

The Effect of Mindfulness-Based Cognitive-Behavioral Therapy (MBCT) on Perceived Stress, Disease Adaptability, Quality of Life, and Cognitive Functions in Patients Undergoing Chemotherapy

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Abstract

Objective: This study aimed at investigating the effectiveness of mindfulness-based cognitive-behavioral therapy on the perceived stress, disease adaptation, quality of life, and cognitive function of patients undergoing chemotherapy.

Method: The design of the study was semi-experimental with a pretest-posttest and control group. The statistical population of this study was all patients with sarcoma-lymphatic and gastrointestinal cancer undergoing chemotherapy in Firoozgar-Taleghani-Shariati specialized hospitals in Tehran in the second half of 2021. The study sample consisted of 40 patients with cancer who were selected through convenience sampling and then were randomly assigned to experimental and control groups (20 in each group). The therapy was performed by the researcher for eight 90 minutes –sessions, two sessions per week. Research data were collected using Cohen's Perceived Stress Scale (1983), Watson's disease adaptability (1988), Barclay's cognitive functions, and quality of life questionnaires (2012), and were analyzed by multivariate repeated measures variance analysis.

Results: The results showed a significant difference in all variables, and demonstrated that mindfulness-based cognitive therapy significantly improved perceived stress, disease adaptation, quality of life, and cognitive functions of participants in the experimental group in the post-test and follow-up.

Conclusion: According to the research findings, it can be concluded that mindfulness-based cognitive therapy is effective in improving the psychological indicators of cancer patients.

Keywords: Mindfulness-based Cognitive therapy, Perceived Stress, Disease Adaptation, Quality of life, Cognitive functions

Introduction

Despite significant advances in medical science, cancer, after cardiovascular disorders, is the second leading cause of death in the United States (Holly, 2015) and the third leading cause of death in Iranians after cardiovascular disease and accidents (Asodi Kermani, Ashrafian, Zeinali, et al., 2010). According to the World Health Organization (WHO), currently, 10 million new cases of cancer are being diagnosed worldwide each year (cited by the Ameri-

can Cancer Society, 2013). The incidence of cancer in our country is 12-148 cases per 1 million people for women, and 441-51 cases per 1 million people for men (Shahid Sales, Hasanzadeh, Sajadi, & Ale Davood, 2017). Cancer is considerable at any age and the prevalence of cancer is almost equal in both sexes (Siu, 2016). Cancer is one of the most destructive human diseases in all periods of life that affects the entire system of society and is associated with serious defects and many consequences in all areas of life (Torre, Bray, Siegel & Ferlay, 2015).

The psychological effects of being diagnosed with cancer significantly reduce mental health levels and

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also cause individual stress and upset the balance of life (Speyer, Herbinet, Vuillemin, Briancon, & Chastagner, 2010), which can affect the adaptation to the disease in patients with cancer. Adaptation to the disease is defined as having a positive attitude toward oneself and the world despite having physical problems (Derman Deatrack, 2016). In fact, the person's attitude towards the disease is her/his view of the disease and its symptoms, and the patient follows the treatment instructions better with a positive attitude, and as a result, her psychosocial adaptation to the disease increases. In general, people who adapt well are constantly committed and actively involved in the cancer coping process and pursue to seek meaning and importance in their lives; in contrast, people who do not adapt well often feel lonely, isolated, and hopeless (Board, 2015).

On the other hand, the physical effects of cancer treatment, especially chemotherapy, are associated with a wide range of symptoms of physical dysfunction, including weakness, fatigue, lethargy, skin blemishes, bleeding, bruising, and, most importantly, weakness of the immune system, which paves the way for mental disorders (Pak, Barati, Shokrolahi, & Kokhaei, 2014). Regarding the interaction between immune function and mental disorders, we can refer to Psycho Neuro Immunology (PNS), in which the most focus is on the inverse effects of immune activation on the brain and also on the immune system as the target point of the central nervous system function. Nowadays, the historical view in which the central nervous system is considered an immune system and functions independently of immune system effects is obsolete; instead, there is a new view that the brain is one of the main targets of the effects of blood-soluble cellular products, which generates the function of activating the immune system. This interaction is useful and perfectly adaptable for the organism, although, like any other adaptive process, it is prone to pathological disorders, and increased neuroinflammation may lead to mental illness such as stress (Ashdown, Dumont,

