



Screening For Depressive Symptoms at the Beginning of Outpatient Cardiac Rehabilitation by Assessed Perceived Risk Factors by Patients

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Abstract

Objectives: The screening for depressive symptoms at the beginning of outpatient cardiac rehabilitation (CR) can significantly increase the quality and quantity of clinical care. This study investigated the degree of depressive symptoms in CR patients according to what they perceived to be the underlying causes of their disease.

Methods: The administrative data for this cross-sectional study was obtained from the database of the CR department at Imam Ali hospital in the city of Kermanshah in Iran. Demographic and clinical information for 602 patients was gathered between April 2006 and April 2011 using forms compiled from the database, the Beck depression inventory, and the structured clinical interview for axis I disorders (SCID-I). Depressive symptoms were compared for five groups of patients who attributed either biological, environmental, physiological, behavioral, or psychological risk factors as the cause of their disease. The chi-squared test, Univariate analysis of variance, and Bonferroni post-hoc analysis were used for data analysis using SPSS software.

Results: After adjustment for gender, age, and educational level, significant statistical differences were found between the depression scores of patients stating perceived behavioral and physiological ($p = 0.020$) and psychological ($p < 0.0005$) risk factors. This means that the level of depression in patients with perceived physiological and psychological risk factors was significantly higher than for the behavioral group. No significant difference was observed between the modified means of other groups.

Conclusions: Because patients with perceived physiological and psychological risk factors showed higher rates of depressive symptoms at the beginning of outpatient CR, screening for depression by assessment of the causal attitudes of cardiac patients can increase understanding of the outpatient CR team about the mental health of patients.

Keywords

Depression, Risk factors, Attitude, Outpatient, Rehabilitation, Cardiovascular

Introduction

Cardiovascular disease (CVD) is a common chronic disease that affects about 15 million people in Iran and for which millions of people exhibit risk factors without being aware of it [1]. These risk factors are biological (gender, age, family history), environmental (smoke, toxic materials, air pollution, effects of war), physiological (diabetes mellitus, high blood pressure, high cholesterol, obesity), behavioral (unhealthy diet, smoking, drug abuse, physical inactivity, physical labor), and psychological (depression, anger, stress, anxiety) [1]. Psychological factors are of great importance and many patients perceive them to be the cause of their disease [2].

Although there are many risk factors and psychological triggers, depression is a major psychological element of CVD and has been a topic of study [3-6]. Depression can develop after a cardiac event in cardiac rehabilitation (CR) patients [4]. Vulnerability markers include plaque and blood and form part of atherosclerotic disease influenced by immune system parameters [7]. Decreased plasma tryptophan concentrations parallel changes in immune activation markers in atherosclerotic disease. The development of depressive symptoms in cardiac patients could result in chronic immune stimulation and concomitant depletion of tryptophan [8]. Soroush et al. [3] found that the prevalence of depressive symptoms in women undergoing CR was 94% and in men was 83%, the reason being a major cardiac event such as myocardial infarction (MI) or coronary artery bypass surgery (CABG). It appears that the intensity of depression is the result of inaccurate beliefs and attitudes of patients rather than being a direct consequence of experiencing a cardiac event [9,10] or being related to the origin of the cardiac problem [2]. CR patients at the secondary prevention stage express attitudes and beliefs about the risk factors of the disease [11] that may be inconsistent with real risk factors [12].

Inconsistency between the perceived and real risk factors can affect patient understanding, increase anxiety [12], and can pave the way for development of psychological disorders like depression. Patient understanding at all stages of illness include recognition of symptoms, searching for a cause related to the illness, and changes in individual behavior that can affect the advance of the disease [13]. It plays an important role on the health behavior of patients [14] and

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is essential for assessing whether CR patients with different attitudes toward illness risk factors experience symptoms of depression. It is necessary to assess which groups of attitudes toward disease risk factors increases the intensity of the depressive symptoms.

The results of previous study show that the psychological attributes and attitudes of patients about risk factors of heart disease are influenced by their current mood [15]. Another study showed that psychological factors and mood can affect causal beliefs of patients [16]. Bahremand et al. [17] found that there is a significant relationship between physical symptoms and patients beliefs, because mood and depression plays an important role in the degree of acceptance. Clinical notes and recommendations [18] have shown that this can leads on some occasions to abandonment of the outpatient CR program. Screening for depression at the beginning of outpatient CR program can significantly increase the quality and quantity of clinical care; hence, the present study assessed depressive symptoms found in outpatient CR patients with toward the perceived risk factors of CVD.

