Original Article

Effectiveness of Acceptance and Commitment Therapy in Health Anxiety and Adherence to Treatment in Patients Undergoing Open-Heart Surgery

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Abstract

Background and Objective: Cardiovascular disease is the most common cause of mortality among non-communicable diseases. The purpose of the present study was to determine the effectiveness of acceptance and commitment therapy (ACT) in the health anxiety and adherence to treatment of patients undergoing open-heart surgery.

Materials and Methods: The research method was semi-experimental with a pre-test and post-test design. The statistical population consisted of all the patients with heart disease in Tehran, Iran, in 2019, out of whom 45 subjects were divided into experimental and control groups. The data were collected using the Health Anxiety Questionnaire and Adherence to Treatment Questionnaire. The data were analyzed using analysis of covariance and SPSS software (version 22).

Results: The obtained results showed that ACT significantly reduced health anxiety (F=83.60; P<0.0001) and increased adherence to treatment (F=271.32; P<0.0001).

Conclusions: It can be concluded that ACT is effective in increasing adherence to treatment and decreasing health anxiety.

Keywords: Acceptance and commitment therapy, Adherence to treatment, Health anxiety, Open-heart surgery

Background

Cardiovascular disease (CVD) is the most common cause of mortality among non-communicable diseases. In 2012, about 17.5 million patients died of CVD, accounting for 31% of all mortalities worldwide. According to the results of 10 centers for chronic disease prevention, CVD is one of the three most common diseases causing mortality in individuals over the age of 35 [1]. According to the World Health Organization, by 2020, CVD will be the leading cause of mortality worldwide. In terms of infection, mortality, disability, and economic cost, it will be the most important disease and cause of mortality by 2020. In Iran, about 90,000 mortalities annually occur due to this disease [2].

The findings suggest that CVD is associated with diseases and other problems, which can lead to many problems in occupational performance, sleep function, cancer, obesity, and lifestyle. Stress experiences cause physiological changes in the heart and arteries, which in turn increases CVD [3]. However, negative psychological factors, such as depression, anxiety, and hostility, play an important role in the development and progression of heart disease [4]. Instead, findings show that psychological well-being plays an important and useful role in reducing the risk of heart disease [5].

Recent studies have emphasized the importance of the influence of psychological and emotional factors as the most important risk factors in CVD. In addition, periods of acute stress or intense excitement can lead to cardiovascular attacks [6]. Among various factors playing a role in the development and severity of heart disease, the role of psychological factors of stress and lifestyle is very important [7]. These factors have caused the severity of the disease to increase and create major psychological problems for these individuals, regarded as a series of chains increasing and intensifying cardiovascular problems in these patients. Among the psychological factors that these patients are struggling with, anxiety is associated with illness and distress [8].

Psychological distress is associated with changes in the nervous-glandular system, hypothalamic-pituitary and adrenal axis, platelet function, and heart rate [9]. The evidence has shown that individuals with lower levels of stress exhibit avoidant behaviors or do not express their emotions in stressful situations [10]. These factors increase the risk of health anxiety in cardiac patients [11]. Anxiety is a disorder in which individuals suffer from severe anxiety and worry about their body and health without realizing that they are at risk or suffering from a specific illness and consider simple physical symptoms to be serious illnesses. If this anxiety is exacerbated, individuals may feel self-conscious so that this anxiety is an alternative to the patient's self-disorder [12]. The results show that 51% of chronic patients suffer from this anxiety [13]. This anxiety leads to maladaptive avoidance of conditions, such as visiting family members or exercising [14].

There have been a limited number of studies carried out on health anxiety in cardiac patients; nevertheless, numerous studies have been conducted on patients with stress and anxiety [15, 16]. In a study, Hayes examined the differences among health anxiety, depression, and anxiety in individuals with heart and non-cardiac problems and concluded that the levels of anxiety, depression, and health anxiety were higher in individuals with coronary artery disease [17]. Acceptance and commitment therapy (ACT) is an intervention enhancing the level of well-being, reducing the level of distress, and increasing psychological resilience [18]. Numerous treatments and commitment-based interventions, including large-scale randomized trials, to improve the health and quality of life of cardiac patients, have not yet been performed [19].