Ng, Poole, Boksa & Luheshi, 2006). Stress is the process by which environmental events threaten or challenge the organism's well-being, and the organism responds to this threat. Stress can also increase the likelihood of being more irritable, which in turn increases the risk of various malfunctions in people (Barkley, 2002). Research has shown that perceived stress levels are higher in people with cancer than in non-cancer patients (Krull, Huang & Gurney, 2010). Research also shows that deficits in cognitive functions are more common in people with cancer than in non-cancer patients (Dehghani, Tavakoli, & Makarian, 2015). In fact, cancer can cause a range of cognitive impairments. The two major groups of symptoms associated with cognitive impairment include cognitive degradation and cognitive dysfunction, and complications from cancer diagnosis and treatment can lead to a range of cognitive dysfunctions and cognitive impairments. To determine abnormalities in cognitive processing, researchers have focused on memory impairments, integration, attention, cognitive inhibition, problem-solving ability, and other cognitive functions (Soref, Dar, Argov & Meiran, 2008; Shin, Choi, Kim, Hwang, Kim & Cho, 2008). This system is an essential component of most practical skills, and damage to this part disables the patient. The frontal lobe, specifically the dorsal-lateral frontal region, and the anterior cortex are essential for cognitive functions such as abstraction and problem solving, displacement strategies, dysfunctional response inhibition, and thinking flexibility (Owen, 2002).

Some research has also revealed that the quality of life of people with cancer declines and malfunctions (Ustandac & Zencirci, 2015). Today, quality of life is a basis for providing services tailored to different aspects of life and resource allocation, and some researchers consider improving quality of life the most important goal of medical interventions (Nawaz, Malik & Batool, 2014). There are different theories about the concept of quality of life and most experts agree that quality of life consid -

ers both positive and negative facts of life. Rapley (2003, quoted from Yendork & Somhlaba, 2014), by adhering to a mental view of the quality of life, summarizes the key features that exist in several accepted definitions of quality of life. He believes that all of these definitions state that quality of life is a person's psychological perception of the reality of different aspects of the world.

Also, according to the definitions of quality of life, it is a person's understanding of health which is based on satisfaction or dissatisfaction with aspects of life being important to the person, and the degree of conformity of the person's hopes and dreams with what he experiences. It is a multidimensional concept that focuses on the impact of disease and treatment of a person.

Due to the importance of cancer and being exhausting, different treatments have been proposed to improve the mental condition of people with cancer and under treatment. Therapeutic studies on this disorder generally take two medications and psychotherapy forms, and various techniques and methods have been used so far. Today, the third generation of psychotherapies has been offered, including Mindfulness-Based Cognitive Therapy (MBCT). Mindfulness-Based Cognitive Therapy (MBCT) is one of the therapies used today to treat many mental disorders (Itzan, Niemiec & Briscoe, 2016). This therapeutic approach was developed in 1992 by Teasdale and Segal by combining the cognitive aspects of Beck (1979) and the mindfulness-based stress reduction program (MBSR) proposed by Kabat-Zin (1990).

Mindfulness requires specific behavioral, cognitive, and metacognitive strategies for centralizing the attention process, which in turn avoids the declining spiral of negative mood and the emergence of pleasant thoughts and emotions (Tizdel et al., 1995). This type of cognitive therapy includes various meditations, stretching yoga, body inspection exercises, and several cognitive therapy exercises that show the relationship between mood, thoughts, feelings,

and body sensations (Finucane & Mercer, 2006). The developers of mindfulness-based cognitive therapy, by examining the factors influencing cognitive therapy, came to the conclusion that repeated work with the content of thoughts and habitual avoidance tendencies gradually causes a change in the general view of the individual in relation to thoughts and emotions. In other words, they found that achieving a kind of decentralized relationship and developing a different perspective on thoughts and emotions is a major factor in the effectiveness of cognitive therapies, and is the ability to get rid of the rumination trap and eliminate the consequences of low mood cycles (Crane, 2009).