Methods

Study design and procedure

The design of the study was cross-sectional. The administrative data was obtained from the CR department at Imam Ali hospital in the city of Kermanshah in Iran. Data for 602 patients was collected from April 2006 to April 2011 using the compiled forms. The database of this specialized center comprised information about CABG, percutaneous coronary intervention (PCI), MI, and heart valve repair or replacement surgery in patients registered in outpatient CR programs after a cardiac event. Demographic and clinical information about the psychological condition, comorbid diseases, and perceived risk factors of patients are included 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 inspection unit of the university assessed the accuracy of the data twice during the year. The standard Beck Scales and structured clinical interview for axis I disorders (SCID-I) for comorbid disease were used at the beginning and end of outpatient CR at this center to evaluate the psychological states of the patients for anxiety and depression. These scales were explained and implemented by the clinical psychologist in the outpatient CR department. Illiterate patients were provided with self-report questionnaires that were read out loud by the clinical psychologist, who recorded the responses. Data extraction was carried out by the same psychologist under the supervision of the outpatient CR cardiologist and head nurse.

Inclusion and exclusion criteria

The inclusion criteria included were being 30 to 80 years of age;

no addiction to illicit drugs, including morphine and its derivatives; no psychotic disorder. Exclusion criteria were missing information for required items.

Participants

A total of 720 patients participated in the outpatient CR program over the five-year period between April 2006 and April 2011. After exclusion of 25 patients for failure to meet the inclusion criteria, the data of the remaining patients was entered into analysis. Missing information for some patients caused a further 93 patients to be excluded. The final sample size was 602 persons. This study was approved by the ethics committee of Kermanshah University of Medical Sciences and all patient data was kept anonymous and confidential.

Instruments

SCID-I: This is used to evaluate axis I psychological disorders. It comprises six parts for assessment of diagnostic criteria of the 38 axis I disorders and includes mood disorders, anxiety, and psychosis [19].

Perceived risk factors: Komasi and Saeidi [20] measured perceived risk factors with an open single item: "What do you think is the main cause of your illness?" The perceived risk factors fell into biological, environmental, physiological, behavioral, and psychological factors [20]. Those who suggested heredity, age, and gender as the main reasons for their illness were sorted into the biological group. Those who chose environmental (dust, smoke, toxic substances, effects of war, passive smoking), physiological (hypertension, diabetes, hyperlipidemia, obesity), behavioral (nutrition, lack of exercise, cigarettes, substance abuse, physical labor), and psychological (stress, grief, depression, anger, rage, spousal abuse) sources as the main reasons for their illnesses were sorted into the relevant groups [1,20]. Each patient was sorted to only one group according to beliefs about the main source of illness. This single item and the classifications were adapted from Saeidi and Komasi for perceived risk factors [1,2,11,20].

The beck depression inventory: This questionnaire was designed by Beck as a 21-item exam with 3 points for each item and a total score of 0 to 63. The results are scored as follows: 0-4 denotes possible denial; 5 to 9 denotes very mild depression; 10 to 18 denotes mild to moderate depression; 19-29 denotes moderate to severe depression; 30 and above denotes severe depression. Beck et al. determined the test-retest index for a one-week interval to be 0.93 [21].

Statistical analysis

The chi-squared test was used to compare the nominal variables for comorbid diseases among patients with different attitudes toward risk factors. The percentages for the distinct variables were also reported. The mean and standard deviation were reported for continuous

Table 1: Demographic features and depressive symptoms.

Variable	Biological Factors 19(3.2%)	Environmental Factors 24(3.9%)	Physiological Factors 68(11.3%)	Behavioral Factors 207(34.4%)	Psychological Factors 284(47.2%)
Sex					
Male	14(2.3)	17(2.8)	41(6.9)	183(30.4)	166(27.6)
Female	5(0.8)	7(1.2)	27(4.5)	24(4.0)	188(31.2)
Marital status					
Married	17(2.8)	20(3.3)	59(9.8)	191(31.7)	239(39.7)
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(10.5)	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)	10(1.7)	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)	18(3.0)	94(15.7)	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)
Depression	16.8 ± 3.8	16.5 ± 3.7	17.7 ± 2.9	16.4 ± 3.5	18.0 ± 3.2

variables. After evaluating the assumptions and determining that there was no violation of the assumptions, Univariate analysis of variance (ANOVA) and the Bonferroni post-hoc analysis were used for comparison of the dependent variable between groups. ANOVA was carried out using SPSS ver. 21.0 for Windows (SPSS; USA) to control the effects of gender, age, and educational level as fixed factors. A p-value of < 0.05 was considered statistically significant.