In a research sample with a small group without a control group, Goodwin et al. demonstrated that a program based on ACT promoted patients' cardiac health behaviors. The program also increased following diet and doing physical activity [20]. The ACT improved the psychological well-being of cardiac patients and reduced the risk factors for heart disease. Therefore, ACT is suggested for the reduction of mortality and increase in the quality of life among these patients [21]. Acceptance and commitment-based therapy has also been studied regarding anxiety disorders. Hoffmann et al. showed that the treatment based on group acceptance and commitment is logical, effective, and acceptable in the treatment of severe health anxiety [22]. In a study carried out by Hood et al., it was indicated that ACT reduced the level of health anxiety during the three-month follow-up with a large intragroup effect size of 0.66 [23].

As previously mentioned, heart disease is one of the biggest problems in the health care system. These patients have incurred staggering costs on the family and health care system due to health anxiety and lack of follow-up treatment. Health psychology has tried to play a significant role in the prevention and treatment of this disease using psychological concepts. The use of new cognitive therapies in the field of health has recently received much attention.

Objectives
Given that CVD is on the rise in the community and coronary artery bypass grafting is being used as a common treatment for these patients, depression is also common in these patients. Therefore, it is necessary to pay special attention to the psychological issues related to these patients. As a result, due to the wide range of physical and psychological problems of cardiac patients and need to pay attention to their health issues, this study aimed to evaluate the effectiveness of ACT in health anxiety and adherence to treatment of individuals undergoing open-heart surgery.

Materials and Methods
The research method was semi-experimental with a pre-test and post-test design. The statistical population of this study included all the patients undergoing open-heart surgery and referring to Valiasr Hospital in Ghaemshahr, Mazandaran, Iran, in 2019. By interviewing and examining the inclusion and exclusion criteria, the subjects were selected using the targeted sampling method and randomly divided them into two groups. The criterion for selecting the number of the sample based on a previous study [24] was an effect size of 0.25, alpha of 0.05, and power of 0.80 in the two groups. The minimum number of the sample to achieve the desired power was 15 subjects in each group; therefore, a total of 30 individuals were selected for the present study.

The inclusion criteria were not receiving psychotropic drugs, narcotics, and psychological therapies during the study, being over 40 years of age, and not suffering from acute or chronic mental disorders. The exclusion criteria were no attendance at trial and intervention sessions for more than two sessions, unwillingness to continue attending trial and intervention sessions, severe psychiatric disorders requiring immediate treatment, and use of psychedelics or drugs. In this study, in coordination with Social Security Treatment Management of Mazandaran province and director of Valiasr Hospital in Ghaemshahr, it was requested to introduce patients undergoing open-heart surgery to the researcher. Subsequently, the researcher

Table 1. Content of acceptance and commitment therapy sessions

Session	Content
Session 1	Taking the test, familiarizing the patient with octave therapy, and examining the heart disease in each individual (the duration of the disease and taken measures)
Session 2	Explaining the relationship among pain, mood, and judgment and calling for creative helplessness
Session 3	Finding patient controlling methods through constructive frustration, introducing desire and acceptance as a technique, and examining the expense of unwillingness and non-acceptance
Session 4	Reviewing previous assignments, finding faults, and developing acceptance and desire techniques
Session 5	Reviewing previous assignments, weakening dependence on conceptualized self, developing awareness of self-observation, and distinguishing between self-conceptualization and self-observation
Session 6	Self-textual training, reviewing being in the present, alternative attachment to the past, and future-conceptualization, and training mindfulness techniques
Session 7	Clarifying values, being in the present, and reviewing previous assignments
Session 8	Assessing the assignments of previous session, teaching committed behaviors, removing obstacles, carrying out a final evaluation, and performing post-test

randomly selected two experimental and control groups and then trained one of the groups in eight sessions of ACT. However, the control group did not receive any intervention. Finally, considering the position for teaching the independent variables, the necessary data for the analysis were collected by performing pre-test and then post-test. Eventually, 15 individuals were prepared for each group to perform the analysis.