The main goal of mindfulness-based cognitive therapy is to make the patient aware of the effects of cohesive mindfulness reactivation through self-monitoring and staying in mind and attempting to observe his/her thoughts and feelings through various exercises by using and creating the state of mind presence (e.g. breathing flow or bodily sensations). In other words, in mindfulness-based cognitive therapy three basic goals are pursued: attention regulation, development of metacognitive awareness and decentralization, and development of acceptance of mental states and contents (Tizdel, 1999). Many studies have shown that mindfulness-based cognitive therapy can improve mental health. For example, Oraki, Zare, and Hosseinzadeh (2020) found that mindfulness-based cognitive therapy has a significant effect on perceived stress in non-alcoholic people with fatty liver; Mazaheri, Aghaei, Abedi, and Adibi (2020) showed that the mindfulness-based cognitive therapy has a significant effect on the perceived stress of patients with wounded colitis; Razavizadeh Tabadakan, Jajarmi, and Vakili (2019) found that mindfulness-based cognitive therapy has a significant effect on depression, rumination, and perceived stress in women with type 2 diabetes; Sheikhzadeh, Zanjani, and Bari (2019) showed that mindfulness-based cognitive therapy improves the quality of life and mindfulness of cancer patients;

Nasiri Kalmarzi, Moradi, Asmaei Majd, and Khanpour (2018) demonstrated that mindfulness-based cognitive therapy has a significant effect on quality of life and mindfulness of patients with asthma; Ghasemi, Karimi, and Dabbaghi (2018) showed that mindfulness-based cognitive therapy intervention improves the quality of life of women with breast cancer; Taghiloo, Makvand Hosseini, and Sedaghat (2017) showed that mindfulness-based cognitive therapy has been effective in reducing perceived stress in patients with MS; Mohammadi, Davoodi, and AleYasin (2017) found that mindfulness-based cognitive therapy improves psychological adaptation to cancer in women with cancer; Strauss, Gu, Pitman., Chapman, Kuyken, and Whittington (2018) showed that mindfulness-based cognitive therapy has a significant effect on employees' quality of life and stress; Shapero Greenberg, Mischoulon, Pedrelli, Meade, and Lazar (2018) found that mindfulness-based cognitive therapy has a significant effect on patients' quality of life; and McCay, Frankford, and Beanlands (2016) showed that mindfulness-based cognitive therapy reduces anxiety and increases patients' well-being. Given the above mentioned and considering that no similar study has been conducted in the country and abroad, the present study seeks to answer the fundamental question of whether mindfulness-based cognitive therapy has a significant effect on perceived stress, disease adaptation, quality of life, and cognitive functions of cancer patients undergoing chemotherapy.

Method

Population and Participants

The present study is semi-experimental with a pretest-posttest and control group design. In this study, the assessment was performed in the pre-test, post-test, and two-month follow-up stages. The statistical population of this study included all patients with sarcoma-lymphatic and gastrointestinal cancer undergoing chemotherapy in

Firoozgar-Taleghani-Shariati specialized hospitals in Tehran in the second half of 2021. In this study, according to Delavar (2011), the number of each group was determined as 20 people; therefore, 40 cancer patients were selected through convenience sampling and randomly assigned to the experimental and control groups (each group with 20 participants). Inclusion criteria were the age range of 15-30 years, people with gastrointestinal lymphatic sarcoma cancers, and their consent and signature; the exclusion criteria of the study included brain tumors and head cancers, failure to attend regular sessions, and lack of cooperation in providing homework and ending chemotherapy. It should be mentioned that two members of the experimental group and two members of the control group were excluded from the research, and as a result, the sample size of each group reached 18 people.

