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Original Article

Effectiveness of Transdiagnostic Treatment on Health Locus of Control and Emotional Regulation in Patients with Coronary Heart Disease

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Abstract

Introduction: Coronary heart disease (CHD) is one of the main death causes in the world. Therefore, it is necessary to identify the psychological disorders in these patients and to apply the necessary interventions to reduce them. The purpose of the present research was to examine the effectiveness of transdiagnostic treatment on health locus of control and emotional regulation in patients with CHD.

Methods: This research was a quasi-experimental one with the plan of pretest posttest control group. The statistical population included all patients with coronary heart disease 40-65 years old who were treated in Kasra hospital of Tehran in 2019. The sample included 90 patients assigned to the two groups experimental and control group randomly. Data were collected using the Multidimensional Health Locus of Control Scale and Emotional Regulation Scale. The data were analyzed using the methods of multivariate analysis of covariance (MANCOVA).

Results: The result showed that the transdiagnostic therapy significantly increases the internal health locus of control and emotional regulation in the experimental group ($p<0.01$).

Discussion: This finding has important implications as regards the education and mental health of patients with coronary heart disease. Based on the results, it is necessary to pay more attention to two variables health locus of control and emotional regulation in the design of interventions to reduce the psychological problems' patients with CHD.

Declaration of Interest: None

Key words: Transdiagnostic treatment, Health locus of control, Emotional regulation, Coronary artery. Disease.

Introduction

Coronary heart disease (CHD) is one of the main death causes in the world. One in five people dies because of this disease (1). In spite of medical advances, CHD is one of the most prevalent chronic diseases and one of the death causes in Iran. Therefore, heart surgeries constitute about 60% of surgeries in the country (2). CHD prevalence is increasing due to population growth and aging all over the world (3). Regarding the high prevalence of CHD, the World Health Organization (WHO)

has sent one of its goals as achieving a 25% decrease in heart attack-caused deaths by the year 2015 (4). Evidence suggests that traditional factors only predict half of the CHD variance. Consequently, researchers have become interested in investigating the psychosocial risk factors of CHD (5). According to studies, patients with CHD report serious psychological problems, such as high levels of anxiety, depression, and self-criticism, which can affect patients' health (6). In fact, in addition to biological factors, psychological factors are also effective in all heart diseases. The health locus of control is one of these effective psychological factors (7).

Health locus of control defined as individual beliefs based on past experiences in health issues and having external or internal control over them could affect health (8). People who are more responsible about their health and believe that they control their health themselves become more involved in health-related behaviors and these behaviors have positive mental effects on them (9). Those who believe that other people or chance are responsible for their health have an external locus of control; it will lead to the person's loneliness, inability, and unsuccessful fight against diseases (10,11). The results of the research suggest that people with an internal health locus of control have a health-promoting lifestyle, higher physical and psychological health, and less health-risk behaviors such as alcohol consumption, intense sport, aggression, etc (12).

Emotion regulation is another variable involved in this disorder because negative emotions play a major role in the incidence and exacerbation of heart disease. The findings of numerous studies show that emotions are effective in triggering, exacerbating, and adjustment to chronic illnesses. (13). Emotional regulation is a process by which people change the experience or expression of their emotions. It can be used to make people feel better or to achieve a variety of both personal and interpersonal goals (14,15). The results of numerous studies indicate difficulties in regulating emotions in cardiovascular patients. For example, one study showed that poor emotion regulation strategies are an important factor in the development of heart disease (16). Besharat and Ramesh (17) in their study showed that difficulty in emotion regulation was associated with worry and anger rumination in cardiovascular patients.

Regarding the results of the studies and the approved effectiveness of psychological factors in the occurrence of this disease, psychological interventions seem to be necessary for improving psychological health and decreasing the symptoms in CHD patients. Transdiagnostic treatment is one of the new treatments developed in recent years among the transformations of cognitive-behavioral therapy opposed to specific treatments for emotional disorders (18). According to meta-analysis studies, this treatment has higher effectiveness compared with traditional methods of cognitive-behavioral therapy (18,19). The transdiagnostic approach focuses on identifying the common and core maladaptive temperamental, psychological, cognitive, emotional, interpersonal and behavioral processes that underpin a broad array of diagnostic presentations (20) and targeting these factors in treatment (21). This approach which mainly emphasizes cognitive and behavioral processes attempts to teach people how to face with their unfavorable emotions and respond to their emotions in a more adaptive manner; so that they can decrease the intensity and occurrence of emotional habits by regulating them, decrease traumas, and increase efficiency (20).

