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Emotional Processing In Patients with Ischemic Heart Diseases

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Abstract

BACKGROUND: Cardiovascular disease is the most prevalent public health problem on a worldwide scale, and ischemic heart disease accounts for approximately one-half of these events in high-income countries. One of the most important risk factors for this disease is mental and psychological especially stressful experiences.

AIM: This research was established to compare emotional processing, as a key factor in stress appraisal, between IHD patients and people with no cardiovascular disease.

METHODS: Using simple sampling, fifty patients were selected from people who diagnosed as IHD in the hospital and referred for treatment after discharging care and treatment. Control group participants were selected as control group peoples, using neighbourhood controls selection. The Emotional Processing Scale was filled by all members of the two groups.

RESULTS: There were significant differences between the two groups on the EPS-25 total scores, as well as on emotional processing dimensions of signs of unprocessed emotion, unregulated emotion; avoidance and impoverished. Also, there was no significant difference between the two groups in the dimension of Suppression. The final step of regression revealed a β of 10.15 and 1.05 for AVO and IEE subscales respectively.

CONCLUSION: The result showed that patients with IHD are using more negative emotional processing styles.

Introduction

Cardiovascular disease (CVD) is the most prevalent public health problem on a worldwide scale [1], and ischemic heart disease (IHD) accounts for approximately one-half of these events in high-income countries [2]. Despite an improvement in treatments and prevention, IHD still caused over 2.1 million deaths (23% of all deaths) in Europe in 2015 and resulted in over 165 million disability-adjusted life-years (DALYs) lost in 2012 (6% of all disability claims) [3] [4].

The relationships between psychosocial risk factors and CVD have been investigated in a variety of laboratory [5] [6] and epidemiologic studies [7] [8] [9] [10]. This connection has been the subject of an ever-growing body of literature over the last 50 years [11] [12]. The majority of these studies have demonstrated the relationship between the chronic and acute stress [13] [14] [15] [16] [17], and its aversive emotional and psychological consequences, such as depression [18] [19] [20], anger [21] [22], PTSD [23] [24], anxiety [25] [26], and CVD. Therefore, the role of negative emotion in CVD has been notable in recent works [27] [28] [29]. To explain associations between psychosocial factors (especially stressor) and CVD, several biological and behavioural mechanisms have been proposed, including inflammatory processes, lack of exercise, and lifestyle-related factors [5] [30].

Negative emotions are a common reaction to stressful experiences, and different approaches to processing these emotions may have distinct consequences for the stress response trajectory [31]. In other words, the types of emotion regulation or processing could change the consequences of stressors as fundamental factors contributing to the pathophysiology of CVD. Therefore, recently, researchers have investigated whether poor emotion regulation and processing capacity could be associated with CVD [31] [32] [33]. Emotional processing can be either helpful or harmful, and the consequences of attending to emotions may depend on the nature of the emotional processing. Emotional

process can be referred to as psychological, psychophysiological and psycho-neurological mechanisms by which distressed emotional reactions in individuals are converted or changed to non-distressed reactions [34]. According to Rachman paper [35], the incomplete abortion or processing emotion could result in direct and indirect signs.

The role of this mechanism in the emergence or maintenance of some psychological disorders such as PTSD [36], panic disorder [37], depression [38] has been investigated in many studies. Also, its contribution to psychosomatic disorders including fibromyalgia [39], chronic fatigue [40] chronic pain [41], inflammatory bowel disease [42] and functional gastrointestinal disorders [43] has been proposed. Literature also showed a relationship between the excessive emotional regulation and some physical illnesses such as cancer [44], cardiovascular diseases [33] and multiple sclerosis [45]. It has also been considered as an important factor in psychotherapy [46] [47].

Despite the strong evidence reporting the role of emotional processing in consequence of stress and linking negative emotion (as the consequence of stress), few studies have been able to examine this relation to the development of CHD, [*29*][48]. For example, *Kubzansky and Thurston* [29] reported that those reporting high levels of emotional vitality (is characterized by a sense of energy and positive well-being in addition to being able to regulate emotions effectively) had multivariate-adjusted relative risks of 0.81 (95% confidence interval, 0.69-0.94) for Coronary Heart Diseases (CHD).

In spite of these studies, (majority investigated emotional regulation), the relationship of emotional processing and CVD has been remained provocative. Therefore, the existence of a comprehensive study with all aspects of its emotional processing is completely felt. This research aimed to investigate this relationship. This study was based on the hypothesis that emotional processes play a key role in IHD; therefore, they should report higher scores in emotional processing scale.

Methods

Using simple sampling, fifty IHD patients were selected. The patients were selected from people who diagnosed as IHD in the hospital and referred to Heart clinic for treatment for after discharging care and treatment. Fifty non-patient people were selected as control group peoples, using neighbourhood controls selection

Emotional processing scale (EPS). The Emotional Processing Scale (EPS) is a 25-item, five-factor self-report questionnaire designed to measure emotional processing styles and deficits [49]. The scale is rated on a ten-point scale (0 for completely disagree to 9 for completely agree). It measures five dimensions namely: suppression (SUP), signs of unprocessed emotion (SUE), unregulated emotion (UE), avoidance (AVO) and impoverished emotional experience (IEE). This scale has reported favourable psychometric properties, including high internal consistency and high temporal reliability.