After obtaining the necessary permits and referring to Firoozgar-Taleghani-Shariati Hospital in Tehran, 40 people who wished to participate in the research were selected according to the inclusion and exclusion criteria of the study. Then they were randomly assigned into the experimental and control groups. In the pre-test stage, the questionnaires were given to the participants to measure the research variables. After this stage, a contract for participating in the therapy sessions was signed by the members of the experimental group. Then the researcher performed eight 90-minutes training sessions for treatment twice a week. At the end of the intervention sessions, the subjects of both groups were re-tested in the post-test and two-month interval follow-up. Finally, the data obtained from the pre-test and post-test were analyzed by repeated-measures analysis of variance using SPSS-22 software.

Ethical Statement

To comply with the ethical considerations in this research, according to the approval of the ethics committee of Payam Noor University, an ethics license has been obtained from the National System of Ethics in Biomedical Research with ID IR.PNU.

REC.1400.288. In addition, the purpose of the study and the conditions of the study were explained to the participants, and they were ensured that the information would remain confidential to the researcher. The informed consent form was taken from patients. In addition, while answering all the participant's questions about the research, they were assured that the research results would be published in the form of statistics and general conclusions, and they could have full authority to participate in the research.

Measures

Perceived stress scale: The Perceived Stress Scale was developed in 1983 by Cohen, Kamarck, and Mermelstein and has three versions, 4, 10, and 14- questions, used to measure perceived general stress over the last month (In this research, a scale of 14-questions was used). This scale measures thoughts and feelings about stressful events, control, coping, dealing with stress, and experienced stress. This scale also examines risk factors in behavioral disorders and shows the process of stressful relationships. This scale is based on a 5-point Likert scale from never (zero scores) to always (score 4). On this scale, the lowest score is zero and the highest score is 56. A higher score indicates more perceived stress. Using the Cronbach's alpha method, Cohen et al. reported the reliability of this scale at 0.86. Safaei and Shokri (2014) also reported the reliability of this scale by Cronbach's alpha method equal to 0.80 and also confirmed its content and face validity.

Disease Adjustment Scale: This scale was developed by Watson et al. in 1988 and is a 5-dimensional scale that includes struggle-seeking spirit, worrying concerns, destiny-oriented thinking, despair and helplessness, and cognitive avoidance. This questionnaire has 29 questions and is designed based on a 4-point Likert scale with a high score indicating less adaptation to the disease. Watson et al. (1988) reported the reliability of this scale at 0.88 using Cronbach's alpha method. In Iran, Pato, Moradi, Allahyari, and Payende (2015) reported the

reliability of this scale based on Cronbach's alpha analysis equal to 0.90 and also confirmed its face and content validity.

The Quality of Life Scale: This questionnaire includes 36 items in eight dimensions including physical function, functional limitations due to physical problems, physical pain, general health, feeling of well-being, mental health, functional limitations due to emotional problems, and social function. The total score of the eight dimensions of health ranges from 0 to 100, with higher scores indicating better health status. Internal consistency analysis showed that, except for the cheerfulness scale, other Persian scales have minimum standard coefficients of reliability in the range of 0.77 to 0.90. The convergence validity test using the correlation of each question with the hypothesized scale also gave the desired results and all correlation coefficients exceeded the recommended value of 0.40 (the range of change of coefficients is from 0.58 to 0.95). In the factor analysis test, two main components were obtained, which explained 65.9% of the dispersion among the scales of the SF-36 questionnaire. The validity and reliability of this questionnaire have been confirmed in the Iranian population. Montazeri, Garshatbi, and Vahdania, (2005), except for the cheerful scale, showed the minimum standard reliability of this test in the range of 0.77 to 0.90 on other scales. Also, they showed the convergent validity of this scale in the range of 0.58 to 0.95.

