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A comparative study on the effectiveness of acceptance and commitment therapy (ACT) and schema therapy (ST) on problem solving styles in people with heart diseases

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***Abstract*---**The aim of present study was to compare the effects of acceptance and commitment therapy and schema therapy on problem solving styles in heart patients. The research method was quasi-experimental with a pre-test-post-test and two experimental groups and one unbalanced control group. The statistical population of the study included all patients with heart diseases referred to the Nuclear Medicine Center in 2017 in Tehran for diagnostic examinations and cardiac scans. The study sample consisted of 45 people (15 people in the acceptance and commitment therapy group, 15 people in the schema therapy group and 15 people in the control group). They were selected by a non-random convenience sampling method and were randomly allocated to three groups. To collect research data, Cassidy and Long (1996) standard problem solving styles questionnaire (Aga Yousefi and Sharif, 2011) was used. After performing the pre-test for all three groups, the experimental groups received acceptance and commitment treatment protocol (Wells and Sorrell, 2007; Mesgarian, 2012) for 12 sessions (1 session per week of 120 minutes) and the schema therapy protocol (Young et al., 2012; Hamidpour and Andoz, 2012) for 10 sessions (1 session per week of 120 minutes). After the

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intervention, post-test was performed in all three groups. To analyze the collected data, descriptive statistics and multivariate analysis of covariance were used. The results showed that therapeutic interventions were effective in improving the problem-solving styles of heart patients. However, the effectiveness of acceptance and commitment therapy in patients with heart diseases was greater than schematic therapy training. It is recommended that the training of these psychological interventions be considered as an effective intervention to improve the problem-solving styles of heart patients.

***Keywords*---**heart patients, acceptance, commitment therapy, problem solving styles, schema therapy.

Introduction

Heart diseases, including myocardial infarction, are one of the most common diagnoses in hospitalized patients (*Elmasry, D. M., et. al., 2019; Permadi, A. W., et. al., 2020; Alanazi, A., et. al., 2020*). The mortality rate in these patients is about 30%. Studies in this regard show an increasing number of these patients in the world (Fukuda et al., 2018). The disease accounts for about 35% of deaths in developing countries and about 30% of all deaths around the world (Boden, 2002; Shidfar, Hosseini & Shojaei Zadeh, 2006). Scientific evidence suggests that the risk of heart disease can be reduced by modifying risk factors such as poor diet, hypertension, smoking, and lack of exercise (Alm-Roijer, Stagmo, Udén & Erhardt, 2004; Gregg et al., 2005), and control of these risk factors reduces mortality caused by this disease by 50% (Imani Pour, 2009). In most patients with heart disease, mental illnesses are seen as a disease with complications of heart disease. Depression, anxiety, delirium and cognitive disorders are common problems in these patients (Saed et al., 2019). Based on a study conducted by Stuart et al. (2000), heart attacks cause mental changes, changes in the quality of the patient and spouse sexual relation, job changes and social relationships. The effects of heart attack on the family, especially the patient's spouse, indicate that patients' families suffer high levels of anxiety and stress (Mahdavi et al., 2015). The financial problems caused by the frequent hospitalization of these patients in Iran have imposed huge costs on Iran's health system and have drastically reduced the quality of life of patients. Since this disease affects the lifestyle of patients and their families, it is necessary to change their lifestyle (Abdollahian, Mokhaber and Kafaei Razavi, 2006).

One of the psychological variables considered by researchers to improve the lifestyle of these patients is problem-solving styles. Based on Solberg and Meter (2001), problem solving is a high level of cognitive activity that occurs in situations for which the individual does not have a present or accessible response (Rath, Hardil, and Litke, 2011). Nezu, Nezu & D'Zurilla (2015) view problem solving as the process through which individuals try to define the transient or time-consuming problems they face with them daily and to effectively cope with them by producing or developing solutions. Therefore, problem solving is a conscious, logical, effortful, and purposeful process designed to improve the status in complex situations, change or reduce negative emotions, or both

(Walkling, 2007). A "problem" or problematic situation refers to inconsistency and difference between the helpful responses available to the person and the request for adaptation by the environment. Also, it a task or situation in life present that requires an effective response to achieve a goal or resolve a conflict, and the person does not currently have a current response available (Lamana 2012).

