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Effectiveness of acceptance and commitment therapy upon distress, emotion regulation, and self-compassion in patients with cardiovascular disease: a randomized clinical trial

Arash Fattahi¹, Fatemeh Mazini², Nasrin Jaberghaderi³, Fatemeh Rajabi⁴, Mehdi Derakhshani^{5*}, Mohammad Laki⁶

1. PhD Candidate in Psychology, Department of Psychology, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran.
2. Department of Psychology, Sari Branch, Islamic Azad University, Sari, Iran.
3. Assistant Professor, Department of Clinical Psychology, Faculty of Medicine, Kermanshah University of Medical Sciences, Kermanshah, Iran.
4. Department of Psychology, School of Psychology and Educational Sciences, Shahid Beheshti University, Tehran, Iran
5. Department of Clinical Psychology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran,
6. Department of Psychology, Andimeshk Branch, Islamic Azad University, Andimeshk, Iran.

Corresponding author:

Mehdi Derakhshani

E-mail: mehdiderakhshani123456@gmail.com

Abstract

Introduction: Cardiovascular patients experience various psychological problems due to the conditions caused by their disease, which make it worse if left untreated.

Objective: The purpose of the current study was to evaluate the effects of acceptance and commitment therapy on distress, emotion regulation, and self-compassion in patients with cardiovascular disease.

Methods: This study was a randomized clinical trial with pre-test, post-test and two-month and four-month follow-up periods accompanying a control group. At four

stages, patients filled out questionnaires on depression, anxiety, stress (DASS-21), emotion regulation (ERQ), and self-compassion (SCS). The experimental group underwent a treatment protocol based on acceptance and commitment therapy. Data were then analyzed using SPSS-25 with repeated measures analysis of variance.

Results: Act significantly reduced depression, anxiety, and stress, enhanced self-compassion, and improved emotion regulation in cardiac patients. Between-subjects (Group) partial etas for depression, anxiety, stress, reappraisal, suppression, and self-compassion were 0.61, 0.64, 0.66, 0.62, 0.66, and 0.65, respectively. Treatment efficacy was maintained during the 2- and 6-month follow-up visits.

Conclusion: The results of this study suggest that treating cardiac patients' psychological problems in a way focused on acceptance and commitment therapy may have an impact on how well they respond to their treatment.

Keywords: Acceptance and Commitment Therapy, distress, emotion regulation, self-compassion, cardiovascular.

Introduction

Cardiovascular disease (CVD) is the most common noncontagious disease and refers to a group of diseases that affect blood vessels or the heart.¹ According to the World Health Organization (WHO), cardiovascular disease (CVD) is one of the leading causes of death, killing 17.9 million in 2019.² Coping with a serious illness such as cardiovascular disease can lead to increased levels of fear, personal health concerns, psychological distress, and changes in health-related quality of life (HRQoL).³ Cardiovascular disease leads to economic and psychological consequences. For example, affected individuals experience depression, anxiety, and mental distress which can disrupt their recovery process.⁴ The disease can also disrupt emotion regulation and lead to poor self-compassion in sufferers.⁵ Individuals who lack the emotional and/or mental capacity to effectively handle stressful situations may be more prone to psychiatric pathologies.^{6, 7} Accordingly, anxiety, depression or any perceived psychosocial stress these patients deal with are associated with rapid disease progression, increased future cardiac events, decreased quality of life, increased health care costs, and poor long-term psychological adjustment, and all are associated with poorer prognosis.^{7, 8} There is substantial evidence

from epidemiological, psychological, psychiatric, cardiology, and public health studies supporting these associations.⁹

Studies investigating cardiovascular risk factors suggest that these risk factors reduce cortical blood flow, cause white matter damage, and cause dysfunction in frontal-subcortical circuits that regulate emotions.^{10, 11} Emotion regulation involves experiencing, processing, and modifying emotional responses. Consequently, when a range of emotions are evoked as a result of a health event, the inability to effectively manage those emotions can limit self-care activities and affect mental and physical health.¹¹ A study by Jentsch and Wolf (2020) examined the function of controlling negative emotions in enhancing psycho-physiological reactions to an acute psychosocial stressor. Their study's findings demonstrated that adaptive patterns and overall adaptability of cardiovascular, neuroendocrine, and psychological responses are fostered by cognitive reappraisal (rather than expressive suppression).¹²