Barclay's Cognitive Function Questionnaire: This questionnaire was designed by Barclay in 2012 to represent cognitive functions in non-clinical and clinical populations. The scale consists of 70 items and the scoring of the questionnaire is based on a 4-point Likert scale (from never to always). It also includes five subscales that measure the cognitive functions of time self-management, self-regulation/problem solving, self-control/inhibition, self-motivation, and emotional self-regulation. In this tool, 7 scores are obtained, of which 5 scores are related to subscales, one score to the overall score,

and the other score is extracted from 11 questions of this scale, which are presented as a list of cognitive functions. For example, scores between 70 and 140 indicate low cognitive dysfunction, scores between 140 and 175 indicate moderate cognitive dysfunction, and scores higher than 175 indicate a strong cognitive dysfunction (Barclay, 2012). Barkley (2012) confirmed the validity of this questionnaire and using Cronbach's alpha method, reported the total validity of the scale at 0.99 and its components in the range of 0.74 to 0.33. In Iran,

this questionnaire was standardized by Mashhadi, Mirdorghi, Hosseinzadeh, Hassani, and Hamzeh Lou (2014) and the reliability of this questionnaire was 0.96 for the overall score and 0.80 to 0.92 for the components. Its face and content validity were also confirmed.

Intervention

In this study, the protocol of mindfulness-based cognitive therapy was developed based on the protocol of Tizdel et al. (1995), which is briefly described in Table 1.

Table 1: The Content and structure of mindfulness-based cognitive therapy sessions

Session	Content of sessions
1	Introducing the therapist, familiarity of the group members with each other and establishing the therapeutic relationship, explaining the treatment and the structure of the sessions, providing information about psychological functions and their types, reviewing related therapies, psychological training, and performing pre-test.
2	Reviewing pre-session experiences and receiving feedback from patients, assisting the participants in learning skills to prevent relapse of stress and dysfunction, becoming more aware of the feelings, thoughts, and sensations of the body moment to moment and being in the moment, summarizing the discussions in the meeting, and providing homework.
3	Reviewing the experiences of the previous session and receiving feedback from patients, paying attention to their feelings and thoughts and expanding them and acceptance of unpleasant thoughts and feelings, teaching skills of responding to unpleasant thoughts or feelings; summing up the discussions of the session, reviewing the exercises for the next session, and providing homework.
4	Reviewing previous session experiences and receiving feedback from the participants; avoiding the continuation and intensification of negative thoughts; changing old thinking habits, including recognizing automatic routines, being unmotivated at work, and knowing things are inconclusive; summarizing the discussion in the meeting, reviewing the exercises of the next session, and providing homework.
5	Reviewing the experiences of the previous session and receiving feedback from the subjects, awareness of warning signs, awareness of small changes, wishing for extraordinary and always comparing their current situation with the desired situation, summarizing the discussions of the meeting, reviewing the session exercises, and providing homework.
6	Reviewing the experiences of the previous session and receiving feedback from patients; learning to deal with attention and do everyday affairs while consciously paying attention; realizing the wandering mind; controlling the wandering mind by practicing body browsing; using the method of deep relaxation or meditation; breathing mindfulness, summarizing the discussions of the previous session; examining the next session exercises, and providing homework.
7	Reviewing the experiences of the previous session and receiving feedback from individuals including continuing previous exercises; being fully aware of and accepting thoughts and feelings; changing of mood and thoughts; awareness of the symptoms of anxiety and depression; planning and performing a specific action, summarizing the discussions raised in the meeting; examining the next session exercises, and providing homework.
8	Reviewing the experiences of the previous session and receiving feedback from individuals; Sharing group members' experiences with each other and achievements and expectations that were not met; and finally running the post-test.

Results

Demographic data (Table 2) showed that 55.55% (10 people) were male and 44.45% (8 people) were female in the experimental group, 16.67% (n = 3) of the experimental group were married and 83.33% (n = 15) were single, and the mean (and standard deviation) of the age of the subjects in the experimental group was 26.652 (and 3.510). In the control group, 50% (9 people) were male and 50% (9 people) were female, 22.22% (n = 4) of the control group were married and 77.78% (n = 14) were single, and the mean (and standard deviation) of the age of individuals in the control group was 24.986 (and 3.329). Also, the mean and standard deviation of research variables in the three stages of measurement in the experimental and control groups are given in Table 2.

