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Comparison of the effectiveness of Cognitive-Behavioral Therapy and Acceptance and Commitment Therapy on Anxiety, Perceived Stress, and Pain Coping Strategies in Patients with Cancer

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Quantitative Study

Abstract

Background: Cancer is one of the main and basic dilemmas of health and treatment all around the world. The purpose of this study was the comparison of the effectiveness of cognitive-behavioral therapy (CBT) and acceptance and commitment therapy (ACT) on anxiety, perceived stress, and pain coping strategies in patients with cancer.

Methods: The methodology of the current study was of practical, semi-experimental, and pretest-posttest design with a control group. The statistical population of this study included all patients with leukemia who were hospitalized between April and June 2019 in Sayed Al Shohada Hospital, Isfahan, Iran, and their disease was confirmed. The study sample included 45 people who were selected from the mentioned population using convenience sampling and were assigned to the 3 groups of ACT (n = 15), CBT (n = 15), and control group (n =15) through simple randomization method. Data were collected using the Perceived Stress Scale (PSS) (Cohen et al., 1994), Beck Anxiety Inventory (BAI) (Beck et al., 1991), and Coping Strategy Questionnaire (CSQ) (Rosenstiel and Keefe, 1985). Data analysis was conducted using analysis of covariance (ANCOVA) in SPSS software.

Results: The results showed that CBT and ACT were effective on decreasing anxiety and perceived stress, and increasing pain coping strategies in patients with cancer. ACT was more effective than CBT on anxiety, perceived stress, and pain coping strategies.

Conclusion: It can be concluded that CBT and ACT are effective on anxiety, perceived stress, and pain coping strategies and can be used for patients with cancer.

Keywords: Anxiety disorders; Cognitive-behavioral therapy; Pain

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Introduction

Cancer is one of the main and basic dilemmas of health and treatment all around the world, and it is considered the third cause of death and the second chronic non-communicable disease. Cancer includes a group of diseases characterized by uncontrollable and unusual expansion of cells (Baitar et al., 2018). Unfortunately, statistics of the individuals affected by this disease is increasing in all age groups, and has a significant effect on different dimensions of the patients' life and even on their caregivers and surroundings (Batinic, Nesvanulica, & Stankovic, 2017). Patients with cancer suffer from physical (such as fatigue, shortness of breath, neurological disease, poor bowel and urine control, bone fractures, pain, sleep, and endocrine problems, and increased risk of chronic diseases such as heart attack and osteoporosis) and psychological (such as depression, anxiety, cognitive disorder, negative thoughts, fear of disease recurrence and death, loneliness, sexual problems, and body image) complications (Baudry, Lelorain, Mahieuxe, & Christophe, 2018).

One of the most common cancers is leukemia. This disease is categorized into myeloid, and lymphoma based on cell origin and chronic and acute disease progression. It is categorized into the 4 groups of acute lymphoblastic, acute myeloblastic, chronic lymphoblastic, and chronic myeloblastic leukemia (Boyle, Stanton, Ganz, Crespi, & Bower, 2017). Leukemia constitutes 8% of the total cancers of the human population, and it is the fifth most common cancer group in the world. Cancers of the hematopoietic tissue such as bone marrow and lymphatic system are created with the help of white blood cells and lymph. White blood cells grow and divide when the body needs in a regular and controlled way, but blood cancer disturbs this process and makes blood cell development uncontrollable. In acute leukemia, bone marrow generates many immature white cells. Meanwhile, the natural production of the blood white cells is interrupted, which in turn destroys the ability of the body to confront diseases (Brunault et al., 2016).