The coefficient α value for the scale was .92. Internal consistency was high (α ≥ 0.80) for three factors and moderate for two (α ≥ 0.70). The Pearson's test-retest correlation coefficient obtained for the entire scale was 0.74. The psychometric data on final 25-item version also showed internal consistency 0.92, 0.88 and 0.90 for the UK, Italian and Italian & UK data respectively [50] [51].

During one month all questionnaires (EPS) were completed by patients who referred to Heart clinic for treatment after discharge from the hospital. All patients were diagnosed by hospital cardiologist as IHD. After selection, the IHD patient, his/her house address had been determined and among 4 neighbourhoods from left and 4 from right the most similar person to the patient (age, education, gender, economic status, marriage status and ….) was selected as a matched control person. The patient would have been removed from the case group if he/she had reported any psychiatric disorders, additional physical diseases or any cognitive inability.

Data were analysed using SPSS version 22. Frequencies and score means were obtained for demographic variables and were analysed by independent T-test (for age) and chi-square (for gender, education and marital status variables). The average scores of two groups were compared by using independent T-test for SUP and SUE subscales (met criteria for normality) and because of significant level for normality test, Mann-Whitney U test for UE, AVO, IEE subscales and total scores. Also, a logistic regression (backward model) was conducted to determine odds ratios of developing IHD for each variable of interest. The five subscales were included in the analysis as predictor variables and IHD as the dependent variable. A p-value < 0.05 was considered to be statistically significant.

Results

The demographic statistics of the research participants are presented in Table 1. The sample size was 100 (50 IHD and 50 control group). The mean age of the IHD group was 59.84 years (SD = 14.78; ranged 24-88). The mean age of the control group was 58.2 years (SD = 14.60; ranged 22-90).

Table 1: Sample demographic data

Variables	MI group	Controlled group	Values of differences
Age	59.84 (14.63)	58.2 (14.78)	T = 0.56,df 98, Sig 0.59
Sex (%)			
Male	23 (46)	27 (54)	x^2 = 0.16, df 1, Sig 0.84
Female	25 (50)	25 (50)	
Education (%)			
Primary to high school Education	46 (92)	43 (86)	x^2 = 0.9, df 1, Sig 0.26
Academic Education	4 (8)	7 (14)	
Marriage status			
Married	47 (94)	48 (96)	x^2 = 1.04, df 1, Sig 0.31
Single	3 (6)	2 (4)	

The result showed that majority of participants in both groups had under academic education (92% for IHD and 86% for control group) and 95% of them were married (94% for IHD and 96% for control group). Using independent T-test for comparing the age and chi-square for sex, education, and marital status, there was no significant difference between the two groups.

The result indicated that mean of total scores in EPS was 140.26 ± 27.81 for IHD group and 123.56 ± 26.71 for control group. Table 2 presents the group means and standard deviations for the total scores of EPS-25 and the five dimensions of emotional processing. There were significant differences between two groups on the EPS-25 total scores ($Z = 3.048$, $p < 0.002$), as well as on emotional processing dimensions of: signs of unprocessed emotion ($T (98) = 2.39$, $p < 0.001$), unregulated emotion ($Z = 2.33$, $p < 0.02$); avoidance ($Z = 3.48$, $p < 0.001$) and impoverished ($Z = 2.94$, $p < 0.003$). In addition, there was no significant difference between two groups in dimension of Suppression ($T (98) = 0.37$, $p < 0.7$).

Table 2: Means and standard deviations MI and control groups' scores in EPS

		Means(SD)			
Items	**MI group**	**Controlled group**	**Total**	**T**	**P Value**
SUP	25.28(9.38)	24.62 (14.8)	24.95 (8.78)	0.37	0.71
SUE	29.68(6.84)	26.46 (6.66)	28.08 (6.90)	2.39	0.01
		Mean rank		**Mann-Whitney**	
UE	57.26	43.74		912	0.02
AVO	60.59	40.41		745.5	0.0001
IEE	59.03	41.97		823.5	0.003
Total	59.34	41.66		808	0.002

Suppression (SUP); signs of unprocessed emotion (SUE); unregulated emotion (UE); avoidance (AVO) and impoverished emotional experience (IEE).

