

The effect of MBCT mindfulness-based cognitive therapy techniques on increasing hope in cancer patients undergoing radiotherapy

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ABSTRACT

The present study was conducted to investigate the effect of mindfulness techniques on increasing hope in cancer patients undergoing radiotherapy. For this purpose, 30 cancer patients in two control and experimental groups were available by sampling. This research method was semi-experimental, and in this regard, Freiberg (2001) and Snyder (1991) hope test questionnaires were used to collect data. The subjects of the experimental group participated in 8 sessions of 35 minutes of individual psychological therapy of mindfulness. The Freiberg test was performed in the experimental group to mentally prepare the patients for the research before the mindfulness sessions. Also, the subjects responded to Snyder's hope questionnaire as a pre-test and post-test. For data analysis, mean difference and analysis of covariance test (ANCOVA) were used in SPSS software version 22. The findings showed that mindfulness techniques have a positive effect on increasing hope in cancer patients. These findings can provide a new platform for optimal psychological interventions along with medical treatments, to help cancer patients undergoing treatment.



1. Introduction

According to the WHO World Health Center, cancer is a general term for a large group of diseases that can affect any part of the body. Also, cancer is one of the main causes of death worldwide, accounting for 10 million deaths in 2020.

Given the chronic nature of cancer and its ongoing complex emotional and physical stresses, people living with cancer are challenged to overcome many crises and cope with the resulting symptoms, life changes, and uncertainty about the future. (Jane et al., 2006). Cancer and its treatment can have a serious impact on people's quality of life and work productivity (Melis et al, 2020.)

Mindfulness relaxation can benefit cancer patients throughout care from diagnosis through procedures and treatments. It is also considered a useful skill that is performed by patients to reduce and cope with stress, promote relaxation, and reduce physical discomfort and emotional discomfort (Jane et al, 2006).

In cognitive therapy based on mindfulness, MBCT is a slow and regular training of awareness. This treatment helps to get rid of overthinking, ruminating, or worrying too much about certain things, and it also helps to get rid of the desire to avoid, stop, or move away from things. This therapy focuses on the underlying psychological processes that underlie all how people grieve (Teasdale et al, 2014).

Mindfulness may influence pain intensity through an integrated process involving neurobiological and psychological systems. Cancer pain impairs cognition, especially attention, as well as memory and other psychological functions. Mindfulness relaxation training is associated with increased activity in the anterior cingulate cortex and the anterior prefrontal cortex. That these two parts are in the cognitive regulation of pain processes and in the prefrontal cortex of the brain, which plays a role in re-framing the contextual evaluation of sensory experiences, during and after mindfulness exercises, non-reactive and non-judgmental acceptance, thoughts, feelings and body sensations are improved they do Research has shown that mindfulness reduces severe pain, anxiety, and depression (Holden et al, 2018).

Mindfulness is theoretically and empirically related to psychological well-being. Elements of mindfulness, the non-judgmental awareness and acceptance of one's moment-to-moment experience, are considered to be potentially effective antidotes to common forms of distress, rumination, anxiety, worry, fear, anger, etc., many of which involve cravings. Maladaptive to avoid, repress, or become overly involved with their distressing thoughts and feelings. Mindfulness describes a psychological trait, a state of consciousness, or a psychological process. Evidence from correlational research has shown that mindfulness is positively related to a variety of mental health indicators, such as higher levels of positive emotion, life satisfaction, vitality, and adaptive emotion regulation, and lower levels of negative affect and symptoms of psychological harm (Robinsa et al, 2013)

Hope is a belief in positive outcomes following adverse events in life and creating solutions to achieve goals. Increasing hope in cancer patients to fight adverse situations during diagnosis and treatment helps to empower patients. Since despair and reduced quality of life can lead to reduced acceptance and tolerance of cancer complications, therapeutic interventions can help to increase the hope and quality of life of cancer patients (Rahimi et al, 2020). Hope has a positive effect on coping with a cancer diagnosis and reducing the discomfort caused by it. Since cancer is a progressive disease, hope also changes in patients. Hope is related to the reduction of cancer symptoms, less fatigue and lower level of depression in patients with various cancers, and also

hope has positive effects on the life of cancer patients (Perlman et al, 2022).