Results

Of the total of 602 patients, 441 were male (73.3%). The mean (+SD) age for the biological factors group was 50.3 (\pm 11.3), for the environmental group was 62.3 (\pm 7.1), for the physiological group was 56.8 (\pm 9.9), for the behavioral group was 58.1 (\pm 8.9), and for the psychological group was 57.7 (\pm 7.1). Moreover, 95% of the patients underwent CABG, 4% received PCI, and 1% had MI. **Table 1** shows the other demographic variables and the level of depressive symptoms. **Table 2** lists the conditions of group comorbidities.

Table 2 indicates that there was no significant difference between groups for comorbidity. Univariate ANOVA was used to compare the level of depression between groups after adjustment for gender, age, and educational level. The F-value for the effect of groups was 2.409, which indicates that there was a significant difference between at least two of the five groups for the level of depression ($p = 0.049$). Bonferroni post-

hoc analysis was used to determine in which groups the difference in depression grade was significant. The results are shown in **table 3**.

Table 3 shows that there was a significant statistical difference between the modified means of the patients with behavioral attitudes with those having physiological and psychological attitudes. This means that the level of depressive symptoms in the physiological and psychological groups was higher than in the behavioral group. There was no significant difference observed between the modified means of other groups (**Figure 1**).

Discussion

The present study investigated the extent of depressive symptoms in outpatient CR patients having different perceptions about risk factors for their illness. Consistent with the results of several studies [15,16], the results showed that those who regard physiological and psychological factors as the cause of their disease showed more depressive symptoms than those with perceived behavioral risk factors. Previous studies [1,16] have shown that patients who perceive physiological and psychological risk factors as the cause of their disease are more anxious than those who perceive the cause to be behavioral risk factors. Studies have found this to be the result of inaccurate attitudes arising from the lack of control over on the consequences of the disease [1].

Table 2: Comorbidities and medical and behavioral history of patients.

Comorbidity	Biological Factors	Environmental Factors	Physiological Factors	Behavioral Factors	Psychological Factors	X ²	P value
Mental conditions						6.75	0.21
Mood disorders	0	3	14	18	44		
Anxiety disorders	5	4	13	17	44		
Mood/Anxiety	1	1	4	13	30		
Sleep problems	1	1	9	23	32		
Medical history							
Diabetes	3	4	13	18	21	8.18	0.09
Hypertension	4	4	17	19	19	9.12	0.63
Hyperlipidemia	6	7	15	25	27	6.53	0.07
Behavioral history							
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

Table 3: Results of Bonferroni post-hoc analysis on groups for the dependent variable.

Group (I)	Group (J)	Mean Difference	SD	95% Confidence Interval		P value
				Lower Bound	Upper Bound	
Biological Factors	Environmental	0.289	0.965	- 2.446	3.025	0.99
	Physiological	- 1.019	0.815	- 3.331	1.292	0.99
	Behavioral	0.354	0.753	- 1.781	2.490	0.99
	Psychological	- 1.245	0.745	- 3.357	0.865	0.96
Environmental Factors	Biological	- 0.289	0.965	- 3.025	2.446	0.99
	Physiological	- 1.308	0.746	- 3.424	0.806	0.81
	Behavioral	0.065	0.677	- 1.856	1.896	0.99
	Psychological	- 1.535	0.668	- 3.429	0.358	0.22
Physiological Factors	Biological	1.019	0.815	- 1.292	3.331	0.99
	Environmental	1.308	0.746	- 0.806	3.424	0.81
	Behavioral	1.374	0.439	0.128	2.619	0.020*
	Psychological	- 0.226	0.424	- 1.429	0.976	0.99
Behavioral Factors	Biological	- 0.354	0.753	- 2.490	1.781	0.99
	Environmental	- 0.065	0.677	- 1.986	1.856	0.99
	Physiological	- 1.374	0.439	- 2.619	- 0.128	0.020*
	Psychological	- 1.600	0.287	- 2.414	- 0.786	0.0005*
Psychological Factors	Biological	1.245	0.745	- 0.865	3.357	0.96
	Environmental	1.535	0.668	- 0.358	3.429	0.22
	Physiological	0.226	0.424	- 0.976	1.429	0.99
	Behavioral	1.600	0.287	0.786	2.414	0.0005*