The ethical considerations were observed in the present study. All the individuals received oral information about the study and participated in the study if they were willing to. The participants were assured that all the information would remain confidential and will be used for research objectives. In order to respect privacy, the names and surnames of the participants were not registered.

Health Anxiety Questionnaire

This questionnaire was developed by Salkousis and Varis in 2002 for the measurement of health anxiety [24]. The questionnaire has 18 items measuring health anxiety based on a 5-point Likert scale. This questionnaire has three sections discussing the general health concerns of the negative consequences and main part. The validity of this questionnaire was obtained by Shahidi et al. at 0.90, and Cronbach's alpha coefficient for this questionnaire was obtained within the range of 0.70-0.82 [25].

Adherence to Treatment Questionnaire

Seyed Fatemi et al. developed this questionnaire in order to observe adherence to treatment in chronic patients in 2017 [26] with 48 items. Careful treatment, willingness to participate in treatment, ability to adapt, integration with life therapy, adherence to treatment, and hesitation in the implementation of treatment characterize 40 items based on a 5-point Likert scale from fully agree to fully disagree. The reliability of this scale was confirmed using internal consistency with a Cronbach's alpha coefficient of 0.92 [27].

The ACT was performed in eight 90-minute sessions once a week for 2 months based on the Hayes training package. The validity of this package has been confirmed by its developers and it has high formality and content validity [28]. In addition, the content validity of this educational package was approved by five professors of psychology at University of Tehran, Tehran, Iran, and then it was used in the present study. Table 1 tabulates a summary of the contents of ACT sessions.

In addition to using average descriptive statistics and standard deviation, the data were analyzed based on multivariate analysis of covariance (MANCOVA) using SPSS software (version 22). The MANCOVA assumptions were assessed using the Levene's test, variance homogeneity test, and regression slope homogeneity test. Furthermore, the normality of data distribution was examined using the Shapiro-Wilk test. A follow-up test was also utilized to compare the groups. The significance level of the tests in this study was considered to be 0.05.

Results

The obtained results showed that the mean values of cardiac patients' age in the experimental and control groups were 51.47±4.37 and 52.8±14.14 years, respectively (Table 2). In addition, the results

Table 2. Mean and standard deviation of study variables in experimental and control groups

Research variable	Group	Pre-test		Post-test	
		Mean	Standard deviation	Mean	Standard deviation
Health anxiety	ACT	58.57	6.09	25.67	3.09
	Control	55.60	8.77	55.33	8.60
Adherence to treatment	ACT	120.88	6.14	173	6.45
	Control	124.80	7.22	126.81	6.56

ACT: Acceptance and commitment therapy

Table 3. Results of multivariate analysis of covariance for comparison of mean health anxiety and adherence to treatment

Dependent variable	Sum of square	df	Mean of square	F	P	Eta
Health anxiety	8100.92	2	4050.460	83.609	0.0001	0.80
Adherence to treatment	21574.816	2	10787.408	271.328	0.0001	0.92

of the Chi-square test demonstrated that there was no significant difference between the two groups in terms of age. Table 3 shows the mean values of the experimental and control groups regarding the variables under study.

Before performing the covariance analysis test, the Shapiro-Wilk and Levene's tests were used to assess the required assumptions. The Shapiro-Wilk test for the distribution of research variables in the pre-test and post-test stages showed that the study variables had a normal distribution. The Levene's test was employed to predict the homogeneity of the error variances. The results of the Levene's test indicated that the homogeneity assumption of variances was accepted. The examination of the homogeneity of regression slopes also demonstrated that the assumption of homogeneity of regression slopes was also established. Therefore, there were prerequisites for MANCOVA. Table 3 tabulates the results of covariance analysis.