What is discussed in this research is the implementation of mindfulness techniques on the hope of cancer patients to increase their hope.

People with cancer endure a lot of pain and discomfort, which may cause them to lose hope. For many patients, cancer diagnosis turns the distant and vague awareness of death into a real and frightening possibility (Carlson & Speca, 2017).

Cancer diagnosis can have a significant impact on the mental health and well-being of patients. Among people without psychiatric history, a cancer diagnosis is directly related to an increased risk of common mental disorders, which may negatively affect cancer treatment and recovery, as well as the patient's quality of life and survival (Knifton et al, 2019).

Positive psychological constructs have attracted increasing attention in research on sources of coping with cancer-related problems. Prevalence of PTSD psychological illness and discovery of associations of perceived social support, hope, optimism and resilience with PTSD symptoms in patients with hematologic malignancy. Perceived social support was negatively associated with PTSD symptoms, however, when positive psychology variables were added, optimism was negatively associated with PTSD symptoms. Due to the positive effects of perceived social support, optimism affects PTSD symptoms (Liu et al, 2015).

Constantly reviewing the past leads to worry about possible future dangers and this leads to the loss of the present. If people are present in life as it happens, the fear of the past and the future will disappear. Mindfulness is a state of being in which one is awake and aware of the present moment as a way of paying attention, which is the attitude component of mindfulness. In this way, a person is non-judgmental, curious, receptive and attentive. Critical self-judgments or worrying about fearful future events can have very real consequences for people's well-being in the here and now because the body responds to these mental events as if they had occurred (Carlson & Speca, 2017). Mindfulness skills training has been used to reduce psychological issues and develop mental health in different communities (Adnan et al, 2023).

When patients fully experience the present, it becomes difficult for them to worry about the past or the future. Mindfulness training helps patients to fully and consciously experience the present (Kase & Ledley, 2007).

In cancer survivors, relaxation and approach training in the framework of the cognitive process based on mindfulness facilitates the self-regulation of emotions during distress and suffering. This training emphasizes a moment-to-moment, non-judgmental and non-reactive approach to the internal and external experiences of patients, which reduces their rumination and mental preoccupation with their unpleasant experiences (Asadi et al, 2020).

Hope means that one wants something to happen or to be true and to believe that something is possible or probable. Recent studies describe the positive effect of hope in coping with a cancer diagnosis and reducing the distress associated with cancer. Cancer disease can usually be chronic, progressive and fatal, affecting the level and level of hope of patients during the disease process (Salinas et al, 2022). Research shows the important role of hope in cancer patients. It shows the existence of a positive correlation between hope, quality of life, social support, spirituality and well-being, and there is also a negative relationship between hope and depression and mental distress (Feldman & Corn, 2023).

Having hope is considered an important need, and there is also a significant correlation between perceived levels of control and hope. However, programs to address individual control needs should be evaluated with caution and hope development programs are interpreted carefully.

Decreasing physical health is considered a threat to hope. In cancer patients, the stage of the disease does not affect the level of hope of the patients. And on the other hand, knowledge has a positive effect on increasing the psychological well-being of people. Hope is an important strategy in coping with diseases. The 5 important recurrent factors of hope include: finding meaning, affirming relationships, using internal resources, living in the present, and anticipating survival. The level of hope in people has an important relationship with the level of coping with their illness (Chi, 2007).

Health-related quality of life covers a wide range of subjective perceptions from physical, emotional, social and cognitive functions to disease symptoms and treatment side effects among cancer patients. Quality of life is considered a vital aspect of cancer patient care in the clinical environment by many doctors (Nikbakhsh et al, 2014).