Although surgery, chemotherapy, radiotherapy, and hormone therapy have increased the survival rate of these people, these common cancer treatments, in turn, lead to short-term and long-term complications in these patients so that patients with breast cancer suffer from a broad range of somatic, psychological, and social signs and symptoms during the diagnosis and treatment process (Chambers et al., 2018). Researchers believe that coping strategies affect individual perception of pain severity, and the ability to control and tolerate pain and continue everyday activities (Cuijpers, Cristea, Karyotaki, Reijnders, & Huibers, 2016). Patients with chronic pain apply various coping strategies and some are adaptive and others are maladaptive. Studies on patients with chronic pain have indicated that while using active coping strategies (such as trying to perform one's duties despite having pain, lack of attention to pain, and use of muscle relaxation) have adaptive results, using inactive coping strategies (dependence and reliance on others to gain contribution for the controlling of the pain and restriction of activity) is accompanied with severe depression, more pain, and physical disability (Dezutter, Dewitte, Thauvoye, & Vanhooren, 2017).

One of the major issues which patients with cancer face is the stress and anxiety resulted from confrontation and adjustment with the patient. Different researchers have found that the perceived stress number of patients with cancer as an explanatory mechanism explains the increasing decline in multiple quality of life (QOL) indicators (Emmert et al., 2017). Based on the interactive-cognitive model of

stress, the person's assessment of his/her communication with the environment has a determinate role in creating stress. If a person conceives his/her environment as extremely stressful and feels that he/she does not have the ability to confront dilemmas, his/her stress is increased, but if he/she knows that he/she can face stressful events, he/she will experience less stress. Moreover, those individuals who perceive their disease experience negatively, have a higher level of perceived stress (Sarid, Berger, & Segal-Engelchin, 2010).

There is much evidence that implies that there is a relationship between cancer and psychological pressure and those emotional factors which are an integral part of civilized societies. In addition to the effect of psychological issues on the formation of cancer, diagnosis and treatment of cancer are accompanied by stress and anxiety, which affects the health of the person negatively. The most common psychological disorders in these patients, according to studies, are adjustment disorder in addition to anxiety, accompanied by depression, and accompanied simultaneously by depression and anxiety (Borji, Nourmohammadi, Otaghi, Salimi, & Tarjoman, 2017). Anxiety entails insecurity or a threat that the person does not clearly understand its source, a threatening situation which is perceived under the effect of increased arousals, both internal and external, that the person is unable to control (Abad, Bakhtiari, Kashani, & Habibi, 2016).

Today, a set of treatment approaches, named third-wave behavioral therapy, are designed to solve chronic problems. One of these treatment approaches is acceptance and commitment therapy (ACT) that is a kind of clinical behavioral analysis applied in psychotherapy. ACT is a psychological intervention based on evidence that integrates acceptance and mindfulness in different ways with commitment and behavior change strategies. It can be said that one of the main objectives of ACT is to increase psychological flexibility. In other words, it helps the patients to expel avoidance and cognitive fusion (Majeed & Sudak, 2017). ACT is focused solely on a better life regardless of whether or not that better life is accompanied by a better feeling. ACT is based in the idea that the individual must give up fighting with himself and not restrict his life in order to be relieved from unpleasant inner experiences. Through clarification and explanation of values, the person tries to improve his/her life (Mozafari, Nejat, Tozandehjani, & Samari, 2020).

Psychological consequences of cancer and its treatment have been the subject of many research activities. In this regard, the cognitive-behavioral approach is among the approaches in psychology that have attracted the attention of researchers and psychologists during the last few decades. This approach can help patients minimize the negative psychological effects of their disease. There is strong empirical support for the use of cognitive-behavioral therapy (CBT), as a novel health care method, in common psychological problems in somatic diseases. Hitherto, cognitive-behavioral models and their treatment protocols have been reported as effective on a great number of psychological disorders and chronic medical diseases, including cancer, in clinical studies. Therefore, considering variables that can have a protective role against stress is important. Moreover, lack of sufficient scientific resources regarding protective variables for stress in patients with cancer is a gap that can be filled with the present study. The results of such a study will be a preliminary basis for further studies and designing specific interventions for the improvement of psychological problems in patients with cancer. Thus, the present study was conducted with the aim to compare the effectiveness of CBT and ACT on anxiety, perceived stress, and pain coping strategies in patients with leukemia.