The results of Table 3 revealed that the mean scores of health anxiety and follow-up in the experimental and control groups were significantly different from each other due to the larger F-value calculated than the critical F-value at the level of 0.05 (3.23). To be more precise, between the experimental groups and control group in terms of health anxiety (F=61.83; P=0.0001; Eta=0.80) and adherence to treatment (F=271.33; P=0.0001; Eta=0.92), there was a significant difference in the elimination of the effect of pre-test averages. It can also be concluded that based on the coefficients of segregation the therapeutic intervention had a very strong effect on the explanation of the dependent variable. More precisely, ACT (group-independent variables) accounted for 80.3% in explaining health anxiety and 92.8% in explaining adherence to treatment in patients undergoing open-heart surgery.

Discussion

The present study aimed to determine the effectiveness of ACT in health anxiety and adherence to treatment in patients undergoing open-heart surgery. The obtained findings showed that acceptance-based therapy reduced the health anxiety of the experimental group, compared to that reported for the control group. The results of the current study are consistent with the findings of studies conducted by Hoffman et al. and Elinberg et al. [10, 22]. The results also showed that this therapy increased the follow-up of the treatment of

these patients.

To explain the above-mentioned results, it should be said that acceptance-based therapy is on the basis of the principle taught to cardiac patients that deal with this disorder instead of avoiding anxiety-provoking situations, especially health anxiety, by increasing psychological acceptance of internal experiences, such as thoughts and feelings, that they have when thinking about their heart disease, and by setting goals for their illness and commitment to them [11].

Capacity is one of the main factors that has improved patients' mental health. The ACT taught cardiac patients how to release their inhibitory thoughts keeping them stressed and anxious, escape from disturbing thoughts, accept their internal events that they control pathologically, and analyze them instead of avoiding them [13]. One of the biggest problems that individuals with cardiac problems face is the engagement with verbal tags as heart disease. This has caused both the patient and those around him/her to use this label for the individual. The ACT allows individuals with heart disease to get rid of the verbal control causing their problems to spread and allow them to stop arguing with them [14]. This treatment does not seek to make patients with heart disease think more realistically but rather to avoid negative psychological experiences, thereby increasing their awareness and focusing on the moment to improve their health. All of these factors can also increase the chances of following the treatment in these patients.

As previously mentioned, one of the basic principles of treatment is based on acceptance and commitment to the reduction of the empirical avoidance of patients with heart disease [17]. Other individuals do not run away from their feelings and emotions and try to accept them as they are. During the therapy sessions, the therapist tried to convince patients not to run away from their illness, especially the label. These factors generally work together to ensure that an individual not only does not reduce adherence to his or her follow-up diet and medication but also promotes it [15]. Therefore, these individuals are less afraid of verbal labels, such as heart disease, and try to accept and make them a part of their lives. That is why they accept to increase their commitment to the use of drugs day by day. As the treatment of these individuals continues, they learn to refrain from

pain and confusion in order to reduce these experiences. Then, their function is enhanced by increasing their level of psychological resilience [12].

Conclusions

It can be concluded that ACT was effective in the adherence to treatment and reduction of health anxiety. The obtained results of the present study suggested that ACT significantly increases adherence to treatment and decreases the health anxiety of cardiac patients.