In cancer patients, there is a positive relationship between hope and quality of life, social support, and mental and existential well-being, as well as a negative relationship between hope and symptom burden, psychological distress, and depression. Evidence shows that hope is related to a variety of psychological variables in people with cancer, including depression, coping, and PTSD (Feldman & Corn, 2023).

A better understanding of the meaning of hope during treatment can be valuable in supporting cancer patients with treatment decisions, psychosocial support, better-experienced quality of life and symptom burden, and any wishes they may have regarding advanced care planning. Bring a lot (Hecke et al, 2020).

Facing emotions instead of eliminating them can lead people to their potential. If well organized, cancer support groups can serve such a purpose. Also, meditation exercises can provide a relatively safe platform for communicating with people's emotional lives. Embracing emotions and respecting them makes people realize that they are not only emotions but there is another part of them called consciousness that does not fear, does not get sad and does not get angry. The advantage of such a process is that when emotions are accepted with openness, they can also face the roots of fear (Carlson & Speca, 2017).

One of the biological advantages of mindfulness is that people learn to pay attention to the present moment with compassion. This small and low-risk behavioural intervention will have a profound effect on the functioning of the body and ultimately on the lives of patients (Wolf & Serpa, 2015). Mindfulness can play a variety of roles in psychotherapy. When mindfulness training is done regularly, it is natural to communicate with patients in different ways. As the mind's capacity for attention increases, it becomes easier to be honest and real in the treatment room focus on the mind and be aware of the unfolding moment-by-moment thoughts and feelings of the patients and the therapist. Also, greater emotional tolerance provides patients with an enhanced capacity to be with painful emotions. Mindfulness exercises generally move attention away from patients' narratives and towards moment-to-moment experiences. As a result, mindfulness-based psychotherapy usually focuses on what is happening here and now and is also concerned with changing bodily sensations. Focusing on bodily sensations can also help heal traumatic memories or blocked emotions along the way. Many anxious patients feel good about being treated. They are happy to have a therapist that they can talk to and come up with a plan for when problems arise. Mindfulness helps patients with anxiety disorders focus their attention fully on what they are doing in a non-judgmental and accepting way. The extent of mindfulness practice can range from mindfulness training to intense meditation (Siegl et al, 2014).

The Function Of Mindfulness

Mindfulness measures are related to various mental health indicators and mindfulness interventions have a positive effect on mental health. Several psychological processes may be considered potential mediators of the beneficial effects of mindfulness, including increased understanding, mental awareness, exposure, acceptance, attentional control, memory, and self-regulation of behaviour (Keng et al, 2011).

Mindfulness, based on what is used in psychotherapy, has two important components: acceptance of the here and now and non-judgment. It means being aware of the present experience with acceptance (Siegl et al, 2014).

Establishing an optimal balance between concentration, attention, awareness and acceptance in any given moment is an art. Practising more concentration is often helpful when the mind is confused or lost in thought streams. When the mind is overwhelmed by difficult memories or emotions, or full of self-criticism, practising kindness, self-compassion, and sobriety will often help. When the mind is more stable and receptive, mindfulness can lead to greater insight and integration by helping to become aware and accepting of a wide range of thoughts, feelings, and memories (Siegl et al, 2014).

Rand and Chiavens (2012) define hope as the perceived ability to generate pathways to achieve desired goals and motivate oneself to use those pathways. Definitions and explanations for the main concepts of Omid Snyder's 1994 cognitive model, including goals, paths, and agency, are provided. Goals are abstract mental goals that guide human behaviour. Path thinking involves the perceived ability to create multiple paths to achieve desired goals. Mediated thinking involves the perceived ability to initiate and maintain movement along a path (323–334).

Hopefulness has been described as an inner resource, a state of mind, and a fundamental belief that there is a way out of problems. Hope provides the power of adaptation to overcome difficult situations and achieve the desired meaning and goals. One often-used definition of hope is a multidimensional life force characterized by confident yet uncertain expectations to achieve a bright future that is realistically possible and personally important to the hopeful.

