Research Paper:

Effectiveness of Cognitive-behavioral Therapy and Mental Imagery Exercises on Health-related Quality of Life of Patients With Leukemia and Lymphoma

Abbas Betiar[1] , Naser Saraj Khorrami[2*] , Behnam Makvandi[3]

1. Department of Health Psychology, Khorramshahr International Branch, Islamic Azad University, Khorramshahr, Iran.
2. Department of Psychology, Dezful Branch, Islamic Azad University, Dezful, Iran.
3. Department of Psychology, Ahvaz Branch, Islamic Azad University, Ahvaz, Iran.

ABSTRACT

Background: Patients with cancer experience considerable psychological distress, which leads to depressive symptoms, severe anxiety, and decreased quality of life. The present study aimed to determine the effectiveness of Cognitive-Behavioral Therapy (CBT) and Mental Imagery Exercises (MIE) on the Health-Related Quality of Life (HRQoL) of patients with leukemia and lymphoma living in Babol City, Iran.

Methods: This research was a field trial study with a pre-test, post-test design and a control group. The statistical population consisted of all male and female patients with leukemia and lymphoma, referring to the Hematology Department of Ayatollah Rouhani Hospital of Babol Province, in 2019. A total of 45 patients were recruited based on the inclusion criteria and were randomly assigned into two experimental groups and one control group (15 per group). The first experimental group received eight 90-minute sessions of individual CBT and the second experimental group received ten 90-minute sessions of MIE. The control group received no intervention. The study data were collected by the 36-item short-form survey (SF-36) before and 45 days after the last treatment session. Then, the data were analyzed using descriptive (mean, standard deviation) and inferential statistics (analysis of covariance [ANCOVA]) in SPSS software, v. 23.

Results: The results indicated that CBT and MIE had a significant positive effect on HRQoL in patients with leukemia and lymphoma (P<0.001). There was no significant difference between the effectiveness of the two therapies.

Conclusion: Considering the effectiveness of the CBT and MIE on HRQoL in patients with cancer, we suggest they be utilized extensively along with medical and clinical interventions to improve the HRQoL of cancer patients.

* Corresponding Author:
Naser Saraj Khorrami, PhD.
Address: Department of Psychology, Dezful Branch, Islamic Azad University, Dezful, Iran.
Tel: +98 (61) 42420606
E-mail: serajkhorrami@gmail.com

Highlights

- The emotional, cognitive, and social aspects of cancer may affect the HRQO.

- CBT and MIE had a significant positive effect on the HRQoL.

- No difference was observed between the CBT and MIE in terms of their effectiveness on the HRQoL.

Plain Language Summary

Cancers have become increasingly prevalent among noncontagious chronic diseases. Chronic diseases such as cancers can severely affect the patients' health and HRQoL. Patients with cancer may experience considerable stress, anxiety, depression, and psychological problems, which leads to low HRQoL. This results of this study suggest that CBT and MIE positively affect HRQoL in patients with cancer. Moreover, there is no significant difference between the effectiveness of the two therapies.

1. Introduction

Despite achievements in controlling and preventing contagious diseases in recent decades, chronic diseases are rising (Rodin et al., 2018). These diseases affect all stages of life. Although some illnesses have slight effects on the Health-Related Quality of Life (HRQoL), these effects are significant in most cases due to the debilitations caused by the diseases. In particular, chronic diseases are characterized by a prolonged course and unclear prognosis; therefore, they require hefty costs and many efforts for treatment (Poorcheraghi, Hekmatpou, & Mehrabi, 2019). Among the most important health problems in societies, chronic diseases such as cancers can severely affect the patients' health and HRQoL (Nayak et al., 2017).

Cancer emerges when a cell starts multiplying and growing uncontrollably, resulting in a decreased number of normal cells. In some countries, cancer is considered the second cause of death after cardiovascular diseases (Rawla, Sunkara, & Barsouk, 2019). In Iran, cancer is the third cause of death after cardiovascular diseases and accidents (Rahimi Pordanjani et al., 2016). Defined as the cancer of leukocytes, leukemia is an extensive term referring to a category of cancers in the bone marrow and the lymphatic system. Leukemia is classified into two major groups called myeloid and lymphoid: each of which can be acute or chronic. Lymphoma is another prevalent cancer that emerges in lymphatic tissues such as lymph nodes, spleen, and thymus that generate and store the infection-fighting cells. Lymphoma is generally divided into Hodgkin and non-Hodgkin lymphoma (van der Meulen et al., 2018).

Known as a negative stressor, cancer has serious impacts on both the mental health and physical health of patients. According to the research, patients with cancer experience high levels of mental distress, leading to depression and severe anxiety (Carlson et al., 2019). The experience of being diagnosed with cancer and feeling threatened by its serious after-effects in the near future can cause significant psychological challenges among patients (Syrowatka et al., 2018). The emotional, cognitive, and social dimensions of cancer, along with the side effects of pharmacotherapy, can cause adverse effects on patients' HRQoL.