Table 2. Mean and standard deviation of pre-test, post-test, and follow-up of research variables in experimental and control groups

Group	Mindfulness-based cognitive therapy						Control					
	Pre-test		Post-test		Follow-up		Pre-test		Post-test		Follow-up	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Perceived stress	38.524	3.521	28.894	4.952	33.635	2.852	38.125	4.141	34.489	3.698	35.998	3.489
Disease adjustment	62.106	8.666	46.182	5.425	54.338	5.990	64.600	5.428	61.420	5.639	65.859	6.353
Quality of life	50.927	7.659	71.058	6.025	59.263	5.493	48.598	6.888	52.138	5.452	50.635	6.321
Cognitive function	109.748	10.006	83.965	8.869	95.565	9.000	113.632	10.365	111.480	10.529	115.963	9.419

Before using the parametric test of repeated measures analysis of variance analysis to determine the effectiveness of the mindfulness-based cognitive therapy on perceived stress, disease adaptation, quality of life, and cognitive functions, homogeneity of variance was examined by the Levine test. Based on the results, the assumption of homogeneity of variances in the research variables in the two groups was confirmed. The result was not significant for any of the variables, so using parametric tests was confirmed ($P \geq 0.05$). Also, the M-box test was used

to test the assumption of the variance homogeneity and the results showed that the BOX value was not significant and the assumption of no difference between the variances was confirmed ($P = 0.059$, $F = 1.43$, $BOX=93.48$). Also, since one of the assumptions for performing the repeated measures analysis of variance is to check the sphericity using Machley spatial test, the non-significance of this test indicates the observance of this assumption ($P \geq 0.05$). The results of these tests permit the use of repeated measures analysis of variance. These results show that there is a significant difference between the experimental and control groups in terms of at least one of the dependent variables. Eta squared shows that the difference between the two groups is significant with respect to the dependent variables as a whole.

The results of Table 3 show that there is a significant difference between the means of all research variables between the experimental and control groups in pre-test, post-test, and follow-up phases and the effect of mindfulness-based cognitive-behavioral therapy was significant on perceived stress ($\eta^2 = 0.554$, $P < 0.001$, $F = 19.117$), disease adaptation ($\eta^2 = 0.439$, $P < 0.05$, $F = 16.212$), quality of life ($\eta^2 = 0.493$, $P < 0.05$, $F = 17.395$), and cognitive function ($\eta^2 = 0.471$, $P < 0.001$, $F = 17.174$).

Table 3. Results of multivariate analysis of variance with repeated measures in experimental and control groups

	Dependent variable	SS	Df	MS	F	P value	η^2
Time	Perceived stress	97.844	2	48.922	5.825	0.025	0.290
	Disease adjustment	144.900	2	77.450	5.932	0.023	0.212
	Quality of life	180.108	2	90.54	5.685	0.020	0.247
	Cognitive function	210.848	2	105.424	4.281	0.050	0.163
Group *time	Perceived stress	230.125	2	115.062	19.171	0.001	0.554
	Disease adjustment	209.647	2	104.733	16.212	0.048	0.489
	Quality of life	157.108	2	78.554	17.395	0.035	0.493
	Cognitive function	238.121	2	169.060	17.174	0.046	0.471
Error	Perceived stress	469.510	32	14.672			
	Disease adjustment	537.687	32	16.802			
	Quality of life	617.559	32	19.298			
	Cognitive function	801.051	32	25.032			

Table 4 shows the results of the paired comparison of research variables in three test stages in the two groups. The results indicate a significant difference between the mean score of research variables in the pre-test, post-test, and follow-up, which implies the effect of mindfulness-based cognitive-behavior therapy on research variables.

effectiveness of mindfulness-based cognitive therapy (MBCT) on perceived stress, disease adaptation, quality of life, and cognitive functions of cancer patients. The results showed that mindfulness-based cognitive therapy has a significant effect on perceived stress in cancer patients. This finding is consistent with the results