Dufault and Martocchio have considered hope in close relation with this definition of hope as a multidimensional concept, the importance of hope is universally accepted and hope is closely related to the experiences of health and illness. In critical illness, the future may be uncertain in terms of survival, recovery, and daily functioning. In other patient groups, hope is important for coping, quality of life, and recovery. For patients who are in difficult life situations, hope is considered an effective coping strategy. Regarding hope, in one of the researches, several patients mentioned that when they were on the verge of death and life, they expressed hope to return to their previous life and their experience of severe illness was a motivation to change direction in life (Berntzen et al., 2024).

Hope stems from the innate drive for attachment, mastery, and survival. As a coping strategy and resource, hope has a positive relationship with well-being and quality of life. In health care, hope is seen as a protective and therapeutic intervention (Velic et al, 2023).

According to Snyder's complex in 2000, hope is considered a kind of thought process that consists of the component of active thinking (purposeful intentions) and paths (purposeful plans). Both components are essential in forming and determining the amount of hope through purposeful behaviours and cause adaptation and physical and mental health. Paths show a person's creativity to achieve goals. Agent thinking is the motivational component of hope and reflects a personal

perception of the ability to achieve past, present and future goals. This thinking shows the ability of a person to reach specific goals through hypothetical ways and achieve goals. Active thinking is important when facing obstacles in setting up the necessary motivation to step into other paths. Having meaning in life in interaction with hope increases happiness, satisfaction with life and positive emotions and also reduces depression (Khodapanahi et al., 2018).

The effect of mindfulness on hope

Related research emphasizes that social support facilitates individual adaptation to academic life and maintains a healthy state. As a result, it has a positive effect on mental health. Mindfulness, described as focusing and open observation of the present situation, is associated with mental health benefits. In other words, perceived hope is considered a positive psychological state when trying to achieve goals, which will create a sense of success and well-being. As an important point, mindfulness and perceived hope are known to be prominent predictors of mental health and can influence one's psychological state. The role of perceived social support, mindfulness, and perceived hope in enhancing mental health requires further investigation into their interdependencies. Mindfulness can strengthen self-acceptance, courage and self-confidence and have a positive effect on creativity and the physiological and psychological health of people. Supportive behaviours can promote feelings of hope and also reduce anxiety. Hope can reduce the stress of failure and motivate people to strive for their goals. Therefore, it is effective in coping with stress and adapting to environmental changes. Mindfulness and hope can reduce stress and regulate emotions, especially in adverse situations, prevent negative emotions and maintain mental health (Lo et al, 2023).

Both hope and mindfulness are believed to have state and trait components, and both can be learned and enhanced. Furthermore, the opposite of mindfulness (mindlessness) is associated with the opposite of hope (learned helplessness), suggesting a relationship between mindfulness and hope. Most importantly, factors such as resilience, mindfulness, and hope are related to various factors. As mindfulness and hope show a moderate relationship between life experiences and resilience, then interventions that increase mindfulness and hope can be used to reduce the negative impact of adverse experiences. Successfully increasing hope and mindfulness can make people stronger and more resilient to whatever obstacles they face, enabling them to overcome them with resilience (Collins, 2009).

Mindfulness and perceived hopefulness are recognized as prominent predictors of mental health and can influence a person's psychological state. Mindfulness can strengthen self-acceptance, courage and self-confidence in people and have a positive effect on creativity and the physiological and psychological health of people. There is a mediating role of perceived hope in the relationship between perceived social support and mental health literacy. Hope reflects a person's optimism about the future and acts as a motivation for people's ability to achieve goals.