Methods

This study was a semi-experimental research with a pretest-posttest design and control group. The statistical population of this study included all patients with leukemia who were hospitalized between April and June 2019 in Sayed Al Shohada Hospital, Isfahan, Iran, and their disease was confirmed. The study sample included 45 people who were selected from the mentioned population using convenience sampling and were assigned to the 3 groups of ACT (n = 15), cognitive-behavioral group training (CBGT) (n = 15), and control group (n = 15) through simple randomization method. The sample volume was determined based on an effect size of 0.25, alpha of 0.05, and power of 0.80 in 3 groups. The minimum number of samples to achieve the desired power was calculated as 15 people in each group, a total of 45 people. The study inclusion criteria included complete consent to participate in the research, a specialist's diagnosis of leukemia, a minimum education of guidance school, lack of any other chronic diseases and physical and mental disabilities, and a maximum age of 80 years. The exclusion criteria included having any kind of chronic condition such as diabetes and cardiovascular disease, having any kind of physical or mental disabilities, misusing any kind of drug, taking any kind of antidepressant drugs, having a history of psychological diseases, and absence from more than 3 treatment sessions. Ethical principles were taken into consideration in the present study. Before conducting the study, the objectives of the study were explained for participants. They were assured that participating in the study is completely optional and failure to participate does not have any effect on their health care process. They were also assured of the confidentiality of their information. Then, they were asked to sign a consent form, and all questionnaires were completed by the individuals.

Perceived Stress Scale: The Perceived Stress Scale (PSS) was developed in 1994 by Cohen et al. This scale includes 14 items of which 7 items are positive, and 7 items are negative. Every item is scored on a 5-point scale ranging from never (0) to most often (4). This scale includes items with reverse scoring. In other words, all 7 positive items are scaled contrariwise. Higher scores in this questionnaire represent higher perceived stress, and lower scores represent lower perceived stress. Cohen et al. reported Cronbach's alpha coefficients of 0.86 and 0.77 for the 7 positive items and 7 negative items, respectively, and 0.83 for the whole scale (Cohen et al., 1994). Maroufizadeh, Zareiyan, and Sigari, (2014) implemented this scale among female teachers and evaluated its validity using Cronbach's alpha as an internal consistency index of the PSS ($\alpha = 0.81$).

Beck Anxiety Inventory: The Beck Anxiety Inventory (BAI) was designed by Beck et al. in 1991 for measuring the amount of anxiety and includes 21 statements. Each statement reflects a symptom of anxiety; symptoms experienced by those who are clinically anxious or those who are at anxiety making position. To complete the BAI, the responder must read a list of the symptoms and grade the symptoms quantitatively. Changes ranged from 0 to 63. The higher scores are indicative of the severity of the anxiety. Beck et al. (1991) found the internal consistency of this scale to range between 0.73 and 0.92. Khesht Masjedi, Omar, and Masoleh (2015) reported that the test-retest reliability of the BAI ranges between 0.48 and 0.86 based on the kind of the statistical population.

Coping strategy questionnaire: The Coping Strategy Questionnaire (CSQ) was developed by Rosenstiel and Keefe in 1983. The CSQ measures 6 cognitive coping strategies

(distraction, catastrophizing, ignoring pain sensations, distancing from pain, coping self-statements, and praying) using 42 statements. Every coping strategy measures behavior (raising behavioral activity). Each of the 7 coping strategies is made up of 6 statements. The subject is asked to read each statement carefully and specify how much he/she uses each mentioned strategy when experiencing pain. Higher scores on this scale indicate higher pain coping strategies and lower scores indicate lower pain coping strategies. Rosenstiel and Keefe have norm-referenced this questionnaire among a group of patients with chronic back pain and measured the internal consistency coefficient of its 7 subscales (0.71 and 0.85) (Rosenstiel & Keefe, 1983). The reliability coefficient of the subscales of the Persian version of the CSQ in the Iranian population has been reported between 0.74 and 0.83 (Saffari, Pakpour, Yaghobidoot, & Koenige, 2015).