Although the relationship between emotion regulation styles and well-being is well-documented, research on how these strategies affect physical health is limited. Another factor that may be related to emotion regulation and coping styles in these patients is self-compassion.¹³ Self-compassion is about being kind to yourself rather than being judgmental, knowing that we are the same as others when dealing with isolation, and thereby being aware of one's pain and problems rather than ignoring them.¹⁴ With this attitude, we can make positive changes. Also, with self-compassion, rather than avoiding unpleasant experiences, we strive to be kind and tolerant of unpleasant emotions. High self-compassion is associated with willingness to engage in self-care/health-promoting behaviors, reduced disease risk, and improved physical health. In contrast, low self-compassion is associated with unhealthy behaviors (such as smoking and excessive alcohol consumption), increased risk of disease, and shortened lifespan.¹⁵ Therefore, there is an urgent need to pay special attention to this factor in cardiovascular patients.

Cardiac rehabilitation (CR) after a cardiac event is recommended in such patients and is usually done in groups. CR includes exercise classes, training, and stress management techniques to improve CVD risk profile, physical fitness, and psychological function.^{16, 17} This includes counseling, meditation, and cognitively challenging negative thinking,

although its psychological component is non-standard. Related systematic reviews and meta-analyses also showed mild to moderate effects of CR on symptoms of anxiety and depression.¹⁸ On the other hand, the quality of evidence supporting psychological treatments for anxiety and depression in cardiovascular disease is generally low. Therefore, these disorders should use third-wave cognitive-behavioral therapy, which focuses on concepts such as mindfulness, acceptance, values, and goals.¹⁹ These therapies address the areas where cognitive behavioral therapy falls short. The relational framework theory (RFT), which provides a theoretical foundation for the primary processes involved in psychopathology and dysfunctional emotional regulation, is the foundation for ACT therapy, one of the third wave therapies.²⁰ ACT promote acceptance and tolerance of inner experiences through the use of strategies such as present-moment awareness, cognitive flexibility, and commitment to values.²¹ Increasing psychological flexibility is the major treatment objective of ACT. Instead of avoiding and suppressing mental occurrences, its techniques assist people in learning to embrace and observe them.²² As shown earlier, developing psychological flexibility allows people to change their relationship to their inner experience (rather than changing the experience itself), and to change the desired behavior (e.g. more physical activity) even in the face of difficult thoughts.²³

Effective treatment of anxiety, depression and mental health problems in patients with cardiovascular disease should be a focus when establishing chronic patient care programs, and also it needs to be a priority for policy makers and clinical trials. Therefore, this study aimed to conduct a clinical trial to examine the efficacy of acceptance and commitment therapy for psychopathology, emotion regulation, and self-compassion in patients with cardiovascular from Kermanshah.

Methods

Procedure

This study was a randomized clinical trial with experimental and control groups under the supervision of the Kermanshah University of Medical Sciences and in accordance with

the registered code of ethics IR.KUMS.REC.1399.033. The sample selected Using convenience sampling method. Patients were selected after advertisements were distributed to hospitals in Kermanshah. After conducting a clinical interview and completing the questionnaires, participants who met the criteria for emotional problems were included in the study. The study consisted of two groups: the control group, patients in this group received only cardiovascular drugs. However, the experimental group also received ACT treatment in addition to disease treatment. Treatment was given once a week for eight 90-minute sessions. Participants were evaluated four times: pre-test, post-test, 2-month follow-up, and 4-month follow-up. Measurements were taken 2 days before the intervention, 2 days after the intervention, 2 months after the end of the treatment, and at the end of four months. The treatment was administered by a faculty member who had the necessary information about the treatment program. ACT was performed based on the Eifert and Forsyth treatment protocol.²⁴ The treatment consisted of 8 sessions. The contents of the sessions are shown in the table below.