The role of hope

Existing research emphasizes the important role of hope in achieving goals while simultaneously reducing negative emotions, increasing mental health, and enhancing happiness. Mindfulness acts as a mediating mechanism in the management of depression and emotional states. Hope can reduce the stress of failure and motivate people to strive for their goals. Therefore, it is useful in dealing with stress and adapting to environmental changes. Mindfulness and hopefulness can reduce stress

and regulate emotions, especially in adverse situations, as well as prevent the onset of negative emotions and maintain mental health. People who show high levels of hope show more motivation and more efficiency in facing challenges and realizing goals (Lo et al, 2023).

Clinical application of Increasing Hope

In clinical applications, it can be seen that hope is effective in the improvement of psychological diseases in the continuation of the individual's treatment. Hope is one of the most valuable resources in human nature that enables a person to cope with difficult and stressful situations such as loneliness, boredom and suffering. The level of hope in the disease process can affect well-being and treatment follow-up. Hope is an important psychological resource that helps patients cope with chronic diseases.

One of the main elements of the concept of recovery is the follow-up treatment. Hope is described as a vital part of the healing process. Hope is a future-oriented attitude that motivates a person with mental illness to overcome their negative symptoms by redefining their sense of personal purpose and meaning in life. Hope can facilitate purposeful thinking because it is well compatible with the cognitive process (Kısaoglu., Tel, 2024).

One way to help people think better and prepare for the future is to help them imagine the future in a way that does not involve negative emotions such as fear and helplessness, but rather positive ones such as hope and enthusiasm. Leino., Kulha, 2023).

In one of the researches conducted on kidney patients, they concluded that the trial of using hope to reduce pain and the use of opioids in hemodialysis and evaluating the effectiveness of an intervention based on cognitive behavioural therapy. as teaching pain coping skills to reduce pain interference and other pain-related outcomes among people on maintenance hemodialysis and chronic pain (Dember et al, 2024).

Research background

A study was conducted in 2021 in this field with the title of The Effect of MBAT Mindfulness-based Art Therapy on Psychological Distress and Spiritual Health in Breast Cancer Patients undergoing Chemotherapy. This study shows that psychological distress and spiritual well-being are directly related to the quality of life of cancer patients. As a result, the mean score of psychological distress and distress decreased significantly and significantly improved distress and spiritual well-being in terms of meaning, peace, and faith (Joshi et al, 2021).

A research in 2018 titled The Effectiveness of Cognitive Therapy Based on Mindfulness on Hope and Pain Beliefs of patients with Chronic Back Pain. Patients with LBP suffer from physical and mental disability. The results of this study show that MBCT can be an effective treatment to increase the hope of patients with chronic LBP. MBCT may be developed to reduce LBP (Abdolghaderi et al, 2018).

In a study conducted in 2019, the study aimed to determine the effect of cognitive therapy based on mindfulness on hope, ineffective attitudes and over-worry of infertile women. The findings showed that cognitive therapy based on mindfulness led to an increase in hope and a decrease in ineffective attitudes and over-anxiety in infertile women (Ebrahimi et al, 2013).

In a study conducted in 2013 to investigate the relationship between hope and pain, energy and psychological and demographic characteristics in adult outpatients of the oncology department based on the conceptual model of hope beyond it. Hope scores were significantly negatively related to age. Specifically, oncology patients who were 65 years of age or older had lower hope than

those under 65. Gender was also a significant factor and men had higher hope scores than women. As a result, older adults make up the majority of people diagnosed with cancer in Canada. Lower hope scores are found in this age group compared to their younger counterparts (Duggleby et al, 2013).

A 2010 study titled *Hope in Lung Cancer, Relationships of Hope with Symptoms and Psychological Distress* points to the importance of this issue. Findings from this cross-sectional study highlight the potential importance of hope in understanding adaptation to lung cancer (Berendes et al, 2010).

Shabahang et al. (1400), in an article on the effect of mindfulness-based stress reduction intervention on the resilience and life expectancy of patients with digestive cancers. The result of this research showed that mindfulness-based stress reduction intervention is an efficient method for improving the resilience and life expectancy of patients with gastrointestinal cancers, which ultimately leads to an increase in patient compliance.