Data were analyzed using descriptive statistics such as mean and standard deviation, and inferential statistic such as univariate analysis of covariance (ANCOVA) in SPSS software (version 22; IBM Corp., Armonk, NY, USA). Shapiro-Wilk test was used to measure the normality default of the ANCOVA, and Levene's test was used to assess the homogeneity of the regression slopes to study the homogeneity of the variances. Significance level was considered as 0.05.

Results

Mean ± standard deviation of age in the CBT, ACT, and control group was 56.12 ± 3.44, 53.27 ± 10.89, and 55.10 ± 3.4, respectively.

As can be seen in table 1, as the probability value was higher than the significance level, the studied groups were identical in terms of gender, education, and marriage. Before conducting ANCOVA, Shapiro-Wilk and Levene's test were used to measure the observation of the required pre-assumptions. Shapiro-Wilk test for the distribution of perceived stress, anxiety, and coping strategies with stress in the pretest stage did not reject the normality assumption. Levene's test was used to measure the pre-assumption of the homogeneity error variance. The results of Levene's test did not reject the hypothesis of the homogeneity of the variances. Studding the homogeneity of the regression slopes also indicated that the pre-assumption of the homogeneity of the regression slopes was established. Therefore, the required pre-assumptions for conducting univariate ANCOVA existed. Descriptive indices, in addition to the results of ANCOVA, are presented in table 2.

Wilk's lambda criterion was used to measure the significance of the multivariable effect. Wilk's lambda criterion indicated that the effect of group on the linear composition of the group on the dependent variables is significant (Partial η^2 = 0.77; F = 42.27). In other words, there was a statistically significant difference between the 3 groups at least in one of the studies.

Table 1. Frequency distribution and comparison of the demographic features of the participants

Demographic features		ACT n (%)	CBT n (%)	Control n (%)	P-value
Gender	Woman	6 (40)	86 (53.3)	7 (46.7)	0.44
	Man	9 (60)	76 (46.7)	8 (53.3)	
Education	Pre-diploma	9 (60)	86 (53.3)	10 (66.7)	0.29
	Diploma	5 (33.3)	56 (33.3)	30(2)	
	Bachelor's	1 (6.7)	16 (6.7)	1 (6.7)	
	Master's	0 (0)	16 (6.7)	1 (6.7)	
Marital status	Single	2 (13.3)	16 (6.7)	2 (13.3)	0.51
	Married	13(86.7)	146 (93.3)	13 (86.7)	

ACT: Acceptance and commitment therapy; CBT: Cognitive-behavioral therapy

Table 2. Central and dispersion index of the studied variables in the experimental and control groups

Variable	Group	Pretest	Posttest
		Mean ± SD	Mean ± SD
Anxiety	Acceptance and commitment therapy	14.20 ± 2.48	9.80 ± 2.67
	Cognitive-behavioral therapy	15.40 ± 3.35	12.73 ± 3.34
	Control	15.47 ± 1.55	15.00 ± 1.51
Perceived stress	Acceptance and commitment therapy	14.27 ± 3.08	10.33 ± 3.08
	Cognitive-behavioral therapy	15.00 ± 3.7	12.60 ±2.97
	Control	13.73 ± 2.08	13.27 ± 2.08
Pain coping strategies	98.80	11.15 ± 21.40	14.23 ± 98.80
	101.60	8.44 ± 115.07	8.30 ± 101.60
	100.07	10.54 ± 100.53	10.37 ± 100.07

SD: Standard deviation

Univariate ANCOVA was conducted separately for each variable in order to determine the significant source of the multivariable effect. The results presented in table 3 indicate that the group significantly effects the scores of anxiety (Partial $\eta^2 = 0.78$; $P < 0.0001$; $F(2,39) = 72.89$), perceived stress (Partial $\eta^2 = 0.78$; $P < 0.0001$; $F(2,39) = 71.01$) and pain coping strategies (Partial $\eta^2 = 0.85$; $P < 0.0001$; $F(2,39) = 113.14$).