Table 3 showed the data resulted from logistic regression. The Omnibus Test showed a chi-square of 16.74, df = 2 and $p < 0.0001$. The Hosmer and Lemenshow Test also showed a chi-square of 5.21, df = 8 and $p < 0.73$. Also, the overall predicted percentage for the model was 66, and it explained between 15.6 to 20.8 percentages of variances. In the final step of the backward system of analysis (step 4), the result showed that the only predictor variable with a significant value in this equation was AVO with $\beta = 1.16$ (95% C.I. = 1.03-1.30). In addition, IEE showed a significant value near to significant level with $\beta = 1.05$ (95% C.I. = 0.99-1.10 and significant value = 0.06)

Table 3: Logistic regression for exploring the correlates (emotional processing) of IHD

								95% CI. for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp (B)	Lower	Upper
Step 1	SUP	-0.005	0.027	0.033	1	0.855	0.995	0.945	1.048
	SUE	-0.009	0.045	0.043	1	0.836	0.991	0.907	1.083
	UE	0.012	0.035	0.125	1	0.723	1.012	0.946	1.083
	AVO	0.140	0.053	7.035	1	0.008	1.150	1.037	1.276
	IEE	0.047	0.040	1.379	1	0.240	1.048	0.969	1.134
	Constant	-4.907	1.662	8.722	1	0.003	0.007		
Step 2	SUE	-0.009	0.045	0.036	1	0.849	0.991	0.908	1.083
	UE	0.013	0.034	0.157	1	0.692	1.014	0.948	1.083
	AVO	0.140	0.053	7.018	1	0.008	1.150	1.037	1.276
	IEE	0.045	0.038	1.404	1	0.236	1.046	0.971	1.126
	Constant	-5.027	1.532	10.762	1	0.001	0.007		
Step 3	UE	0.012	0.033	0.135	1	0.713	1.012	0.948	1.081
	AVO	0.138	0.052	7.115	1	0.008	1.148	1.037	1.271
	IEE	0.041	0.033	1.571	1	0.210	1.042	0.977	1.111
	Constant	-5.098	1.486	11.764	1	0.001	0.006		
Step 4	AVO	0.140	0.051	7.408	1	0.006	1.150	1.040	1.273
	IEE	0.048	0.026	3.396	1	0.065	1.049	0.997	1.105
	Constant	-4.979	1.446	11.853	1	0.001	0.007		

Discussion

The role of psychological factors, especially stress, in heart diseases has been investigated in health psychology literature and possesses from rich evidence-based credit. It seems that the impact of stressors could be changed as a consequence of emotional processing styles. The present study aimed to compare the emotional processing style between IHD patients and normal people.

Demographic data revealed no significant differences between two groups that confirm an acceptable matched samples selection. In another word, the result shows that two groups in the majority of variables that could be confounding are (to some extent) the same. The IHD is the only variable which was different in the two groups.

To our knowledge, this is the first study that examined the relation between IHD and comprehensive aspects (five domains) of emotion processing. We found that patients in four domains (from five domains) of emotional processing had significantly higher scores. That was also the case in total scores of emotional processing. Therefore, the hypothesis that negative emotional processing in IHD is more than none patients group was supported. Similar to previous studies [13] [18], this study showed that patients with IHD reported higher scores in EPS.

In this study, result showed that IHD patients reported significantly higher scores in subscales of SUE, UE, AVO, IEE and total scores than none patients group. The higher scores in this scale, the intended negative emotional processing is used more. In other words, emotional processing with potentially distinct effects on the stress response trajectory is more negative in this group of patients. The binary logistic analysis confirmed the goodness of fit for the model. Although the result of regression showed that only AVO subscale (and to some extent IEE) was a significant predictor variable for IHD, the high correlation between subscale (as a dimension of unit

structure) could be accounted for removing other subscales (SUE, UE) from modelling [52]. This implies that people with more score in AVO are more vulnerable to IHD

Several biological and behavioural mechanisms could be proposed to explain this association.

First, the positive emotional processing and regulation of may lead to health-protective behaviours and lifestyle system [32] [53] [54]. For example, Pressman and Cohen found that greater emotional vitality was significantly associated with less smoking, alcohol consumption, and more physical activity. Second, it may alter disease susceptibility by acting directly on biological systems [54]. For example, recent investigations have demonstrated associations of positive affect with lower heart rate, lower levels of cortisol, and attenuated fibrinogen stress responses as well as with reduced ambulatory systolic blood pressure assessed 3 years later [54] [55].

Third, it may change the stress reaction such as negative emotion. Gross in his theory showed that the individual differences in using different methods of cognitive emotion regulation would carry out different emotional, cognitive, and social consequences. For example, the use of reappraisal styles is related to positive emotional experiences and better intrapersonal practices, and higher well-being [56]. Therefore, better emotion regulation capacity could modify stress reactions associated with certain mental disorders (such as depression, anxiety and anger). For example, the relationship between anger outbursts, depression and anxiety and CHD may (partly) have its basis in emotion regulation [57] [53].

To conclude, the current findings suggest that negative emotional processing style may be associated with producing IHD by potentially distinct effects on the stress response trajectory. In other words, patients with IHD are using more negative emotional processing styles.

This study contains some limitations that are important to acknowledge. The sample consisted of only IHD population. Therefore, it is recommended to use other types of CVD with different types. Secondly, this research studied the emotional processing in this group of patients after the appearance of IHD. Therefore it should be better to investigate this variable in a cohort study in general population and during a long period.

Ethical approval

All procedures performed in studies involving human participants were by the Yasuj University of Medical Sciences Research Ethics Committee and in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

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