The purpose of the research

Investigating the effect of mental awareness techniques on increasing hope in cancer patients undergoing radiotherapy treatment.

Research Method

Statistical population, sample and sampling method

The target population in the present study was cancer patients undergoing radiotherapy in Imam Ali Hospital (AS) of Bojnord City. The sampling method in this research was based on a simple random sampling method. Among the 64 cancer patients undergoing radiotherapy treatment who visited this medical centre during the 2 months of April and May 1403, 41 answered the Freiberg questionnaire with their consent, of which 30 had a higher score in This was the test, they were selected. Using the available sampling method, these numbers were divided into two groups of 15 people, control and experimental. 30 people selected as the experimental and control groups answered the Snyder's Hope Questionnaire with the consent of the doctor under their treatment, in terms of their ability to cooperate and no harm to their treatment, and the scores of the subjects were recorded in this variable.

Snyder's Hope Questionnaire

Snyder's Hope Questionnaire was created by Snyder and his colleagues in 1991 to measure hope. This questionnaire has 12 questions and is self-reported. Among these phrases, 4 phrases are used to measure operative thinking, 4 phrases are used to measure strategic thinking, and 4 are deviant phrases. Based on Snyder's theory, Snyder's hope scale evaluates a person's hope as a relatively stable personality trait (Khalji, 2016). The answers are classified with an 8-point Likert scale from completely agree with a score of 8 to completely disagree with a score of 1. The subject answers each question about how he thinks about himself now. The agent thinking subscale includes 4 questions 12, 10, 9, 2 and 4 questions 8, 6, 4, and 1 as strategic thinking questions. The scoring of questions 11, 7, 5, and 3 are removed as deviating questions to increase the accuracy of the test. Total scores range from 8 to 64.

Validity And Reliability Of The Questionnaire

The reliability of Omid Snyder's test of retest type after 3 weeks is 0.85 and for the agent thinking subscale it is 0.81 and for strategic thinking, it is 0.74. Lopez and Snyder (2007) have reported the internal consistency of the scale through Cronbach's alpha of 0.74 to 0.84 and its reliability coefficient of 0.80 with the retest method. In Iran's student population, its validity has been calculated through Cronbach's alpha for the whole scale of 0.82, for the agent thinking scale of 0.79 and the strategies of 0.88. In Khodapanahi et al.'s research in 2013, reliability was obtained through Cronbach's alpha for the total score of the hope scale of 0.86, for the agent thinking subscale of 0.77 and the strategies subscale of 0.79.

Freiberg Mindfulness Questionnaire (FMI)

This questionnaire was created by Bachhild, Grossman and Wallach (2001). This questionnaire has 30 items and in the short version implemented in this research, it has 14 questions and evaluates the non-evaluative observation of the present time and the acceptance of negative experiences. This questionnaire is made for people who participate in mindfulness meditation practice and is designed to be used by experienced meditators. Subjects answer the questions of the questionnaire as rarely, sometimes, often and always, which are scored with 4, 3, 2, and 1 grades, respectively.

Validity And Reliability of The Questionnaire

Bachhild, Grossman and Wallach in 2001 reported the alpha coefficient of this questionnaire as 0.93 and for those who answered the questionnaire at the beginning and the end of meditation at intervals of 3 to 14 days, it was 0.94. Cronbach's alpha coefficient of this questionnaire has been reported as 0.93. Cronbach's alpha coefficient of the short form of this questionnaire is 0.86 and its correlation coefficient is 0.31 in the clinical sample and 0.79 in the normal sample. Based on the research conducted on normal samples, 24.37 the standard deviation of this questionnaire was 5.63 in normal samples and 31.17 and 7.18 in clinical samples. The Freiberg Mindfulness Questionnaire in Iran has acceptable and sufficient reliability, and the coefficients obtained for Cronbach's alpha coefficient are 0.92, the ordinal theta is 0.93, and the retest reliability coefficient is 0.83 after 4 weeks.