In order to determine the groups in which there was a significant difference, Bonferroni post hoc test was used. Paired comparison using the post hoc test (Table 4) showed that the mean anxiety score in the ACT group was lower compared to the CBT and control groups at the end of the training ($P < 0.01$). The mean perceived stress score in the ACT group was lower compared to the CBT and control groups at the end of the training ($P < 0.01$). Moreover, the mean coping strategies score in the ACT group was lower compared to the CBT and control groups at the end of the training ($P < 0.01$). No significant difference was observed between the ACT group and CBT and control groups in terms of the scores of anxiety, perceived stress, and pain coping strategies ($P > 0.05$). Thus, ACT had a greater effect on the improvement of anxiety, perceived stress, and pain coping strategies compared to CBT ($P < 0.01$).

Discussion

This study was conducted to compare the effectiveness of CBT and ACT on anxiety, perceived stress, and pain coping strategies in patients with cancer. The findings indicated that CBT and ACT are effective on anxiety, perceived stress, and coping strategies in patients with cancer. The results of this study were consistent with the findings of Borji et al. (2017), which indicated that CBT is effective on the anxiety, depression, and stress of family caregivers of patients with cancer. Furthermore, this finding is consistent with the results of the study by Abad et al. (2016), which indicated that CBT is effective in decreasing stress and anxiety in patients with breast cancer.

To explain these findings, it can be said that the patient's assessment of the effect of cancer on his/her life progress and excessive tension and irritability resulted from negative thoughts are among the factors that cause anxiety and worry in the patients more than the disease itself.

Table 3. The results of analysis of covariance of anxiety, perceived stress, and pain coping strategies in the experimental and control groups

Variable	SS	df	MS	F	P-value	Eta	Observed power
Anxiety	112.64	2	56.32	72.89	0.0001	0.78	1.00
Perceived stress	82.35	2	41.17	71.01	0.0001	0.78	1.00
Pain coping strategies	3608.04	2	1804.02	113.14	0.0001	0.85	1.00

SS: Sum of squares; df: Degree of freedom; MS: Mean of squares

Table 4. Bonferroni post hoc test results

Dependent variable	Group	Group	MD	P-value
Anxiety	Acceptance and commitment	Cognitive-behavioral	-1.92	0.0001
		Control	-3.96	0.0001
	Cognitive-behavioral	Control	-2.04	0.0001
Perceived stress	Acceptance and commitment	Cognitive-behavioral	-1.51	0.0001
		Control	-3.38	0.0001
	Cognitive-behavioral	Control	-1.86	0.0001
Pain coping strategies	Acceptance and commitment	Cognitive-behavioral	9.58	0.0001
		Control	22.33	0.0001
	Cognitive-behavioral	Control	12.75	0.0001

MD: Mean difference

Certain beliefs about the disease lead to incompatible coping methods, and intensification of the physical-psychological symptoms and the resulting suffering and disability. CBT first allows patients to state their thoughts and ineffective beliefs and cognitive distortions freely and without fear, then, these thoughts, structural beliefs, and cognitive distortions are reviewed and corrected (Jennings, Flaxman, Egdell, Pestell, Whipday, Herbert, 2017).

According to Beck's cognitive therapy model, cognitive therapy is most effective when the therapist amends these structural assumptions in the patients and replaces these thought distortions with positive rational and non-extreme thoughts (Majeed & Sudak, 2017). Cognitive reconstruction, which is also known as logical empiricism, helps individuals use logical reasoning for practical testing of the content of anxious thoughts against the realities of life experiences to diagnose the flow of anxious thoughts and even to test them behaviorally (Borji et al., 2017).

In this way, cognitive training of the events affects the reaction to those events and will be a preliminary for changing cognitive activity. CBT has a great influence on generating or changing understanding and attitude in individuals. Given that followers of CBT believe that the existence of some common mental errors can confuse our interpretation and perception of reality and generate further inappropriate behaviors and moods, CBT can be effective in improving anxiety, which depends on their ability to clearly, correctly, and effectively transfer their thoughts, emotions, needs, and requests.