*p < 0.05 statistically significant difference

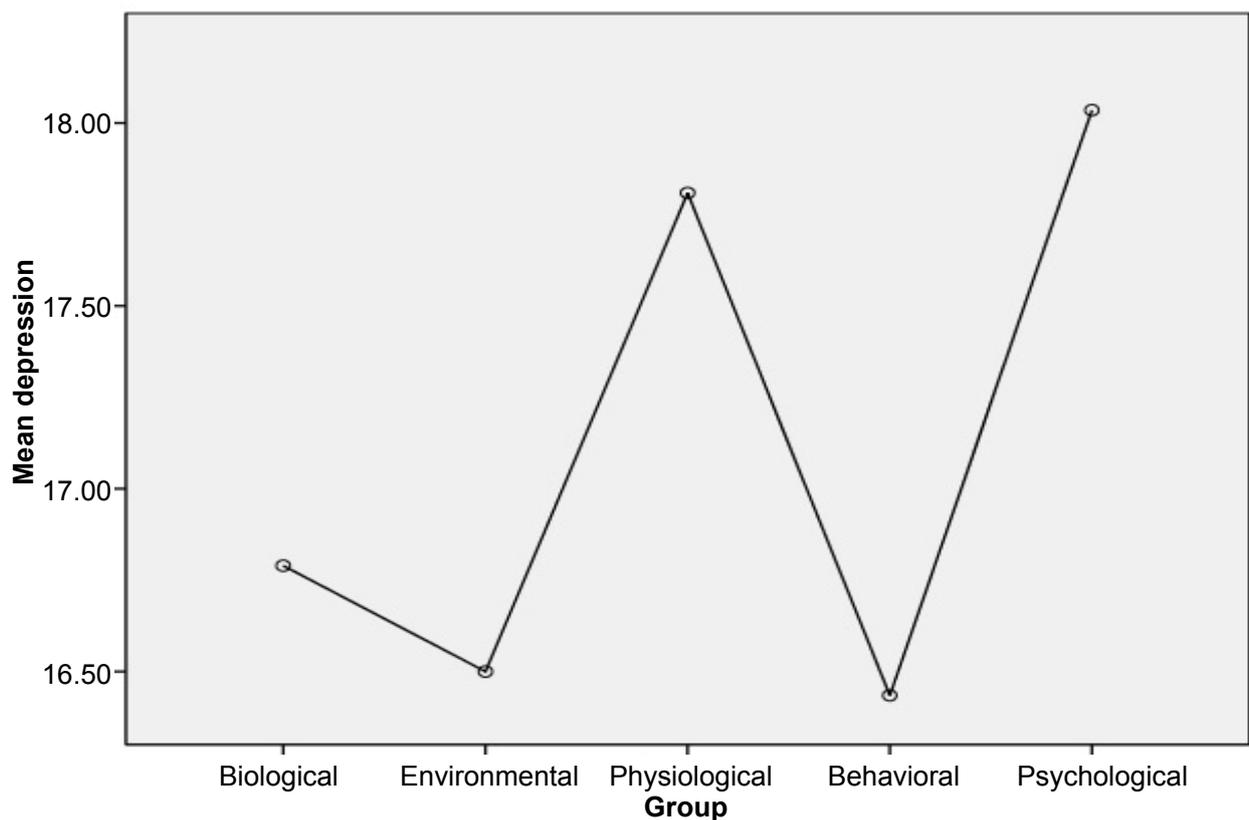


Figure 1: Comparison of depressive symptoms between groups.

It appears that those with a weaker understanding of the consequences of the disease and weaker control over the treatment they are undergoing [22] experience greater anxiety [23] and develop more serious depression [24]. The results suggest that people who consider physiological and psychological risk factors to be the cause feel they have less control over the consequences of the disease and inaccurately assume that they cannot control the perceived risk factors, even by participating in treatment programs. After a cardiac event, this perceived lack of control creates a sense of frustration and helplessness [25] which ultimately leads to depression.