Mindfulness Techniques Protocol

Because the group of participants were cancer patients undergoing treatment, as a result, the treatment intervention was tried to fit the condition and conditions of the patients so as not to harm them and their treatment process.

The main goal of teaching mindfulness techniques is to increase self-awareness and focus on the present. Attention that is focused on the present, purposeful and non-judgmental. Mindfulness techniques seek to increase flexibility, acceptance and regulation of emotions in people. Increasing awareness of the inside and increasing awareness of the outside world brings the ability to regulate thoughts, feelings and behaviours and increases the ability to be in people. The main goal of this approach is that people can live with all the troubles of life. The basic feature of this treatment program is briefly presented here and then it will be discussed in detail.

Sessions: 8 sessions that lasted for 2 months and one session per week for an average of 35 minutes according to the physical condition of the patients.

Mindfulness exercises: Exercises fall into two categories: formal exercises that include examining the body, sitting, eating, and walking, and informal exercises that include focusing attention, paying attention to the present moment, and choosing answers to everyday issues.

Homework: In addition to verbal exercises, patients are encouraged to do exercises at home and in daily life. So that the verbal learning of the sessions deepens and is included in daily life.

Necessary materials: the weekly exercise registration sheet that was provided to the patients at the end of each session.

Data analysis method

As mentioned at the beginning of the research, the purpose of this research was to investigate the effect of mindfulness techniques on increasing hope in cancer patients undergoing treatment. In this section, the findings from the questionnaires have been analyzed with the help of SPSS version 22 software in two sections descriptive and inferential statistics.

The findings

Average scores of the research variable

Based on the average calculated for the hope variable, the average hope scores of the patients in the experimental group before Snyder's hope test were 46.09, and after the mindfulness therapy intervention, the average hope scores of the patients were 52.63. In the control group, the average hope score was 41.73 and since this group did not receive any intervention, after 8 weeks, the hope score of the patients was calculated and the average hope score of the control group patients was 36.20.

The standard deviation and standard deviation error for hope are reported in Table 1.

Table 1- Average, standard deviation and standard deviation error of hope by groups

Standard error	standard deviation	Mean	Groups		
3/04	10/11	46/09	Control test	Pre-Test	hope level
3/06	11/86	41/73		Post-Test	
2/65	8/80	52/63	Control test	Pre-Test	
2/70	10/46	36/20		Post-Test	

Leven test

A Leven test was performed to check the equality of variances. The results of Table 2 were obtained.

Table 2. Leven Test hope level

significance Sig	F	Groups	
2/292	1/163	Pre-Test	hope level
0/320	1/032	Post-Test	

According to Table 2, the significance of the pre-test of hope in the group of equality of variances is greater than 0.05 (2.292>0.05) (P = As a result, the assumption of non-equality of variances is not rejected and the variance of the two groups is equal).

According to Table 2, the significance of the hope post-test in the equality of variances is greater

than 0.05 ($P=0.32 > 0.05$). As a result, the assumption of unequal variances is not rejected and the variance of the two groups is equal.

Inferential statistics

Covariance test

With the implementation of Lon's test and equality of variances in the variable of hope, the condition of using the covariance test has been met. In this regard, the covariance of hope scores in two control and experimental groups with pre-test and post-test is reported in Table 3.

Based on the reported Table 3, the significance of hope ($P=0.00 < 05.0$) obtained for the effect of mindfulness techniques on anxiety in the experimental group that received psychological treatment intervention, showed that mindfulness intervention has a positive effect on increasing hope. Also, based on the significance of the pre-test of hope ($P=0.00 < 05.0$) with the post-test of hope, it was concluded that there is a significant difference between the pre-test and the post-test of hope, so it can be concluded that the 8-week therapeutic intervention of mindfulness increases hope in It has a positive effect on cancer patients undergoing treatment.