References
1. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-5®). Philadelphia: American Psychiatric Pub; 2013.
2. Berge LI, Skogen JC, Sulo G, Igland J, Wilhelmsen I, Vollset SE, et al. Health anxiety and risk of ischaemic heart disease: a prospective cohort study linking the Hordaland Health Study (HUSK) with the Cardiovascular Diseases in Norway (CVDNOR) project. BMJ Open. 2016; 6(11):29-34. [DOI:10.1136/bmjopen-2016-012914] [PMID] [PMCID]
3. Boehm JK, Kubzansky LD. The heart's content: the association between positive psychological well-being and cardiovascular health. Psychological Bulletin. 2012; 138(4):655-70. [DOI:10.1037/a0027448] [PMID]
4. Keshavarz M, Karami E. Farmers' pro-environmental behavior under drought: application of protection motivation theory. Journal of Arid Environments. 2016; 127:128-36. [DOI:10.1016/j.jaridenv.2015.11.010]
5. Finnes A, Ghaderi A, Dahl J, Nager A, Enebrink P. Randomized controlled trial of acceptance and commitment therapy and a workplace intervention for sickness absence due to mental disorders. Journal of Occupational Health Psychology. 2019; 24(1):198-212. [DOI:10.1037/ocp0000097] [PMID]
6. Davies CD, Niles AN, Pittig A, Arch JJ, Craske MG. Physiological and behavioral indices of emotion dysregulation as predictors of outcome from cognitive behavioral therapy and acceptance and commitment therapy for anxiety. Journal of Behavior Therapy and

Experimental Psychiatry. 2015; 46:35-43. [DOI:10.1016/j.jbtep.2014.08.002] [PMID]
7. Deijle IA, Van Schaik SM, Van Wegen EE, Weinstein HC, Kwakkel G, Van den Berg-Vos RM. Lifestyle interventions to prevent cardiovascular events after stroke and transient ischemic attack: systematic review and meta-analysis. Stroke. 2017; 48(1):174-9. [DOI:10.1161/STROKEAHA.116.013794] [PMID]
8. Dindo L, Van Liew JR, Arch JJ. Acceptance and commitment therapy: a transdiagnostic behavioral intervention for mental health and medical conditions. Neurotherapeutics. 2017; 14(3):546-53. [DOI:10.1007/s13311-017-0521-3] [PMID] [PMCID]
9. DuBois CM, Lopez OV, Beale EE, Healy BC, Boehm JK, Huffman JC. Relationships between positive psychological constructs and health outcomes in patients with cardiovascular disease: a systematic review. International Journal of Cardiology. 2015; 195:265-80. [DOI:10.1016/j.ijcard.2015.05.121] [PMID] [PMCID]
10. Eilenberg T, Fink P, Jensen JS, Rief W, Frostholm L. Acceptance and commitment group therapy (ACT-G) for health anxiety: a randomized controlled trial. Psychological Medicine. 2016; 46(1):103-15. [DOI:10.1017/S0033291715001579] [PMID]
11. Forman EM, Butryn ML. A new look at the science of weight control: how acceptance and commitment strategies can address the challenge of self-regulation. Appetite. 2015; 84:171-80. [DOI:10.1016/j.appet.2014.10.004] [PMID] [PMCID]
12. Ginty AT, Kraynak TE, Fisher JP, Gianaros PJ. Cardiovascular and autonomic reactivity to psychological stress: neurophysiological substrates and links to cardiovascular disease. Autonomic Neuroscience. 2017; 207:2-9. [DOI:10.1016/j.autneu.2017.03.003] [PMID] [PMCID]
13. Danitz SB, Orsillo SM. The mindful way through the semester: an investigation of the effectiveness of an acceptance-based behavioral therapy program on psychological wellness in first-year students. Behavior Modification. 2014; 38(4):549-66. [DOI:10.1177/0145445513520218] [PMID]
14. Goodwin CL, Forman EM, Herbert JD, Butryn ML, Ledley GS. A pilot study examining the initial effectiveness of a brief acceptance-based behavior therapy for modifying diet and physical activity among cardiac patients. Behavior Modification. 2012; 36(2):199-217. [DOI:10.1177/0145445511427770] [PMID]
15. Gregg JA, Callaghan GM, Hayes SC, Glenn-Lawson JL. Improving diabetes self-management through acceptance, mindfulness, and values: a randomized controlled trial. Journal of Consulting and Clinical Psychology. 2007; 75(2):336-43. [DOI:10.1037/0022-006X.75.2.336] [PMID]
16. Bikmoradi A, Masmouei B, Ghomeisi M, Roshanaei G. Impact of Tele-nursing on adherence to treatment plan in discharged patients after coronary artery bypass graft surgery: a quasi-experimental study in Iran. International Journal of Medical Informatics. 2016; 86:43-8. [DOI:10.1016/j.ijmedinf.2015.12.001] [PMID]
17. Hayes SC. Stability and change in cognitive behavior therapy: considering the implications of ACT and RFT. Journal of Rational-Emotive and Cognitive-Behavior Therapy. 2005; 23(2):131-51. [DOI:10.1007/s10942-005-0007-9]
18. Henson S, Cranfield J, Herath D. Understanding consumer receptivity towards foods and non-prescription pills containing phytosterols as a means to offset the risk of cardiovascular disease: an application of protection motivation theory. International Journal of Consumer Studies. 2010; 34(1):28-37. [DOI:10.1111/j.1470-6431.2009.00829.x]
19. Grimaldi A, Vermi AC, Cammalleri V, Castiglioni A, Pappalardo F, Taramasso M, et al. Heart surgery for immigrants in Italy: burden of cardiovascular disease, adherence to treatment and outcomes. Journal of Cardiovascular Medicine. 2016; 17(2):105-12. [DOI:10.2459/JCM.0000000000000228] [PMID]
20. Iakovleva MV. Adherence to treatment after coronary bypass