The World Health Organization (WHO) defines Quality of Life (QoL) as an individual's perception of their position in life in the context of the culture and value systems in which they live. This position is related to their goals, wishes, criteria, and priorities. This definition has three components: objective satisfaction, functional status, and contextual factors. The first two components overlap with the QoL and mental health (Rafii, Haghani, & Heidari Beni, 2017). The patients' HRQoL measurement is not only a tool for evaluating the effectiveness of therapeutic interventions but also a method for analyzing the effectiveness costs of these interventions (Wang et al., 2016). In general, the HRQoL includes physical health, psychological status, independence level, social relations, personal beliefs, and the relationships of these factors with environmental features (Corren et al., 2019). Besides the complications of cancer, patients and their families also experience psychological, social, and economic burdens. Therefore, this disease reduces individual and social functions and has severe effects on the role of patients in life, employment status, and ultimately their HRQoL (i.e., mental health and physical health)

(Nayak et al., 2017). In addition, HRQoL can predict the severity and effects of diseases, complications, and disabilities, as well as mental health status in communities (Chou et al., 2017).

Different treatments have been administered in patients with chronic diseases such as cancer. With the ever-increasing developments in health psychology, psychologists have now assumed more active roles in treating patients with cancer. Cognitive-Behavioral Therapy (CBT) is among the most important treatments. This therapy helps clients to think differently with a new mindset; as a result, they can deal with unwanted and unfortunate events around them with proper and healthier behaviors. CBT aims to modify misinterpretation, infuse control over life, increase positive constructive monologues, and improve coping skills (Johnson et al., 2016). Since this intervention has fewer complications than the other treatments, it is more accessible and useful for patients who suffer from chronic diseases. Many studies have assessed the effectiveness of this treatment on the HRQoL of patients with chronic diseases such as cancer (Sun et al., 2019; Getu et al., 2021; Kunzler, Naves, & Casulari, 2018; Bennebroek Evertsz et al., 2017). However, in most cases, this intervention has been conducted on women with breast cancer or the patients who completed their treatment periods: who are considered cancer survivors. Hence, the present study seeks to fill this research gap.

Mental Imagery Exercises (MIE) is another technique for improving the HRQoL of patients with cancer. MIE is a compelling way to use clients' imaginations to build a better life and achieve their desires and aspirations. It is classified as a mental intervention that can significantly affect the physical, emotional, and mental dimensions of the client. MIE is believed to moderate and alleviate the symptoms of diseases, reduce stress and anxiety in patients, amplify motivation, improve tranquility, enhance control over personal life, and improve relationships (Arntz, 2012). The research literature indicates the effectiveness of this therapy on depression, anxiety, and HRQoL among different groups of patients with chronic conditions and the elderly (Kaur et al., 2019; Kashani et al., 2012; Whitaker, Brewin, & Watson, 2010; Telles et al., 2019).

Generally, cancer has a distinct place in psychology, especially health psychology. According to many studies, patients with cancer experience severe psychological problems. These studies indicate that these patients not only have lower QoL than healthy people, but they also experience higher levels of stress, anxiety, depression, and psychological problems. Other studies have shown that if the necessary training is given to these people, the

improvement of their medical and physical therapies will be accelerated and strengthened (Gennaro et al., 2019). Accordingly, this study aimed to compare the effectiveness of CBT and MIE on the HRQoL of patients with leukemia and lymphoma.

2. Materials and Methods

Study design and sample

This research was a field trial with a pre-test, post-test design and a control group. The statistical population consisted of all male and female patients with leukemia and lymphoma, referring to the Hematology Department of Ayatollah Rouhani Hospital of Babol City, Iran, in 2019. G*power software was used to calculate the sample size. Accordingly, among 96 patients assessed for eligibility, 45 patients were selected and randomly assigned into two experimental groups and one control group (Figure 1).

The inclusion criteria were affliction with cancer and being admitted to the hematology ward, patients' consent to participate in the study, minimum high school education to understand therapeutic concepts, absence of severe psychological disorders that require medication, no neurological diseases such as epilepsy and Alzheimer disease, no addiction to drugs and alcohol, having the ability and the energy to complete the inventory, and physicians' approval for their participation in the study. The exclusion criteria were withdrawing from the study, concomitant use of psychedelics, and patient's illness during the intervention when the physician forbids attending therapy sessions.