Based on the F score of hope reported in Table 3, the F score in the pre-test of hope is 108/47 and the impact of mindfulness techniques on the hope of the experimental group is 58/34. This results in mindfulness techniques as a therapeutic intervention. It has been very effective in increasing hope.

Table 3- Covariance of hope in two control and experimental groups

degree of freedom	F	significance	Groups	
1	108/47	0/00	Pre-Test	Hope
1	58/34	0/00	The effect of mindfulness techniques	

Adjusted Mean Expectancy

The adjusted average of the hope pre-test in Table 4 is equal to 43.57, assuming equal variances in the two groups. According to the adjusted average of the experimental group in the post-test (50.83), indicates an increase in hope in the experimental group due to the therapeutic intervention, and the adjusted average of the control group in the post-test was reported as 37.75, as it is evident. Hope has decreased in the control group.

Table 4-Adjusted averages after the hope test

standard deviation	Adjusted mean	Groups	Variable
1/27	50/63	Test	Hope
1/09	37/67	Control	

Discussion and conclusion

Mindfulness techniques have a positive effect on increasing hope in cancer patients.

When people lose hope, they stop taking purposeful actions to achieve desired results. The mindfulness approach based on cognitive therapy, focusing on the here and now, empowers people to take appropriate actions in the present time and about whatever is happening, and this is in line with creating hope in patients.

The results of the current research have led to the positive effect of mindfulness therapy intervention on increasing the hope of cancer patients. The results of this research are by the findings of other researchers, including Daglebi and his colleagues (2013), Abdul Qadri and his colleagues (2018), Ebrahimi and his colleagues (2019), and Shabahang and his colleagues (1400) in these studies on the importance and effect of mindfulness on hope in patients. They have been diagnosed with cancer.

Among patients who are facing serious diseases such as advanced cancer, hope appears in different forms. In general, hoping, wishing or believing in the possibility of a better future. A hope can also be a decision or intervention that produces a specific outcome. According to Culhane, hope differs from expectation in that hopes are always positive and maybe improbable. When hope is misaligned with what is medically realistic, such as when terminally ill patients hope for a cure. Patients may avoid advanced directive discussions, choose inappropriately invasive care, and endure excessive psychological distress. Doctors need to understand their patient's hope for treatment to facilitate informed patient decision-making (Martini et al, 2019).

In cancer patients, mindfulness is effective in the desire to die, hopelessness and suicidal thoughts in addition to influencing depression, social support, physical performance and cancer symptoms (Cho et al, 2021).

Mindfulness focuses on a broader view of the present as it relates to mental health. Perceived hope is considered a positive psychological state when striving to achieve goals, fostering a sense of accomplishment and well-being. Mindfulness and hope are important predictors of mental health and affect it. Mindfulness as a mechanism in the management of depression and emotional states. Mindfulness and hope can reduce stress in adverse situations regulate emotions prevent negative emotions and maintain mental health. Also, high levels of hope can lead to increased motivation (Lo et al, 2023).

Research Proposals

- 1- Because in this study, women and men were not separated, it is suggested that the treatment be carried out separately in women and men and the results of the treatment should be investigated in two separate communities of women and men.
- 2- In the present study, the age of the patients, level of education and familiarity with psychological services were not taken into account, it is suggested that the researchers investigate the factors of age, level of education and level of familiarity with psychological treatments in the effectiveness of the treatment in future researches.
- 3- In the current study, the level of mindfulness of patients was only checked at the beginning, researchers are suggested to perform the Freiberg test at the end of the mindfulness treatment to check the effectiveness of this treatment.
- 4- To evaluate the effectiveness of the treatment in the long term, researchers are advised to have a follow-up phase after a few weeks and reassess the hope.
- 5- Mindfulness techniques should be implemented as group therapy to increase the hope of cancer patients undergoing treatment to provide more effective psychological treatment to patients.

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