Table 4. Pair comparison of research variables in three tests of two groups

Variable	Stage	Mean difference	Sig. level
Perceived stress	Pretest-posttest	9.63	0.01<P
	Pretest-follow up	4.889	0.05<P
	Posttest-follow up	-4.741	0.05<P
Disease adjustment	Pretest-posttest	15.924	0.01<P
	Pretest-follow up	7.768	0.01<P
	Posttest-follow up	-8.156	0.01<P
Quality of life	Pretest-posttest	-20.131	0.01<P
	Pretest-follow up	-8.336	0.01<P
	Posttest-follow up	11.975	0.01<P
Cognitive function	Pretest-posttest	25.783	0.01<P
	Pretest-follow up	14.183	0.01<P
	Posttest-follow up	-11.600	0.01<P

Discussion and Conclusion

The purpose of this study was to evaluate the

of research done by Oraki, Zare, and Hosseinzadeh (2020), Mazaheri, Aghaei, Abedi, and Adibi

(2020), Razavizadeh Tabadakan, Jajarmi, and Vakili (2019), and Taghiloo, Makvand Hosseini, and Sedaghat (2017). To explain this finding, it can be said that among the psychological symptoms these patients face, stress creates a situation in which a person feels helpless and uninterested in life. Patients who have a negative perception of stress spend a lot of time analyzing problems and perceive issues negatively; as a result, these thoughts gradually turn to reality and the person loses his/her awareness of time and experiences constant anxiety and stress. Mindfulness-based cognitive therapy interventions seem to affect the cognitive system and information processing by increasing the individual's awareness of the present through techniques such as focusing on breathing, the body inspection, and increasing awareness of time and place with functions such as eating and drinking with awareness.

On the other hand, mindfulness practices allow the individual to reduce automatic and habitual responses to stressful situations, and over time, by cultivating an inner insight and greater acceptance of unchangeable events of life, decrease the activation of the stress response system (Witek-Janusek et al., 2008). Also, in explaining the findings of this study, it can be concluded that perceived stress in cancer patients has more cognitive-psychological aspects because, in this method, one learns to temporarily let go of one's attitudes and beliefs, which are rooted in the past and are influenced by future fears and anxieties with techniques of experiencing the present (Kabat-Zinn, 2004). One of the most important aspects of mindfulness therapy is that people learn to cope with negative emotions and thoughts and experience mental well-being in a positive way. Also, mindfulness-based therapy is the mental representation of objects in life that are beyond human control, and this is taught through deep breathing and thinking (Mace, 2008). In fact,

mindfulness requires specific behavioral, cognitive, and metacognitive strategies to concentrate the attention process, which in turn avoids the negative spiral of negative mood, negative thinking, tendency to anxious responses, the development of new perspectives, and the emergence of pleasant thoughts and emotions (Segal, Williams & Teasdale, 2012). Thus, this therapy helps patients reduce the cognitive inaccuracies involved in stress perception by facilitating the evaluation and change in interpretation and meaning of events, and as a result, by increasing the ability to cope effectively and adaptably with the disease, manage the stressor better and experience less stress.

The results also showed that mindfulness-based cognitive therapy has a significant effect on disease adaptation in cancer patients. This finding is consistent with the results of Mohammadi, Davoodi, and Ale Yasin (2017). Explaining this finding, it can be said that mindfulness-based cognitive therapy helps the individual achieve this awareness that applying repetitive cognitive patterns in the face of physical senses, thoughts, and emotions causes stress and emotional disorder. This type of treatment reduces the person's vulnerability to such mental states and improves emotional well-being. Thus, after participating in this type of intervention, subjects receive the necessary training on cognitive reconstruction, change attitudes toward disease, and pain and learn how to overcome their low energy, identify negative dysfunctional thoughts, act judgmentally against disturbing thoughts, and not engage in disturbing thoughts, resulting in increased adaptation to illness (Mohammadi et al., 2017).