Table 1. Summary of acceptance and commitment therapy protocol

Module	Content
1	Introduction, therapeutic Relationship, informing participants about the subject of the research, treatment goals and therapist agreements, an introduction to ACT, defining the rules governing the sessions
2	Discussing experiences and evaluations, function as a measure, developing creative hopelessness, practice accepting thoughts and feelings, life enhancing exercises, assessing a person's willingness to change, summarizing the material discussed at the session and giving assignment
3	Introducing control as a problem, introducing willingness as another possible response, engaging in purposeful actions, choosing valuable directions, value-based behavior as a substitute for anxiety control, discussing problems and challenges in the acceptance of the disease, and investigating exercises for next session and giving assignment
4	Application of cognitive defusion techniques, disorganizing problematic chains of language, weakening the fusion of self with thoughts and emotions, learning to accept anxiety by mindfulness, internal control versus external control, intervention in the functioning of the problematic chains of language and metaphors
5	Observing self as context, weakening conceptualized self and strengthening observer self, self as content versus self as context, playing volleyball with anxious thoughts and feelings,
6	Application of mindfulness techniques, models of "mind" as a separate entity, learning to see experiences as process, practicing emotions and experiences to enrich life, identifying patients'

	life values and focusing on these values, summarizing the material discussed at the session and investigating exercises for next session and giving assignment
7	Introducing the concept of values, pointing out the disadvantages of focusing on results, discovering the practical values of life, describing differences between values, goals, and common mistakes, identifying the internal and external barriers
8	Understanding the nature of acceptance and commitment, determining patterns of actions aligned with values, identifying valuedriven behavior plans and creating a commitment to them

Participants

This study included 53 participants. Sample size was obtained either from previous studies or calculated using the following formula.²⁵ Considering probable losses from samples, this number was increased to 40.

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 (s_1^2 + s_2^2)}{(\mu_1 - \mu_2)^2} \quad n = \frac{(10.49)(4.87^2 + 2.66^2)}{(6.03 - 2.93)^2} = 21.71$$

After screening, 20 were selected for the experimental group and 20 were assigned to the control group. During the research process, four participants were excluded for specific reasons; one of the participants of the experimental group and two participants of the control group did not complete the sessions, so they did not complete the post-test and the follow-up phases. In addition, one participant in the experimental group did not complete the follow-up period due to recurrence of cardiovascular disease symptoms. The average monthly income of the participants was 300 dollars. Statistical analysis of the demographic characteristics of the participants revealed no significant differences between the subjects with respect to demographic characteristics. After determining the sample size, all patients, both male and female, were evaluated using the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV) to first confirm patient eligibility for the study. The study included cardiovascular patients who had emotional problems

according to clinical interviews and questionnaire cut scores for depression, stress, and anxiety.

All the interviews and questionnaires were conducted by a psychiatrist. Inclusion criteria for this study were as follows: Diagnosis of cardiovascular disease based on specialist diagnosis 2) At least 18 years of age and with at least a diploma 3) Agreeing to participate in the study 4) No history of substance abuse for at least 1 year. Patients who met the following criteria were excluded from the study: 1) Inability to read or understand Persian to fill out the questionnaires and treatment plan 2) history or current presentation of disorders such as schizophrenia, bipolar disorder type I or II that destroyed realism 3) suicidal–homicidal ideation 4) Presence of acute physical problems 5) Substance abuse 6) Concomitant participation in other psychological interventions 7) Failure to attend 2 or more treatment sessions. Participants completed an informed consent form prior to the procedure. Also, they were completely free to leave the treatment sessions whenever they wished. All information regarding treatment sessions will be treated as absolutely confidential. Participants who wish to be informed about research results will be provided with the necessary information. Participants were then randomly assigned to experimental and control groups. Treatment sessions were conducted by the researcher at the hospital in the form of eight 90-minute sessions, in a group setting, and based on Eifert and Forsyth treatment protocol.²⁴ The psychiatrist was appropriately educated about the questionnaires. All follow-up examinations were performed by the designated person to avoid bias.