Effective solving of big and small problems of life at an individual level is effective on well-being and reducing stress (Siu and Shek, 2010). Six problem-solving styles are creativity, self-confidence, approach, helplessness, inhibition or control and avoidance, the first three styles are called efficient or functional problem-solving styles and the other three styles are called inefficient or dysfunctional problem-solving styles (Grown et al., 2018). Many of heart patients are not ready to face the problems of life and daily challenges and cannot effectively solve the problems (Ahadi, Delavar and Rostami,2018). Studies have shown that heart patients use inefficient problem-solving methods such as helplessness, control and avoidance (Iraqi, Keivani and Mohammadi,2019). Acceptance and Commitment Therapy (ACT) is one type of intervention that can help heart patients in this regard.

Integrating acceptance and mindfulness interventions into commitment and change strategies, this treatment helps clients achieve a vibrant, purposeful, and meaningful life. The goal of ACT is not to change the shape or frequency of annoying thoughts or feelings, but its main goal is to strengthen psychological resilience. Psychological resilience helps people to have a more enjoyable life even in the face of unpleasant thoughts, emotions, and feelings (Flexman, Black & Band, 1970; translated by Mirzaei and Nonahal, 2014). Acceptance and commitment therapy allows a person to find his or her life rich and meaningful, which in turn promotes daily functioning, physical and psychological health. The results of a study conducted by Mahdavi (2017) showed that acceptance and commitment therapy (ACT) improved perceived stress levels, depression symptoms and marital satisfaction of the treated subjects. A study conducted by Hayes et al. (2013) showed that acceptance and commitment therapy increased flexibility and problem-solving ability in heart patients. Schema therapy can also be used as an intervention to improve problem-solving styles in patients with heart diseases. In the 1960s and 1970s, Beck (1967 and 1976) emphasized the fundamental role of cognitive schemas in emotional disorders (Watzler et al., 2014).

Despite the key role of cognitive schemas in early therapists' cognitive writings, the cognitive techniques and therapeutic approaches that emerged showed a greater tendency to examine negative thoughts, dysfunctional beliefs, and attributional styles. In this regard, the developed treatment protocols tended to short-term treatments and they paid less attention to cognitive schemas (Gojani et al., 2017). Schema therapy is an integrated and new therapy developed by Young (2003, Hamidpour, 2012). It is mainly based on the expansion of the concepts and methods of traditional cognitive-behavioral therapy. Although this model considers cognitive and behavioral components necessary for treatment, it also emphasizes emotional change, experimental techniques, and relationship therapy. It seems to have a positive effect on problem solving styles, negative emotions and patient resilience (Wendigik et al., 2019). Schema therapy has been

effective in changing early maladaptive schemas, avoiding dysfunctional problem-solving styles, and reducing anxiety sensitivity in students (Young, Klessco, & Wishar, 2003; Hamidpour, 2012). Given what was stated, paying attention to the psychological damage caused by heart diseases and identifying treatment methods to reduce these consequences are crucial. In addition, psychotherapy and psychological interventions have a higher priority in patients with symptoms of disorders in psychological variables. One of these interventions is acceptance and commitment therapy and schema therapy. Based on the research literature, it seems to affect the mental disorders of patients with heart diseases. Therefore, the aim of present study was to compare the effects of acceptance and commitment therapy and schema therapy on problem-solving styles in heart patients.