Researchers have proved the effectiveness of this treatment on emotional regulation and the decrease of emotional problems in psychological disorders such as anxiety and mood disorders (19,22). However, few types of research have investigated the effectiveness of transdiagnostic treatment in patients with CHD. Researchers in a study (23) aimed to investigate the effectiveness of emotional regulation intervention on cognitive emotion regulation strategies and alexithymia in CHD patients, found this intervention is effective in reducing maladaptive cognitive emotion regulation strategy and alexithymia and enhancing adaptive cognitive emotion regulation strategies. In another study aimed at investigating the effect of transdiagnostic cognitive-behavioral treatment on anxiety disorders, it was found that transdiagnostic cognitive-behavioral treatment can improve the function and efficacy of patients with anxiety disorders (24). Maddahi et al. (25) performed a study aimed at investigating the effectiveness of integrated transdiagnostic treatment on cognitive emotion regulation in patients with CHD. They showed that this treatment is effective in cognitive emotion regulation and promotes the patients' quality of life. Rideout et al. (26) conducted a study aimed at investigating health locus of control in heart transplant patients. They showed that patients with an internal locus of control had a better process of rehabilitation and improvement, but patients with an external health locus of control gained poor results of improvement process.

According to the above statements, psychological problems among CHD patients, and the effect of the interventions performed in the country, the present research is aimed at the evaluation of the effectiveness of transdiagnostic treatment on health locus of control and emotional regulation in patients with CHD.

Method

This research has been conducted by a semi-experimental method with pretest-posttest design and control group. In this research, treatment methods have been considered as independent variables at two levels (transdiagnostic treatment and no intervention), and health locus of control and emotional regulation have been considered as dependent variables. The research population includes all the patients with coronary heart diseases at the age of 40-65 years who have been under treatment in Kasra Hospital of Tehran in 2019. The sample includes 90 patients with CHD who have been selected by convenience sampling and randomly assigned to experimental and control groups. The sample size was determined by using the following formula. As the population was specific and limited, the sample size was obtained by the following formula with an accuracy of 5% and a confidence level of 95%.

$$n = \frac{2\left(1-\frac{\alpha}{2}+1-\beta\right)\text{^}2}{\Delta^2}+1$$

The inclusion criteria included: the patient's willingness to participate in the study, female and male patients with coronary heart diseases at the age of 40-65 years, diagnosis of the patient's disease by a specialist, 2 years past from diagnosis of the disease, and the patients with the education level of at least a middle school degree. The exclusion criteria included: patients not collaborating with the therapist, patients' unwillingness to continue participating in the study, patients with a background of mental illnesses and intellectual disability, patients simultaneously receiving psychological and psychiatric interventions, chronic physical illnesses, drug addiction or abuse.

Data collection was done by using the following tools:

- **Multidimensional health locus of control (MHLC):** Health locus of control

questionnaire was designed by Wallston (10). This questionnaire includes three components of internal locus of control, powerful others locus of control, and chance locus of control. Health locus of control questionnaire includes 18 items and each item consists of six choices ranging from quite agree (score 1) to quite disagree (score 6). Every individual's score ranges from 6 to 36 for each subscale that is evaluated separately. Six out of the 18 items measure people's beliefs about internal health locus of control, and the remaining 12 items evaluate the people in terms of the effect of factors such as chance, powerful others, physicians, etc. on the person's health; these factors represent for an external health locus of control (10). Moshki et al. (27) first evaluated the reliability and validity of this tool, translated, and localized that in Iran. They reported acceptable reliability and validity for this questionnaire. Also, they reported the Cronbach's alpha values of 0.70, 0.75, and 0.69 respectively for I, P, and C components.

- **Emotion regulation scale:** This scale was developed by Gross and John (23). It has 10 items including two subscales of reappraisal (6 items) and suppression (4 items). The answers are based on Likert (7-degree) scale ranging from quite disagree (1) to quite agree (7). The Cronbach's alpha coefficient was reported as 0.79 for reappraisal and 0.73 for suppression; the retest reliability for the total scale was reported as 0.69 after three months (28). The correlation coefficient of reappraisal was reported as 0.24 with positive emotions and -0.14 with negative emotions; the correlation coefficient of suppression was reported as -0.15 with positive emotions and 0.04 with negative emotions (28). The Persian version of Gross and John's emotional regulation questionnaire has been standardized by Hasani (29). In this research, the scale reliability has been determined by internal consistency (with Cronbach's alpha ranging in 0.60-0.81) and an acceptable validity of the scale has been reported based on principal component analysis by using varimax rotation, the correlation between the two subscales (r=0.13), and criterion validity.