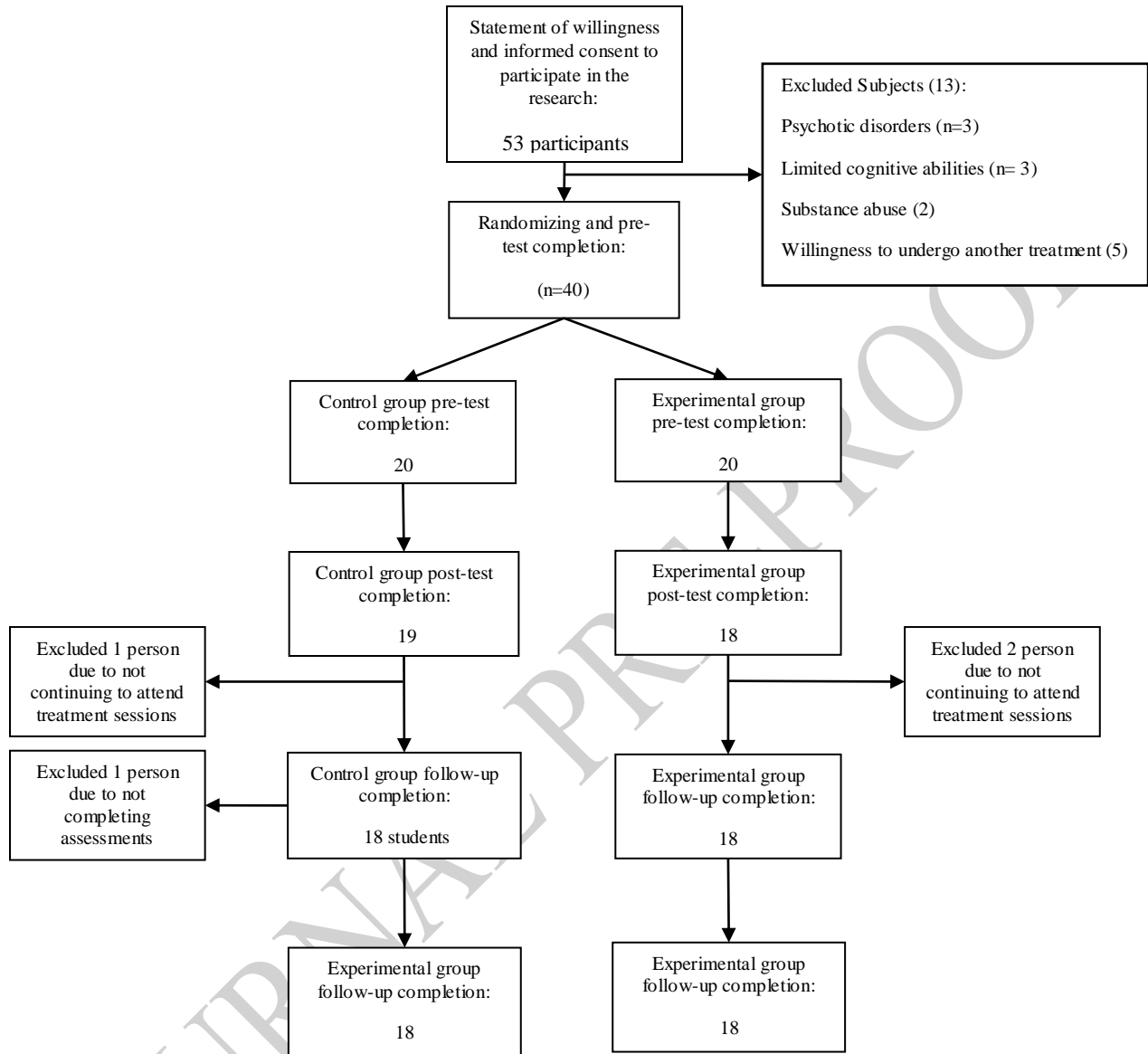


Figure 1. Participants' diagram in pre-test, post-test and follow-up phases

Instruments

Depression, Anxiety, Stress Scale (DASS-21): The questionnaire consists of 21 questions rated on a Likert scale. The results of the factor analysis of this scale showed that 68% of the total variance of the scale was measured by these three factors. Its convergent validity for stress, anxiety, and depression were 0.62, 0.57., and 0.77,

respectively. Cronbach's alpha coefficients for stress, depression, and anxiety have been reported to be 0.97, 0.92, and 0.95, respectively.²⁶ The validity and reliability of this questionnaire has been examined in Iranian students, and the results showed the test-retest reliability of 0.80, 0.76, and 0.77 for depression, anxiety, and stress, respectively. Cronbach's alpha for the depression, anxiety and stress scales were 0.81, 0.74 and 0.78, respectively. Its convergent validity for stress, anxiety, and depression were 0.59, 0.57, and 0.70, respectively.²⁷