The results also indicated that after controlling the pretest, there was a significant difference between experimental and control groups in terms of perceived stress. In other words, CBT has been effective on the perceived stress of patients with cancer. The results of this study show congruence with the results of the study by Serid, Burger, and Segal-Anglechine, which indicated that cognitive-behavioral intervention is effective on perceived stress and moods of nurses (Borji et al., 2017).

To describe these findings, it can be said that CBT decreases the perceived stress of patients. Based on the cognitive-behavioral model, peoples' beliefs affect their feelings and behaviors. Understandings and attitudes of patients greatly affect their attitudes. Negative attitudes toward and understandings of controlling the disease improve perceived stress. The fundamental principle of the cognitive-behavioral model is the effect and continuous and mutual interaction between the understandings and beliefs of an individual regarding the disease (thought), emotions, behaviors, and relationships with others. The cognitive-behavioral approach increases individuals' awareness of irrational beliefs and documents. Furthermore, through performing the practices and assignments given in the training

sessions, wrong beliefs and documents are amended (Abad et al., 2016).

The results also indicated that after controlling the pretest, there was a significant difference between experimental and control groups in terms of coping strategy. In other words, CBT has been effective on the coping strategies of patients with cancer. The results of this study were in line with the results of the study by Majeed and Sudak (2017), which indicated that CBT is effective on chronic pain. Moreover, it was consistent with the study by Mozafari et al. (2020) that indicated that CBT is effective in the management of chronic pain in patients with breast cancer.

In addition, the results of the current study indicated that ACT is effective on the anxiety of patients with cancer. These results were consistent with the findings of Jennings et al. (2017) and Melo et al. (2015). To explain these findings, it can be stated that ACT is a treatment method which includes acceptance and transformational variables in such a way that the position of this treatment method against unchangeable problems is acceptance and against changeable problems and behaviors is a commitment to alignment with change (Karekla & Constantinou, 2010). Another key component in acceptance and commitment-based therapy is values. In ACT sessions, participants are asked to identify their values, specify their objectives towards those values in their life, and commit to themselves that live to realize these value-oriented objectives, and this value and objective clarification can lead to the determination of an individual route of life, and in turn, decrease their anxiety. Indeed, this part of the treatment helps patients find their motivation again for living a rich and valuable life, which is basically the objective of acceptance and commitment-based therapy. The results indicated that after controlling the pretest, there was a significant difference between the experimental and control group in terms of perceived stress. In other words, CBT was effective on the perceived stress of patients with cancer. The results of this study were in accordance with the results of the studies by Jennings et al. (2017) and Karekla and Constantinou (2010). In addition, these findings were in line with that of Pankowski, Adler, Andersson, Lindefors, and Svanborg (2017), which reported that CBT is effective on psychological flexibility, The findings of the present study were also in line with that of Mohabbat-Bahar, Maleki-Rizi, Akbari, and Moradi-Joo (2015); they found that ACT is effective on anxiety and depression in patients with breast cancer. To explain these findings, it can be said that stress and disability (imaginary or real) in facing a threat is understandable. Cognitive stress emphasizes the perception and organism assessment of probable damage from confronting motivating environmental experiences. When people assess the demands of their surrounding environment and consider them to be beyond their total contrastive resources, they will experience stress, and this will consider their desirable physical, mental, emotional, or spiritual conditions as threatening (Sklenarova et al., 2015).

Of the limitations of this study the following items can be noted. The study results are limited to patients with leukemia. This study was conducted only on patients with leukemia in Isfahan, and thus, generalization of results to other areas and cities should be done with caution. It is recommended that this study be conducted in other cities and their results be compared, and this study is followed after group training as individual counseling.

Conclusion

It can be concluded that CBT and ACT are effective on anxiety, perceived stress, and pain coping strategies and can be used for patients with cancer.

Conflict of Interests

Authors have no conflict of interests.

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