Study instruments

The 36-Item Short-Form Survey (SF-36)

This questionnaire is a measure of health-related QoL. It has 36 items that evaluate eight different areas of health: physical dimension (10 items), physical role (4 items), bodily pain (2 items), general health (5 items), vitality (4 items), social function (2 items), role-emotional (3 items), and mental health (5 items). In this questionnaire, item 2 is not part of any of the subscales and its score is added to the total score. The subscales are merged to form two general subscales, one of which is physical health, including Physical Function (PF), Role disruption due to Physical health (RP), Pain (P), and General Health (GH). The other mental health subscale includes role disruption due to Role-Emotional (RE), Energy/Fatigue (EF), Emotional Wellbeing (EW), and Social Function (SF). This questionnaire is scored on a 5-point Likert scale from 0 to
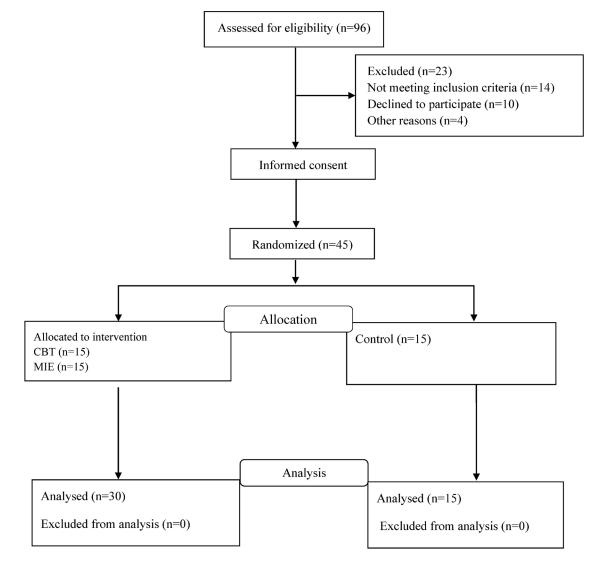
Figure 1. CONSORT flow diagram

4. The total score ranges from 0 to 100, with scores below 45 representing very poor HRQoL, 45-60 poor HRQoL, 60-75 good HRQoL, and above 75 excellent HRQoL. The SF-36 is quickly completed, with 84% completed in 10 minutes or less (median time 8 minutes) (Zhang et al., 2012). Fallahzade and Balanian (2020) reported the Cronbach α coefficient of 0.86 for the whole questionnaire. In the present study, the Cronbach α coefficient was 0.80 for the whole questionnaire.

Intervention program

Cognitive Behavioral Therapy (CBT)

The first experimental group received eight 90-minute sessions (once a week) of CBT. The first author held the therapeutic sessions in one of the meeting rooms of the hospital. The cognitive-behavioral group therapy ses-

sions include the following contents. Session 1 starts with introducing members to each other, becoming acquainted with the logic of stress management, and setting therapy goals. Session 2 discusses the concept of stress management and increasing awareness of physical responses to stressful events. Session 3 allocates to automatic thoughts and starts to identify cognitive distortions. Session 4 is about learning to replace logical thoughts through stress management. Session 5 discusses coping styles, coping theory, and increasing awareness about different coping styles. Session 6 continues the concept of coping and introduces learning and practicing long effective steps, as well as flexibility/acceptance for overwhelming stressors. Session 7 is about identifying useful/harmful sources of social support, learning new strategies for developing, and expanding supportive networks. Session 8 is about identifying the

Table 1. Demographic characteristics of the subjects in the experimental and control groups

Groups	Age (y) (Mean±SD)	No.(%)			
		Education		Gender	
		High School	College	Male	Female
Control	44.25±7.23	9(60.00)	6(40.00)	7(46.67)	8(53.33)
CBT	43.82±8.11	8(53.33)	7(46.67)	8(53.33)	7(46.67)
MIE	46.16±6.92	10(66.67)	5(33.33)	8(53.33)	7(46.67)
P	0.482	0.284		0.910	

CBT: Cognitive Behavioral Therapy; MIE: Mental Imagery Exercises.

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features of anger patterns, learning new strategies for anger assessment and management, and finally analyzing and discussing results at the end of the therapy. After each session, the assignments from the previous week were reviewed and discussed. The participants were instructed to apply what they had learned in their daily lives after the sessions.

Mental Imagery Exercises (MIE)

This intervention was held in ten 90-minute MIE sessions beginning with meditation and gradual relaxation of muscles. In this technique, an individual visualizes arbitrary changes and ideal states mentally. It is individual- and preference-based and can be implemented through different imaginations considered exciting and significant by an individual. For instance, an individual can visualize pain as a melting pain that exits like droplets from fingertips. It is also possible to visualize the fight between immune cells and cancerous or viral cells as images of an attack by a flock of birds against rats. The first session was held to make acquaintance and communicate with patients through individual interviews. This session also included explaining treatment steps and methods used in a therapy session and asking about the patient's feelings before and during the illness. The session also included sympathizing with the patient, analyzing the patient's conditions and problems, and preparing for the process. After that, MIE was conducted (by starting meditation in a peaceful environment, relaxing muscles gradually, and practicing mental imagery). The MIE was practiced again at another time of the day. The second session was similar to the first session until the end. In addition to these sessions, the participants were asked to continue practicing MIE at home. Finally, every patient's feedback was recorded.