Methodology

Method

The research method was quasi-experimental with a pre-test-post-test and two experimental groups and one unbalanced control group design. In this project, which consisted of three groups (acceptance and commitment therapy group, schema therapy group and control group), the pre-test form was performed for three groups and then the post-test form was performed after the intervention in this study. The statistical population of this study included all 3548 heart patients referred to the Nuclear Medicine Center in 2017 in Tehran. To select a sample, 45 patients were selected by a non-random convenience sampling method and then according to the objectives of the research and having consent to participate in the study, they were randomly assigned to three groups of 15 people (two experimental groups and one control group).

Instruments

Problem Solving Styles Questionnaire: This 24-item scale was designed by Cassidy and Long (1996; cited by Aga Yousefi and Sharif, 2011) and has six factors including helplessness, creativity, self-confidence, inhibition or control, avoidance and approach style to problem solving. The styles of helplessness, inhibition or control, and avoidance are subscales of dysfunctional problem solving style and the styles of creativity and self-confidence, and approach to problem solving are subscales of functional problem solving style (Edalati Shateri et al., 2009). This questionnaire can well show the vulnerability of the individuals to stress and separate the healthy population from unhealthy population (Cassidy and Long, 1996; quoted by Aga Yousefi and Sharif, 2011). The maximum score for problem solving is 24, and the minimum score is zero and the mean score is 12. Questions 1 to 4 indicate the problem-solving helplessness factor, questions 5 to 8 indicate inhibition in problem-solving, questions 9 to 12 indicate creativity in problem solving, questions 13 to 16 indicate self-confidence in problem-solving, questions 17 to 20 indicate avoidance in problem solving, and questions 21 to 24 indicate approach to problem solving (Babapour et al., 2003). Cassidy and Long (1996; quoted by Agha Yousefi and Sharif, 2011) reported the internal compatibility of these factors as 0.86, 0.60, 0.66, 0.66, 0.51 and 0.53, respectively. Also, the alpha coefficient in Babapour Kheireddin study (2003) was

reported to be 0.77. Mohammadi et al. (2015) obtained Cronbach's alpha for the problem solving style questionnaire at 0.73, which indicates the reliability of this questionnaire. In the present study, the reliability coefficient of the problem solving styles questionnaire was obtained at 0.76 by calculating Cronbach's alpha, which is statistically confirmed.

Procedure

After selecting a sample from the target population, the subjects were randomly divided into three groups (two experimental groups and one control group), then a pre-test was performed in all three groups. Then, the Experimental Group 1 received acceptance and commitment therapy in 12 sessions of 120 minutes, 1 session per week (Young et al.,2012; Hamidpour and Anduz, 2012) and the Experimental Group 2 received schema therapy in 10 sessions of 120 minutes, 1 per week (Young Et al., 2012; Hamidpour and Anduz, 2012). The subjects in the control group did not receive any intervention during this period. After the training sessions, post-test was taken from all three groups (two experimental groups and one control group), so that the post-test results were compared in two experimental groups and one control group.

Table 1
A Summary of Schema Therapy Training Sessions Heart Patients

Session 1	Introducing members, motivating for treatment, explaining the objective of schema therapy and formulating clients' problems in the form of schema-therapy approach
Session 2	Definition of schema therapy, early maladaptive, characteristics of early maladaptive schemas, evolutionary roots of schemas
Session 3	Introduction to schema domains, brief description of the biology of early maladaptive schemas, explanation of schematic functions
Session 4	Teaching strategies for expressing suppressed emotions
Session 5	Teaching healthy communication and imaginative conversation
Session 6	Teaching mental imaging for problematic situations and coping with the most problematic ones
Session 7	Teaching relationship therapy, relationships with important people in life and role playing
Session 8	Teaching the practice of healthy behaviors by playing roles and doing tasks related to new behavioral patterns
Session 9	Identifying specific behaviors as possible targets for change, prioritizing behaviors for breaking the patters, and preparing for breaking behavior pattern
Session 10	Reviewing the previous sessions briefly and practicing the learned strategies

Table (2): Summary of Acceptance and Commitment Therapy Training Sessions for Heart