surgery: psychological aspects. Revista Iberoamericana de Psicologia y Salud. 2016; 7(1):9-14. [DOI:10.1016/j.rips.2015.10.003]

21. Hirokawa K, Ohira T, Nagayoshi M, Kajiura M, Imano H, Kitamura A, et al. Occupational status and job stress in relation to cardiovascular stress reactivity in Japanese workers. Preventive Medicine Reports. 2016; 4:61-7. [DOI:10.1016/j.pmedr.2016.05.010] [PMID] [PMCID]

22. Hoffmann D, Rask CU, Hedman-Lagerlöf E, Ljótsson B, Frostholm L. Development and feasibility testing of internet-delivered acceptance and commitment therapy for severe health anxiety: pilot study. JMIR Mental Health. 2018; 5(2):e28. [DOI:10.2196/mental.9198] [PMID] [PMCID]

23. Hood SR, Giazzon AJ, Seamon G, Lane KA, Wang J, Eckert GJ, et al. Association between medication adherence and the outcomes of heart failure. Pharmacotherapy. 2018; 38(5):539-45. [DOI:10.1002/phar.2107] [PMID]

24. Salkovskis PM, Rimes KA, Warwick HM, Clark DM. The health anxiety inventory: development and validation of scales for the measurement of health anxiety and hypochondriasis. Psychological Medicine. 2002; 32(5):843-53. [DOI:10.1017/S0033291702005822] [PMID]

25. Shahidi S, Molaie A, Dehghani M. Relationship between health anxiety and alexithymia in an Iranian sample. Procedia-Social and Behavioral Sciences. 2012; 46:591-5. [DOI:10.1016/j.sbspro.2012.05.168]

26. Lü W, Hughes BM, Howard S, James JE. Sleep restriction undermines cardiovascular adaptation during stress, contingent on emotional stability. Biological Psychology. 2018; 132:125-32. [DOI:10.1016/j.biopsycho.2017.11.013] [PMID]

27. Lundgren T, Dahl J, Melin L, Kies B. Evaluation of acceptance and commitment therapy for drug refractory epilepsy: a randomized controlled trial in South Africa-a pilot study. Epilepsia. 2006; 47(12):2173-9. [DOI:10.1111/j.1528-1167.2006.00892.x] [PMID]

28. Franco G, Biagio F, Battista ZG, Giuseppe S, Edoardo B, Ercole V, et al. ALERT-HF: adherence to guidelines in the treatment of patients with chronic heart failure. Journal of Cardiovascular Medicine. 2014; 15(6):491-7. [DOI:10.2459/JCM.0000000000000038] [PMID]