Self-compassion scale (SCS): This scale includes 26 items with a five-point Likert scale that measures three bipolar components in the form of six subscales. These sub-scales are: self-compassion, self-judgment, mindfulness, over-identification, common humanity, and isolation. Cronbach's alpha coefficient of 0.92 indicates a high level of internal consistency for the original version of this scale. Satisfactory convergence and divergence validity and test-retest reliability have also been reported on this scale. Its divergent validity was -0.51 that it was a good validity.²⁸ In a sample of Iranian students, the six-factor structure of the questionnaire was confirmed and Cronbach's alpha coefficient was reported 0.86 for the total scale. Its divergent and convergent validity was -0.36 and 0.26 that was significant. Cronbach's alpha coefficients for the subscales were also in the range of 0.79 to 0.85.²⁹

Emotion Regulation Questionnaire (ERQ): This questionnaire was developed by Gross and John in 2003. It consists of 10 items that assess the respondents' tendency to regulate their emotions through two main strategies including cognitive reappraisal and expressive suppression. Cronbach's alpha coefficient for suppression and reappraisal were 0.73 and 0.79, respectively. Its test-retest reliability for suppression and reappraisal was 0.69 for both of them.³⁰ Respondents respond to each item using a 7 Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Its validity and reliability have been investigated in an appropriate Iranian sample. Its convergent validity and divergent validity for suppression and reappraisal were 0.28 and -0.24, respectively. Its Cronbach's

alpha coefficients were 0.76 for the cognitive reappraisal sub-scale and 0.72 for the Suppression.³¹

Results

A total of 40 individuals participated in this research, whose demographic characteristics are presented in Table 2. The results of the analysis showed that there were no significant difference between the two groups.

Table 2. Demographic characteristics of the subjects

Parameters	Experimental group	Control group	P-value
Grade			0.24
Diploma	8 (0.40)	9 (0.45)	
Bachelor	9 (0.45)	7 (0.35)	
MSc	2 (0.10)	3 (0.15)	
PhD	1 (0.5)	1 (0.5)	
Marital status			0.52
Single	4 (0.20)	3 (0.15)	
Married	16 (0.80)	17 (0.85)	
Age, y	45.50±.96	46.06±1.09	0.36
Gender			0.41
Male	12 (60.00)	13 (65.00)	
Female	8 (40.00)	7 (35.00)	
Occupational status			0.27
Employed	16 (85.00)	15 (75.00)	
Unemployed	4 (15.00)	5 (25.00)	

Before conducting the analysis of variance with repeated measures, and in order to comply with the assumptions, the results of the M-box, Mauchly's sphericity, and Levin tests were investigated. Since the M-box test was not significant for depression (M-box= 17.25, P= 0.13), anxiety (M-box= 14.78, P= 0.23), stress (M-box= 16.74, P= 0.14), self-compassion (M-box= 12.53, P= 0.36), reappraisal (M-box= 12.34, P= 0.37), and suppression (M-box= 14.66, P= 0.23), the homogeneity of the variance-covariance matrices has been met. Also, the non-significance results for depression (levene= 1.005, P= 0.32), anxiety (levene= 0.17, P= 0.68), stress (levene= 0.07, P= 0.78), self-compassion (levene= 0.06, P= 0.79), reappraisal (levene= 0.25, P= 0.61), and suppression (levene= 1.24, P= 0.27), in Levene's test shows that the equality of variances between groups has been met and the error variance of the dependent variables were

equal in all groups. Finally, the examination of the results of Mauchly's sphericity test showed that this test was not significant for none of the variables, and therefore, the assumption of equality of variances within the subjects was accepted.

Table 3. Presents the means and standard deviations of the dependent variables in the four phases including pre-test, post-test, two-month follow-up, and four-month follow-up.