Patients	
Session 1	Introduce members, explaining creative helplessness, discovering failed goals and efforts, gaining insight into ineffective control strategies
Session 2	Teaching the relationship between mood and behavior
Session 3	Teaching the relationship between mood and behavior
Session 4	Teaching strategies for fault and verbal change
Session 5	Assessing the therapist's ability to fault the pathogenic thoughts and feelings and show other practical ways to cultivate the fault
Session 6	Self-conceptualization training and introduction of self-conceptualized distinction in front of the observer
Session 7	Demonstrating the importance of values and creating a desire for behavioral activation
Session 8	Identifying non-compliance life areas with individual values and applying behavioral activation and personal goals
Session 9	Discovering the relationship between goals, activities and strengthening the factors of tendency and fault to achieve behavioral goals
Session 10	Emphasis on client issues, committing clients to specific activities and larger values
Session 11	Addressing the client's concerns about termination of treatment and preparing for possible failure after completion of therapy
Session 12	Reflecting on the client's progress and ongoing goals, reviewing previous sessions briefly and practicing the learned strategies

Results

Table 3
Descriptive statistics of problem-solving styles in heart patients of all three groups

Group	Test	Mean	SD
ST	Pretest Helplessness	3.27	0.70
	Posttest Helplessness	2.40	1.55
	Pretest Inhibition	1.53	1.50
	Posttest Inhibition	2.67	0.98
	Pretest Creativity	1.36	1.56
	Posttest Creativity	2.67	1.54
	Pretest Self-Confidence	0.80	1.66
	Posttest Self-Confidence	2.07	1.33
	Pretest Avoidance	2.73	1.87
	Posttest Avoidance	1.53	1.85
	Pretest Approach	1.67	1.99
	Posttest Approach	3.40	0.91
ACT	Pretest Helplessness	0.90	3.33
	Posttest Helplessness	1.07	1.49

Group	Test	Mean	SD
	Pretest Inhibition	1.47	1.25
	Posttest Inhibition	3.60	0.51
	Pretest Creativity	1.73	1.33
	Posttest Creativity	3.80	0.41
	Pretest Self-Confidence	1.87	2.07
	Posttest Self-Confidence	2.87	1.55
	Pretest Avoidance	2.87	1.81
	Posttest Avoidance	0.20	0.77
	Pretest Approach	1.73	1.94
	Posttest Approach	3.73	2.03
Control	Pretest Helplessness	3.80	0.41
	Posttest Helplessness	3.7	0.41
	Pretest Inhibition	1.40	1.35
	Posttest Inhibition	1.47	1.46
	Pretest Creativity	1.67	1.18
	Posttest Creativity	1.20	0.86
	Pretest Self-Confidence	1.07	1.83
	Posttest Self-Confidence	0.93	1.62
	Pretest Avoidance	2.73	1.87
	Posttest Avoidance	3.20	1.66
	Pretest Approach	2.40	2.03
	Posttest Approach	2.13	1.36

According to the results of Table (3), there was no significant difference between the mean scores of problem solving styles in all three groups in the pre-test stage. However, in the posttest stage, the mean scores of two experimental groups that received psychological interventions were satisfactory compared to the control group. Therefore, participating in schema therapy sessions and acceptance and commitment therapy sessions improved problem-solving styles in both experimental groups, while the scores of the control group in the posttest stage did not change.

Table 4
Examining of Box's M test of problem solving styles in heart patients

Box's M	17.047
Statistic F	1.402
Df1	42
Df2	5236.942
P value	0.128

The results of Table (4) show that the observed covariance matrix of dependent variables is the same among the groups because the significance level is greater than 0.05.

