational level	1342.000	8	167.750	1.361	0.211	0.019

Table 4. Results of the Bonferroni Procedure of Post-hoc Analysis to Compare the Status of the Groups Regarding the Dependent Variables

Variable	Mean Difference	Standard Deviation	P Value	95% Confidence Interval	
				Lower Bound	Upper Bound
Biological Factors					
Environmental	0.892	3.409	0.999	- 8.715	10.501
Physiological	- 2.707	2.876	0.999	-10.813	5.399
Behavioral	2.326	2.661	0.999	- 5.173	9.827
Psychological	- 2.998	2.630	0.999	-10.413	4.415
Environmental Factors					
Environmental	- 0.892	3.409	0.999	-10.501	8.715
Physiological	- 3.599	2.631	0.999	-11.014	3.815
Behavioral	1.434	2.394	0.999	- 5.312	8.181
Psychological	- 3.891	2.360	0.997	-10.542	2.760
Physiological Factors					
Environmental	2.707	2.876	0.999	- 5.399	10.813
Physiological	3.599	2.631	0.999	- 3.815	11.014
Behavioral	5.033	1.543	0.012 [a]	0.684	9.383
Psychological	- 0.291	1.490	0.999	- 4.491	3.907
Behavioral Factors					
Environmental	- 2.326	2.661	0.999	- 9.827	5.173
Physiological	- 1.434	2.394	0.999	- 8.181	5.312
Behavioral	- 5.033	1.543	0.012 [a]	- 9.383	- 0.684
Psychological	- 5.325	1.014	0.0005 [a]	- 8.185	- 2.466
Psychological Factors					
Environmental	2.998	2.630	0.999	- 4.415	10.413
Physiological	3.891	2.360	0.997	- 2.760	10.452
Behavioral	0.291	1.490	0.9991	- 3.907	4.491
Psychological	5.325	1.014	0.0005 [a]	2.466	8.185

[a] P < 0.05.

about the possible negative effects of these risk factors because they attributed their disease to one of these risk factors and, thus, sought to control them by improving their personal behaviors such as having a good diet and physical activity through rehabilitation programs. In contrast, the patients who deemed the physiological and psychological risk factors the reason behind their cardiac condition felt that they had no control over their present conditions and, therefore, suffered from higher anxiety levels. Accordingly, based on the theory of Michie et al. (2005), higher anxiety

among our cardiac patients can be predicted by their perceived lack of control over their illness (15).

The other findings of the current study indicated no significant difference between the patients who related their cardiac condition to the biological or environmental factors and those who recognized the behavioral, physiological, and psychological factors as the cause of their disease. One of the reasons behind this finding might be the low number of these patients compared with the other three groups. Inclusion of a higher number of individuals with such an attitude might have yielded considerably different anxiety scores. Another explanation for this finding is the difference in the male/female ratio between this group and the other three groups. In this study, the number of the men who considered at least one uncontrollable biological risk factor as the cause of their disease was three-fold that of the women. This is while based on a study by Modica et al. (2014), there is a significant difference between men and women in terms of coping with a cardiac condition after surgery. In other words, men resort to the denial mechanism significantly more commonly than women when contending with a cardiac condition following surgery, which can affect the result of a cardiac rehabilitation program (16). In fact, the denial of the current situation by men is followed by treatment resistance, with its corollary impact on the anxiety scores in different ways. This clarification will be further substantiated if we consider the fact that our study population answered the questionnaires at the beginning of their cardiac rehabilitation program, when no strong treatment relationship had yet been made.

Finally, it seems that dispelling cardiac misconceptions and maladaptive beliefs (17) and maintaining effective treatment relationships based on changeable risk factors can alter the causal beliefs and the stressful lifestyle of cardiac patients, thereby improving secondary prevention (8). Meanwhile, enhancing patients' knowledge about their illness can alter their perception and, thus, maximize treatment benefits (9) and receptivity to intervention (18). Moreover, encouraging perceived control over the current situation and discouraging maladaptive beliefs (19) can confer positive internal and external changes in cardiac patients.

Although we controlled for educational level as a variable in the statistical analyses, one of the main limitations of this study was that illiterate individuals accounted for 36% of the study population. Nevertheless, the exclusion of these individuals would have reduced the sample volume significantly. Another weakness of note is the missing data on some of the physical characteristics of the patients such as history of physical illness such as renal disease and etc. We would, therefore, suggest that future studies recruit lit-

erate individuals and consider the effect of comorbid physical conditions on anxiety.

The present study investigated the extent of clinical anxiety in patients participating in a cardiac rehabilitation program with different attitudes toward the risk factors of their disease. The results revealed that the patients who regarded the physiological and psychological factors as the cause of their disease showed higher anxiety than those who considered the behavioral factors as the culprit. It seems that this condition stemmed from a perceived lack of control over the illness. Demonstrably, boosting patients' knowledge about their cardiac condition, challenging misconceived cardiac beliefs, and nurturing perceived control over the illness constitute effective measures in the prevention and management of cardiovascular diseases. Cardiac patients' anxiety can be controlled via alteration in their attitude toward risk factors inasmuch as while psychological or physiological factors per se are not the cause of the occurrence of the disease, behavioral risk factors, as the controlling agent, significantly influence its incidence. In addition, raising cardiac patients' awareness about the fact that psychological and physiological factors are to some extent controllable can reduce their anxiety.

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Footnote

Authors' Contributions: Mozhgan Saeidi participated in the design of the study, subject recruitment, data collection, data analysis, and drafting the manuscript. Saeid Komasi participated in the design of the study, data analysis, and critical revision of the manuscript for important intellectual content. Behzad Heydarpour participated in the design of the study and revised the manuscript critically for important intellectual content. Khodamorad Momeni revised the manuscript critically for important intellectual content. Ali Zakiei revised the manuscript critically for important intellectual content. All authors read and approved the final manuscript.

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