- **Transdiagnostic treatment:** This approach is based on emotional experience and (positive or negative) emotional response. It attempts to teach people how to face with their unfavorable emotions and respond to their emotions in a more adaptive manner (18,20). Transdiagnostic group therapy is a treatment protocol developed by Barlow et al. (18); the program includes eleven 90-min sessions held once a week.

Table1. Summary of transdiagnostic group therapy intervention sessions

Session	Content
1	The group members become familiar with each other and participate in relationship therapy; the members become familiar with the research subject and they get the primary explanations; the problem is conceptualized; the psychological symptoms of heart diseases, pharmacological and non-pharmacological treatments are specified; the questionnaires are answered; the pretest is performed; treatment contract is entered into, and the general plan of treatment sessions are addressed.
2	Psycho-education about the nature of emotions and distinguishing between emotions and thoughts; this session is aimed at increasing the person's awareness of emotional triggers and responses to unfavorable emotional experiences.
3	Increasing the instantaneous and non-judgmental awareness of emotional experiences; orientation to the present moment; provocation of positive and negative emotions; avoiding emotional suppression; provocation of emotions by using mindfulness and emotion induction.
4	Recognition and revision in thinking patterns with the goal of creating flexibility in thinking.
5,6	Recognition of behaviors affected by emotion; creating inconsistent behaviors and emotional exposure; education of detection of the contradictory effect of emotional suppression and control; recognition and prevention of emotional avoidance patterns; education of awareness of physical emotions and bearing them.

7,8	Emotional exposure; introduction of emotional arousal logic; recognition of the effect of emotional experiences on physical emotion.
9	Repeated exposure and the role of habituation; prevention of situational avoidance; creation of fear-avoidance hierarchy and providing the possibility of emotional exposure; clinical actions for exposure to exciting situations and recognition of the response to these emotions.
10,11	Prevention of recurrence by focusing on prevention of emotional avoidance and emotional tolerance; summarizing the contents and performing the posttest.

In this research first, the theoretical foundations were collected by library method. After getting permission from the university and necessary actions were taken for collaborating with Kasra Hosptial of Tehran and performing the interventions. Then, study sample was selected by available method and randomly assigned to experimental and control groups. The subjects were made aware of the research goals and asked to participate in the treatment program. In group therapy, the treatment sessions included eleven 90-min sessions held once a week in the hospital. Before and after the intervention, the two groups completed the questionnaires. Data were analyzed in SPSS 21 software.

Results

The results of the research showed that the mean (and standard deviation) of the age of patients affected by coronary heart disease were respectively 56.38 and 7.10 in the experimental group and 55.09 and 6.88 in the control group. In the experimental group, 84.4% (38 people) were married and 15.6% (7 people) were single. In the control group, 77.8% (35 people) were married and 22.2% (10 people) were single.

Table 1 presents the mean and standard deviation of quality of life for patients affected by macular degeneration in control and experimental groups based on the pretest and posttest results.

Table 2: Mean and standard deviation of depression scores of control and experiment groups in pretest and posttest

Quality of life		**Experimental group**		**Control group**	
		Mean	**SD**	**Mean**	**SD**
Internal locus of control	**Pretest**	14.95	2.46	15. 29	2.57
	Posttest	20.15	2.16	14.44	3.23
Powerful others locus of control	**Pretest**	18.84	2.32	18.71	1.65
	Posttest	15.20	1.92	17.55	1.45
Chance locus of control	**Pretest**	17.73	2.26	17.60	1.67
	Posttest	14.22	1.92	16.49	1.41
Emotional reappraisal	**Pretest**	21.87	2.99	21.91	3.09
	Posttest	23.98	3.73	20.09	3.67
Emotional suppression	**Pretest**	19.58	0.75	19.44	0.84
	Posttest	16.82	0.65	19.08	0.87

As seen in the table, there is an obvious difference between the mean posttest scores of health locus of control and emotional regulation in the control and experimental groups; in the experimental group, the mean scores of internal health locus of control and emotional reappraisal in posttest are higher than the scores of the pretest. The mean scores

of powerful others locus of control, chance locus of control, and emotional suppression in the posttest are lower than the scores of pretest.