Table 5
Homogeneity test of variance of problem solving styles in heart patients

Variable	Test	Leven statistic	Df1	Df2	P-Value
Helplessness	Pretest	0.941	2	42	0.077
	Posttest	3.507	2	42	0.080
Inhibition	Pretest	0.491	2	42	0.615
	Posttest	1.008	2	42	0.258
Creativity	Pretest	0.533	2	42	0.591
	Posttest	0.835	2	42	0.239
Self-confidence	Pretest	2.320	2	42	0.086
	Posttest	0.056	2	42	0.945
Avoidance	Pretest	0.234	2	42	0.792
	Posttest	0.886	2	42	0.201
Approach	Pretest	0.200	2	42	0.820
	Posttest	1.051	2	42	0.235

According to the results of Tables (5), the significance level of the scores of problem solving style (helplessness, inhibition, creativity, self-confidence, avoidance and approach) in pretest and posttest stages is higher than the error level of 0.05 (P> 0.05). Therefore, it can be concluded that the variance of pretest and posttest scores of problem-solving styles (helplessness, inhibition, creativity, self-confidence, avoidance and approach) are homogeneous.

Table 6
Results of multivariate analysis of covariance to examine the inter-group difference of means of variables

Source of variations	Source of variation	value	F	df	df Error	P-Value
Main effect of groups	Pillai's trace	0.980	5.123	12	64	0.001*
	Wilks' Lambda test	0.079	13.273	12	62	0.001*
	Hotelling's trace	10.944	27.485	12	60	0.001*
	Roy's largest root	10.926	58.273	6	32	0.001*

$*P \leq 0/05$

According to the results of Table (6), Pillai's trace (F = 5.123), Wilks' Lambda test (F = 13.273), Hotelling's trace (F = 27.548) and Roy's largest root (F = 58.272) are significant at the level of P <0.05. These results suggest that subjects differ from each other in at least one problem-solving style (helplessness, inhibition, creativity, self-confidence, avoidance, and approach). The results of the above table show that there is a significant difference among the groups in the area of implementation of therapeutic interventions on problem solving styles (helplessness, inhibition, creativity, self-confidence, avoidance and approach).

Table 7
Results of multivariate analysis of covariance to investigate the inter-group difference of means of problem-solving styles in heart patients

Source of variation	Variable	Squared sum	df	F	P-Value	Eta
Group	helplessness	52.991	2	18.464	0.001*	0.506
	Inhibition	26.704	2	12.780	0.001*	0.415
	Creativity	45.413	2	25.097	0.001*	0.582
	Self-confidence	16.419	2	5.046	0.012*	0.219
	Avoidance	63.693	2	15.463	0.001*	0.462
	Approach	20.077	2	9.664	0.001*	0.349
Error	helplessness	51.659	36			
	Inhibition	37.611	36			
	Creativity	32.571	36			
	Self-confidence	58.568	36			
	Avoidance	74.145	36			
	Approach	37.394	36			

$* P \leq 0/05$

The results of multivariate analysis of covariance (7) showed that by controlling the pretest, there was a significant difference between the mean scores of the experimental and control groups in terms of helplessness score (P = 0.001 and $F_{3.33}$ = 18.464), inhibition (P = 0.001 and F = 12.780), creativity (P = 0.001 and F = 25.097), self-confidence (P = 0.012 and F = 5.466), avoidance (P = 0.001 and F=15.463), and approach (P = 0.001 and F = 9.664) in the post-test stage. Therefore, participation in training sessions of schema therapy and acceptance and commitment therapy has an impact on all components of problem-solving styles of heart patient and it improved problem solving in heart patients in posttest compared to pretest.

Table 8
Results of LSD test to compare the effectiveness of schema therapy and acceptance and commitment therapy on problem-solving styles in heart patients

Variable posttest	Group (J)	Group (I)	MD (I-J)	P-Value	Lower bound	Upper bound
Helplessness	ST	ACT	1.33	0.006*	0.40	2.26
	ST	Control	-1.40	0.004*	-2.33	-0.47
	ACT	Control	-2.73	0.001*	-3.66	-1.80
Inhibition	ST	ACT	-0.93	0.020*	-1.71	-0.16
	ST	Control	1.20	0.003*	0.42	1.98
	ACT	Control	2.13	0.001*	1.36	2.91
Creativity	ST	ACT	-1.13	0.005*	-1.91	-0.36
	ST	Control	1.47	0.001*	0.69	2.24
	ACT	Control	2.60	0.001*	1.83	3.37
	ST	ACT	-0.80	0.154*	-1.91	0.31