Table 3. Mean and standard deviation of the variables

Variable	Group	Pre-test	Post-test	Two-month follow-up	six-month follow-up
Depression	experimental	12.94 (1.79)	9.11(1.32)	9.27 (1.41)	10.33 (2.50)
	Control	13.55(1.29)	13.22 (1.83)	13.55 (1.58)	13.77 (1.59)
Anxiety	experimental	15.05(1.16)	11.44 (1.61)	11.66 (1.14)	12.33 (1.49)
	Control	14.16(1.24)	15.83 (0.98)	15.50 (1.29)	14.94 (1.34)
Stress	experimental	19.27(1.80)	15.72(1.63)	16.38 (1.53)	16.94 (1.35)
	Control	20.88(2.02)	21.83 (2.74)	22.05 (2.41)	22.66 (2.47)
Self-compassion	experimental	81.72(0.79)	89.38(3.56)	89.07 (2.57)	88.07 (2.85)
	Control	79.05 (0.93)	83.33 (1.84)	82.83 (2.22)	82.33 (2.58)
Suppression	experimental	22.16 (1.33)	16.27 (1.22)	17.00 (1.18)	17.88 (1.45)
	Control	20.55(1.75)	21.22 (0.73)	21.50 (1.61)	22.16 (1.79)
Reappraisal	experimental	20.05(1.16)	24.88 (1.23)	23.66 (1.53)	22.77 (1.43)
	Control	18.88(1.83)	20.83 (1.79)	20.33 (1.90)	19.77 (2.05)

Table. 4 indicates that ACT significantly changed the variables of depression, stress, anxiety, self-compassion and emotion regulation. These changes were significant and persistent over time. As the table shows, the highest effect size was for stress, suppression, self-compassion, anxiety, reappraisal, and depression, respectively.

Table 4. Mixed ANOVA with repeated measures

Variable	Source	SS	Df	MS	F	Sig.	Eta squared
Depression	Interaction (Time*Group)	30.42	1	30.42	10.679	0.01	0.23
	within-subjects (Time)	85.944	3	28.648	15.45	0.01	0.31
	Between subjects (Group)	324.00	1	324.00	53.89	0.01	0.61
Anxiety	Interaction (Time*Group)	45.00	1	45.00	36.08	0.01	0.51
	within-subjects (Time)	27.167	2	9.056	8.56	0.01	0.20
	Between subjects (Group)	225.00	1	225.00	62.591	0.01	0.64
Stress	Interaction (Time*Group)	63.606	1	63.606	21.60	0.01	0.50
	within-subjects (Time)	37.056	2	12.352	7.68	0.01	0.18
	Between subjects (Group)	821.778	1	821.778	68.212	0.01	0.66

Reappraisal	Interaction (Time*Group)	11.001	1	11.001	4.42	0.04	0.11
	within-subjects (Time)	224.410	2	74.803	50.238	0.01	0.59
	Between subjects (Group)	303.495	1	303.340	55.495	0.01	0.62
Suppression	Interaction (Time*Group)	133.472	1	133.472	45.16	0.01	0.57
	within-subjects (Time)	139.861	2	46.620	30.515	0.01	0.47
	Between subjects (Group)	330.028	1	330.028	67.348	0.01	0.66
Self-compassion	Interaction (Time*Group)	39.200	1	39.200	10.87	0.01	0.24
	within-subjects (Time)	825.500	1	275.167	111.23	0.01	0.76
	Between subjects (Group)	961.00	1	961.00	65.757	0.01	0.65

In table 5. Pairwise comparison has been reported. As the table shows there was a significant difference between control and experimental group.

Table 5. Pairwise comparisons

Variable			Mean Difference	P-value
Depression	Experimental group	Control group	-2.95	0.01
	Experimental group	Control group	-2.50	0.01
Anxiety	Experimental group	Control group	-2.50	0.01
	Experimental group	Control group	-4.77	0.01
Stress	Experimental group	Control group	-4.77	0.01
	Experimental group	Control group	2.90	0.01
Reappraisal	Experimental group	Control group	2.90	0.01
	Experimental group	Control group	-3.028	0.01
Suppression	Experimental group	Control group	-3.028	0.01
	Experimental group	Control group	5.16	0.01
Self-compassion	Experimental group	Control group	5.16	0.01
	Experimental group	Control group		