Contrary to the results of studies that found no link between actual and perceived risk factors [12,26], the present study found a relationship between the perceived psychological risk factors and the real risk factors, including depression. Although the causal links between psychological attitudes, such as stress attribution, and negative moods, such as depression, are unclear, one explanation could be that psychological attitudes are characteristic of people who experience post-surgery depression. Because depressive symptoms predict greater morbidity following a cardiac event, it could be that the negative impact of patient's attitudes about psychological risk factors are relevant because they reflect depressive symptoms in the days and weeks after admission [15].

No significant differences were recorded between those who related their disease to biological or environmental factors and those with behavioral, physiological, and psychological perceived risk factors. Saeidi et al. [1] assessed the degree of anxiety in patients with different attitudes and recorded similar results for all groups. One reason behind this could be the small number of patients in each group. If the number of patients with such attitudes had been greater, the degree of change recorded could have been greater for each level of depression. There also could have been inconsistency in environmental risk factors, such as air pollution and dust, and the passage of time after the war with Iraq as an imposed environmental challenge. These types of attitudes probably decrease and result in more consistent depressive symptoms in patients. Saeidi et al. [2] reported that men referred to the role of such factors as the cause of

their disease 3-fold more than did women. Because the incidence of depression is lower in men than in women [27,28], the intensity of depressive symptoms of this group of patients was considerable.

The study showed that the mean depression grade for all groups was relatively high. There was an overlap in the characteristic immune system correlates for depressive symptoms and immune system-related risk factors for cardiac disease. Depressive symptoms are associated with a wide range of immune system parameters, including a decrease in lymphocytes, an increase in peripheral leukocytes, and elevated acute phase protein and cytokine production [7]. Among cardiac patients, more severe atherosclerotic disease is associated with a greater challenge to the immune system, which is responsible for a worse outcome. Greater susceptibility to depressive symptoms can result from parallel depletion of tryptophan and neurotransmitter disturbances [8]. An increase in depressive symptoms may arise from unfounded beliefs which dominate an individual's perceptions and can regulate the quality and quantity of behaviors and emotions [29]. Patients with depression are more pessimistic than others about changes lifestyle [24] arising from inaccurate attitudes and beliefs about the disease risk factors [30]. The role of causal beliefs and resistance by cardiac patients in the search for treatment is important [31]. It is necessary to reduce the level of depression and the lack of acceptance of and adherence to treatment in this group of patients [16]. Resistance by patients can be modified by correcting inaccurate beliefs [30] and maintaining an effective treatment relationship based on adjustable risk factors [15].

The problem of depression requires accurate diagnosis and screening. The results of the present study suggest that patient attitudes toward disease risk factors can aid in such screening. It could be concluded that patients with perceived physiological and psychological risk factors at the beginning of outpatient CR record higher depression ratios. Screening for depression by assessment of patient causal attitudes and beliefs can increase the understanding of the outpatient CR team about the mental health of patients. Causal predictions by patients can independently foretell disease severity and depression in cardiac patients. Examining the perceptions of

patients about the cause of their disease can aid in the design of the treatment intervention and improve the results of outpatient CR program dramatically [32].

A major limitation in this study was that 36% of patients were illiterate; had they been excluded from the study, the sample size would have decreased significantly. Another limitation was the lack of information about the physical health of the patients, such as renal disease, because information was missing in some cases. It is suggested in the future to limit the study to literate patients and that the effect of comorbid physical conditions and drugs like beta-blockers on depressive symptoms in patients should also be taken into account. Another limitation was the significant difference in the number of patients with different attitudes toward disease risk factors. Patients who considered biological and environmental risk factors for disease outbreak were few in number compared to the other groups. This could have affected the results and reduced the statistical power of the study. It is necessary to include a greater number of patients with these types of attitudes in the future.

Conclusion

The level of depression in patients with perceived physiological and psychological risk factors was significantly higher than for those with perceived behavioral risk factors. No significant difference was observed between the modified means of other groups. Because patients with perceived physiological and psychological risk factors for CVD show higher rates of depressive symptoms at the beginning of outpatient CR, screening for depression by assessment of the causal attitudes and beliefs of cardiac patients can increase understanding by the outpatient CR team about the mental health of patients.

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