Variable posttest	Group (J)	Group (I)	MD (I-J)	P-Value	Lower bound	Upper bound
Self-confidence	ST	Control	1.13	0.046*	0.02	2.25
	ACT	Control	1.93	0.001*	0.82	3.05
Avoidance	ST	ACT	1.33	0.019*	0.23	2.44
	ST	Control	-1.66	0.004*	-2.77	-0.56
	ACT	Control	-3.00	0.001*	-4.11	-1.89
Approach	ST	ACT	-0.33	0.418*	-1.16	0.49
	ST	Control	1.27	0.003*	0.44	2.09
	ACT	Control	1.60	0.001*	0.79	2.42

According to the results of Table (8), there is a significant difference between the effects of schema therapy and acceptance and commitment therapy on problem-solving styles including helplessness, inhibition, creativity and avoidance of heart patients and the effectiveness of acceptance and commitment therapy on problem solving (helplessness, inhibition, creativity and avoidance) of heart patients was more than schema therapy. However, there is no significant difference between the effectiveness of schema therapy and acceptance and commitment therapy on problem-solving styles including self-confidence and approach in heart patients.

Discussion and Conclusion

The aim of present study was to compare the effects of acceptance and commitment therapy and schema therapy on problem solving styles in heart patients. Results suggest that participation in schema therapy, and acceptance and commitment therapy sessions has been effective on heart patients' problem-solving, so that they reduced helplessness and avoidance styles, and increased inhibition, creativity, self-confidence, and approach styles in heart patients in posttest compared to pretest. Also, a significant difference was found between the effects of schema therapy and acceptance and commitment therapy on problem-solving styles (helplessness, inhibition, creativity and avoidance) in heart patients and the effectiveness of acceptance and commitment therapy in heart patients was more than schema therapy training. However, there was no significant difference between the effects of schema therapy and acceptance and commitment therapy on self-confidence and approach problem solving styles in heart patients.
The results of this study are consistent with results of the studies conducted by Shannon (2017), Lee and Corckit (2014), Young et al. (2007), Andrada et al. (2014), Isaacson, Duruval and Trifinger (2010), Schreiber, Grant & Oldag (2012), Muan (2008), Amani et al., (2018), Mohammadi et al., (2018), Mofid et al., (2017). In explaining this result, it can be stated that heart diseases are the most important cause of death in developed countries and different risk factors have been proposed for these diseases. Among them, psychological stressors play an important role in creating or exacerbating of these disorders. Solving the problems of daily life at the individual and social levels leads to psychological well-being, reduced medical problems, increased social adjustment and effective coping with illness (Siu, Shek and Daniel, 2005; Nezu et al., 2012; Baker 2003; Allen et al., 2002).

Implementation of psychological interventions on heart patients caused them to form a positive orientation towards problem solving in their minds and the

tendency to struggle and cope with the problem and believe that the problem can be solved. It also strengthened self-efficacy in solving the problem and commitment to problem solving instead of abandoning the problem and the belief that successful problem solving requires time, effort and perseverance. They also learned to solve their problems without wasting time, instead of waiting for problems to be solved on their own. With an emphasis on changing problem-solving styles and maladaptive schemas formed at an early age and explaining how they affect processing and coping with life events, providing appropriate coping techniques and emphasizing on replacing the more adaptive and effective problem-solving solutions with inefficient styles and strategies, schema therapy provided an opportunity to improve subjects' living conditions. Also, acceptance and commitment therapy provided an opportunity for subjects to reconsider their exaggerated perceptions of being weak and need for others, and to use metaphors to be more aware of their basic needs by focusing on the development of flexibility.

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