Discussion

The present study was conducted with the aim of investigating the effectiveness of acceptance and commitment therapy in reducing psychopathology, emotion regulation, and self-compassion in cardiovascular patients. These results indicated that therapeutic period of acceptance and commitment therapy can have long-term effects. The findings of this study are consistent with research on and meta-analyses of ACT in the field of treating mental health problems in patients with chronic pain and social anxiety.^{23, 32-34}

Early findings of this study showed that ACT is effective in reducing psychological problems such as depression, anxiety, and stress in cardiovascular patients. This finding is consistent with the results of a systematic and meta-analysis study by Lee et al. (2021), which reported that ACT has moderate to high efficacy in reducing anxiety, depression, and stress as well as increasing hope in patients with cancer.³⁵ Regarding ACT, acceptance-based interventions require clients to focus on thinking about meaningful living rather than on changing or alleviating symptoms. ACT techniques have been used to help people with cardiovascular disease to avoid struggling with uncontrollable situations such as high blood sugar, amputation, and thoughts and feelings related to the disease. These techniques help people achieve a worthwhile life by embracing their inner experiences. ACT helped these patients understand what they were experiencing and not what they were feeling, thinking or needing. This perspective allows people to act more flexibly when exposed to stimuli that trigger stress responses. Such psychological flexibility enables individuals to practice value-based self-compassion.^{22, 36}

With regard to emotion regulation in these patients, the results indicated that acceptance and commitment therapy improved the patient's emotion regulation style. **This result is in line with past studies in the ACT treatment field that have demonstrated that this therapy enhances emotion regulating abilities.^{34, 37} Reappraisal often improves positive affect compared to a control condition without emotion regulation, which is consistent with data from correlational and experimental studies, suggesting that framing bad experiences in a more positive way may help people cope with them more appropriately and keep a cheerful attitude even when they experience too much stress.³** In this context, recent research indicates that acceptance is one of the key components of ACT and can be an

effective emotion regulation strategy. Diffusion and acceptance during ACT can be effective in improving disease-related emotional regulation styles.³ As a result, patients are helped and encouraged to accept their thoughts and feelings and to work on changing their thoughts and behaviors diligently. In this way, patients can perceive their intrusive thoughts as just thoughts and realize that their previous style of emotion regulation was ineffective. As a result, rather than reacting to thoughts, they learn to take steps toward what is important to them and what is consistent with their values.³⁸ Thus, as Ruiz and colleagues (2018) suggest, Acceptance and Commitment Therapy (ACT) training can be used as an effective psychological intervention to improve emotion regulation.³⁹

The third finding of this study showed that this therapy could improve self-compassion in cardiovascular patients. This finding is consistent with studies that have shown that the therapeutic elements of this therapy and compassion-focused therapy are similar.²⁵ Although self-compassion is not a stated objective of ACT, it does seem to be one of the pathways of change in ACT for cardiovascular disease and chronic pain. Theoretically, ACT and self-compassion are related, and studies demonstrate that ACT fosters self-compassion. Compassion overlaps with ACT-promoted psychological processes and is one of the therapy-changing mechanisms underlying ACT for chronic pain conditions.⁴⁰ In fact, self-compassion can be an important resource to help deal with the unique challenges of life caused by chronic physical illness.^{40, 41} There is evidence that ACT is effective in increasing self-compassion. Several factors associated with this therapy may promote self-compassion, including unbiased or non-judgmental observation of one's own critical thinking, self-compassion through strengthening one's perspective, and self-acceptance.⁴⁰ Therefore, in this therapy, self-compassion can be a key mediator through which the changes affect the intended outcome. This means that individuals who learn ACT may improve their well-being by adopting a compassionate attitude towards difficult experiences such as a serious illness, instead of trying to change them.⁴²

This study had limitations that should be considered. The sample size was small. Due to the spread of the Coronavirus, the screening was conducted online, and face-to-face interventions were done after the Coronavirus epidemic subsided. Another limitation was the use of self-reporting tools. These tools have inevitable problems (evaluation error, not

answering truthfully, etc.). Therefore, it is recommended that future studies be conducted using larger sample sizes and tools such as interviews.

Conclusion

According to the findings of our study, patients who received treatment based on acceptance and commitment therapy experienced reduction in their psychological difficulties, and their capacity for self-compassion and emotion regulation also increased. As a result, implementing this treatment and imparting its principles to patients can help them recover.

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