In order to observe the assumptions of parametric tests, Box and Levene's tests were used before using the parametric test of multivariate analysis of covariance. The results of the Box test were not significant for any of the variables; based on this test, the presumption of homogeneity of variance/covariance matrixes have been well observed (Box=17.296, F=2.78, P=0.051). According to the results of Levene's test, the presumption of equality of intergroup variances has been observed for posttest and its insignificant results for all variables ($p>0.05$). Therefore, multivariate analysis of covariance can be done. The results of Wilks Lambda showed that there is a significant difference between the posttest of the studied groups in terms of at least one of the dependent variables (Wilks Lambda= 0.218, F=99.37, $P < 0.001$). According to the results of eta-squared, it was found that the difference between the two groups is significant regarding the dependent variables and this difference in posttest is 78% based on Wilks Lambda (eta squared=0.782); i.e. 78% of the variance is related to the difference between the two groups which results from the mutual effect of dependent variable of health locus of control.

Table 3. The results of the analysis of covariance

Variable	Source of change	SS	Df	MS	F	Eta squared
Internal locus of control	Pretest	401.32	1	401.32	138.61	0.620
	Group	805.98	1	805.98	278.37	0.766
	Error	246.10	85	2.895		
Powerful others locus of control	Pretest	0.95	1	0.95	0.32	0.004
	Group	127.69	1	127.69	43.46	0.338
	Error	249.74	85	2/94		
Chance locus of control	Pretest	3.08	1	3.08	1.09	0.013
	Group	118.57	1	118.57	41.83	0.330
	Error	240.94	85	2.83		

As presented in table 3, with the controlled effect of pretest, there is a significant difference between the posttest results of experimental and control groups in terms of the mean scores of internal locus of control (F=278.37), powerful others locus of control (F=43.46), and chance locus of control (F=41.83) ($P< 0.001$). In other words, in posttest of the experimental group, transdiagnostic group therapy has significantly increased internal health locus of control in patients with coronary heart disease. Also, in posttest of the experimental group, transdiagnostic group therapy has significantly decreased powerful others locus of control and chance locus of control in patients with coronary heart disease.

In order to observe the assumptions of parametric tests, Box and Levene's tests were used before using the parametric test of

multivariate analysis of covariance. The results of the Box test were not significant for any of the variables; based on this test, the presumption of homogeneity of variance/covariance matrixes have been accurately observed (Box=4.086, F=1.328, P=0.263). According to the results of Levene's test presented in Table 4, the presumption of equality of intergroup variances has been observed for posttest and its insignificant results for all variables. So, multivariate analysis of covariance can be done. The results of Wilks Lambda showed that there is a significant difference between the posttest of the studied groups in terms of at least one of the dependent variables (Wilks Lambda= 0.180, F=1.931, P < 0.001). According to the results of eta-squared, it was found that the difference between the two groups is significant regarding the dependent variables and this difference in posttest is 82% based on Wilks Lambda (eta squared=0.820); i.e. 82% of the variance is related to the difference between the two groups which results from the mutual effect of dependent variable of emotional regulation.

Table4. The results of the analysis of covariance

Variable	Source of change	SS	Df	MS	F	Eta squared
Emotional reappraisal	Pretest	243.87	1	243.87	21.90	0.203
	Group	346.91	1	346.91	31.16	0.266
	Error	957.55	86	11.13		
Emotional suppression	Pretest	19.670	1	19.67	56.61	0.367
	Group	123.20	1	123.20	354.57	0.805
	Error	29.88	86	0.35		

As presented in table 4, with the controlled effect of the pretest, there is a significant difference between the posttest results of experimental and control groups in terms of the mean scores of emotional reappraisal (F=31.16) and emotional suppression (F=354.57) (P < 0.001). In other words, in posttest of the experimental group, transdiagnostic group therapy has significantly increased emotional reappraisal in patients with coronary heart disease. Also, in posttest of the experimental group, transdiagnostic group therapy has significantly decreased emotional suppression in patients with coronary heart disease.

Discussion and Conclusion

The present research has been aimed at determining the effect of transdiagnostic treatment on health locus of control and emotional regulation in CHD patients with CHD. According to the findings, transdiagnostic treatment is effective in health locus of control in patients with CHD. Transdiagnostic group therapy is significantly effective in increasing internal health locus of control and decreasing powerful others locus of control and chance locus of control in patients with CHD.