The goal of mindfulness cognitive therapy is that a person can consider one's thoughts only as pure thoughts and see them as testable mental events and be able to distinguish their negative mental events from the responses that usually provoke

them, and finally, change their meaning. In the sessions, people were taught to be more aware of mood swings and learn new ways to manage these situations; however, the most important thing is to enable them to return to the present moment, for this purpose they must have the presence of mind with the help of breathing. It seems that mindfulness cognitive therapy exercises, by increasing people's awareness of the present moment, affect the cognitive system and information processing of people with cancer, as well as their performance, and in this way, it has increased their adaptability.

The results also showed that mindfulness-based cognitive therapy has a significant effect on the cognitive functions of cancer patients. This finding is consistent with the results of research by Shapero et al. (2018). Explaining this finding, it can be said that mindfulness-based cognitive therapy is a regular approach to train individuals to gain awareness of physiological responses and achieve a kind of physiological perception and an indicator of relaxation and relief without using tools and equipment. This therapy affects the physiology of the body by reducing metabolism, heart rate and contractile strength, the number of breaths, the secretion of epinephrine, and blood pressure (Musa & Rudal, 2004), which in turn can lead to the improvement of intellectual and functional performances in different people.

The results also showed that mindfulness-based cognitive therapy has a significant effect on perceived stress in cancer patients. This finding is in line with the results of Sheikhzadeh, Zanjani, and Bari (2019), Nasiri Kalmarzi, Moradi, Asmaei Majd, and Khanpour (2018), Ghasemi, Karimi, and Dabbaghi (2018), and Strauss, Gu, Pitman., Chapman, Kuyken, and Whittington. In explaining this finding, it can be said that mindfulness takes one step away from all positive and negative thoughts and patients learn that thoughts are thoughts and

not reality. One cannot control his/her thoughts completely. All she/he can do is to look at the thoughts, stay away from them, and stop the spontaneous reaction to them. The more one can do this, the more she/he feels in control. When individuals perceive the feeling of deep peace resulting from the mindfulness in the depths of their beings, they no longer ask themselves the meaning and purpose of life. They will fully understand that peace, love, and happiness are all within themselves and will find that all the sufferings, pains, and sorrows in the world are due to the fact that human beings have deprived themselves of peace, love, happiness, and the perception and using this inner sources. They will realize that the bad and unpleasant feelings that sometimes overwhelm their existence are due to seeing the world through the wrong windows. Then they realize that their goal is to have a deeper access to the resources within themselves, not only for themselves but for all the people around them, then they will find a beautiful and deep meaning in life (Akin, Can, Durna & Aydiner, 2008).

Also, in explaining the effectiveness of mindfulness-based cognitive therapy in improving the quality of life in cancer patients, it can be said that in long-term meditation and sitting without movement, patients focus on their body's senses. This focus and observation can reduce emotional responses. Thus, practicing mindfulness skills increases clients' ability to tolerate negative emotions and enables them to cope effectively, which in turn can improve their quality of life. This treatment increases people's attention by helping them to accept, communicate with inner experiences, and increase conscious behavior, which in turn increases the quality of life in various dimensions. In fact, mindfulness training is effective on the cognitive system and information processing by increasing people's awareness of the present through tech-

niques such as paying attention to their breathing and body and focusing their consciousness on the here and now. Thus, this method increases the quality of life and its usefulness has been shown as an intervention method for a wide range of chronic mental disorders (Kroska, Miller, Roche, Kroska & O'Hara, 2018).

Each research, in addition to scientific achievements, has limitations that can be overcome in future research to achieve more defensible results and this research is no exception to this rule. One of the limitations of this study is the lack of precise control on demographic characteristics. Also, data collection by the use of questionnaires and self-report methods can challenge the validity of the results. Accordingly, using qualitative methods in data collection, such as observation and interview, is suggested in future research. Finally, it is suggested that this intervention be examined in other populations and the results of other treatments and populations be compared. It is suggested that this intervention be used to improve the psychological condition of cancer patients in medical centers. It is also recommended that this treatment be used as a part of the treatment process for people with cancer in all hospitals in the country.

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