Many studies have investigated the relationship between health locus of control and the promotion of people's health (8). The results of studies suggest that people with an internal health locus of control have a health-promoting lifestyle, higher physical and psychological health, and less health- risk behaviors such as alcohol consumption, intense sport, aggression, etc (26,27). Rideout

and et al. (26) showed that patients with an internal locus of control had a better process of rehabilitation and improvement, but patients with an external health locus of control had poor results of improvement process. However, in spite of the available studies, there is a large research gap in the area of effectiveness of transdiagnostic treatment on health locus of control in patients with CHD. Based on this approach, emotional experiences play the main role in occurrence and continuation of emotional disorders. This treatment helps people how to face with their unfavorable emotions and respond to their emotions in a more adaptive manner. This approach emphasizes changing emotional regulation habits to reduce the frequency and severity of maladaptive emotional habits, reduce injury, and increase performance. The dynamic interaction between thoughts, feelings, and behaviors and their role in emotional experience is addressed in all transdiagnostic approaches (19,20). In fact, this approach enhances cognitive and behavioral control in the individual by interacting with thoughts, feelings, and behaviors. Improving cognitive and behavioral control, in turn, leads to the use of thought and practice processes to modulate the effects of stress in patients.

As another explanation, it can be stated that this treatment helps the patients to have a better understanding of interactions between the thoughts, emotions, and behaviors in creating their emotional experiences. This approach helps them respond more consciously and realistically rather than engaging in their own emotional responses. It also helps patients become more responsible for their own health and believe that they can control their own health. As a result, patients will be more responsible for their health and believe that they control their health themselves. Therefore, they acquire "emotional awareness" skills. This skill emphasizes non-judgmental awareness and focusing on the present moment during emotional experiences (26). Finally, by emphasizing the increase of cognitive flexibility and negative assessment challenge, this treatment seeks for increasing people's awareness of cognitive errors and cognitive flexibility. According to research results, cognitive control reduces the focus on external health control, people believe they can control their own health, and thus become more involved in health behaviors and has positive psychological and behavioral effects (10,11). Nafradi et al. (12) indicated that those who believe that other people or chance are responsible for their health will face loneliness, inability, and failure in fighting diseases.

According to the research findings, transdiagnostic treatment is effective in emotional regulation in patients with CHD. Transdiagnostic group therapy had significantly increased emotional regulation in patients with CHD. In other words, transdiagnostic group therapy has significantly increased emotional reappraisal and decreased emotional suppression in patients with CHD. The results of the research performed by Bahremand et al. (16) are consistent with the findings of the present study. They showed that poor cognitive emotion regulation strategies are considered an important factor development of heart diseases. Roberge et al. (24) showed that transdiagnostic treatment is effective in cognitive emotion regulation and promotes the patients' quality of life. Researchers have proved the effectiveness of this method on emotional regulation and reducing emotional problems in psychological disorders such as anxiety and mood disorders (20,22,24). To explain this finding, it can be stated that the main assumption of the treatment is that patients with emotional

disorders employ maladaptive emotion regulation strategies and they try to avoid unfavorable emotions or decrease their intensity. These efforts lead to a negative result and endurance of their symptoms. Therefore, transdiagnostic is an emotion-based treatment; i.e. the treatment has been developed in such a manner that it teaches the patients how to face their unfavorable emotions, experience, and respond to them in a more adaptive manner. The goal of this treatment is to decrease the intensity and occurrence of maladaptive emotional experiences and improve the patients' function by modifying emotion regulation habits. Although the goal is improvement, transdiagnostic treatment is not aimed at eliminating unfavorable emotions; rather, it emphasizes returning the emotions to an efficient level; so that inefficient emotions become adaptive and helpful (20). By adjusting emotion regulation habits, transdiagnostic treatment decreases the intensity and occurrence of emotional habits, decreases traumas, promotes the function, and helps the patients to learn how to face their unfavorable emotions and respond to them in a more adaptive manner. In this approach, there is a dynamic interaction between the thoughts, emotions, and behaviors; each of them plays an effective role in emotional experiences (18). As another explanation, it can be stated that this integrated protocol changes cognitive reappraisal by affecting emotional processing. Reduced temperament leads to decreased thinking styles and inefficient reappraisal, which it finally leads to decreased emotional suppression, improvement of general function and the patients' quality of life (18). Therefore, it can be concluded that prevention of emotional avoidance and exposure to emotional symptoms, participating in valuable activities, psychological inflexibility, and emotional awareness are necessary components of psychological health in patients with coronary heart disease. These components can be achieved by transdiagnostic treatment and they improve emotion regulation in the person (30,31).

One of the limitations of the present study is that the research has investigated the patients with CHD at the age of 40-65 years in Kasra Hospital of Tehran in 2019. Therefore, there is a constraint regarding the possibility of generalizing the results. The other constraint of the research is the lack of follow up for determining the exact condition of patients exposed to long term interventions. Furthermore, sampling method and the mere use of questionnaire has been another constraint. The results of this research are considered as important implications of education and promotion of mental health in patients affected by coronary heart disease.

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