The control group did not receive any treatment. At the end of the study, to observe ethical considerations, the control group received a course of CBT or MIE if they wished. The questionnaires were completed 45 days after the interventions by the three groups.

Statistical analysis

The data were analyzed by descriptive and inferential statistics, such as Mean±SD and ANCOVA. The LSD (Least Significant Difference) test was utilized to investigate the difference between the groups. SPSS software v. 23 was used to analyze the data.

3. Results

The Mean±SD age of the subjects was 40.27±8.61 years. Table 1 presents the demographic characteristics of the participants. Table 2 presents the Mean±SD of the subscales of HRQoL in the experimental and control groups in the pre-test and post-test phases.

The first step to analyze the significant differences between the experimental and control groups in the post-test was to use ANCOVA to control the effect of the pre-test. The normality of data distribution and the variance homogeneity of groups are among the main assumptions of ANCOVA. The insignificance of Z in the Kolmogorov-Smirnov test indicated that the HRQoL variable was normally distributed. Moreover, Levene's test was used to analyze the variance homogeneity assumption (for the equality of variances in both control and experimental groups) (F=2.40, P=0.06). According to the results, the variance homogeneity assumption was established. Thus, it was logical to use the ANCOVA. Moreover, the ANOVA was used to analyze the assumption of homogeneity of regression slopes (F=0.32, P=0.73). The insignificance of this interaction indicates that this assumption holds. Hence, this assumption holds for all the variables. The insignificance of the covariance homogeneity assumption was determined through Box's M test. The result indicated that the assumption was met (F=1.28, P=0.17). Therefore, the ANCOVA could be

Table 2. Mean±SD of the subscales of HRQoL in the experimental and control groups in pre-test and post-test phases

Variables	Phases	Mean±SD		
		CBT Group	MIE Group	Control Group
Physical health	Pre-test	16.13±5.74	18.73±6.35	17.92±5.66
	Post-test	41.36±8.28	40.66±7.78	16.35±5.31
Mental health	Pre-test	10.13±5.22	8.73±7.14	11.38±6.44
	Post-test	32.66±7.39	34.60±8.97	10.54±5.41
HRQoL (total)	Pre-test	26.26±8.13	27.46±10.87	29.31±9.90
	Post-test	73.93±12.67	75.26±15.85	27.08±8.91

CBT: Cognitive-Behavioral Therapy; MIE: Mental Imagery Exercises; HRQoL: Health-Related Quality of Life.

employed. For this purpose, a 1-way univariate ANCO-VA was adopted to analyze the effects of the independent variable on each of the dependent variables.

According to Table 3, the univariate test results were significant for the HRQoL and its subscales (P<0.001). Hence, the intervention program was influential on the HRQoL. Furthermore, the post hoc test was employed to analyze and compare the effect of each treatment on the HRQoL.

According to Table 4, the mean HRQoL of the control group had significant differences with both CBT and MIE groups (P<0.001). In other words, each of the two interventions affected the HRQoL of patients with can-

cer; however, there were no significant differences between the effects of CBT and MIE.

4. Discussion

The present study aimed to determine the effectiveness of CBT and MIE on HRQoL among patients with leukemia and lymphoma. According to the findings, both therapies improved the HRQoL of the subjects. The results also indicated no significant differences between CBT and MIE in terms of HRQoL. This study proved the effectiveness of CBT on the HRQoL of patients with leukemia and lymphoma, which was consistent with the findings of previous studies (Sun et al., 2019; Bennebroek Evertsz et al., 2017). A valuable aspect of this intervention is to make patients with cancer aware

Table 3. Results of ANCOVA on the post-test scores of the variables

Variables	Sum of Squares	df	Mean Square	F	P	η²	Power
Physical health	17178.02	2	8589.09	88.46	0.001		
Mental health	3428.57	2	1714.28	48.46	0.001	0.83	1.00
Total HRQoL	3223.05	2	1611.53	35.10	0.001		

HRQoL: Health-Related Quality of Life.

Table 4. The LSD test for paired comparison of HRQoL in the post-test phases

Variables	Groups	Mean Difference	SE	P
HRQoL	CBT - Control	52.64	4.70	0.001
	MIE - Control	52.05	4.18	0.001
	CBT - MIE	0.58	4.01	0.880

HRQoL, Health-Related Quality of Life; CBT: Cognitive-Behavioral Therapy; MIE: Mental Imagery Exercises; SE: Standard Error.

of automatic thoughts and cognitive distortions. Also, it replaces inefficient thoughts with positive ones. It can also help patients manage anger, stress, and depression to improve their HRQoL. The intervention also aims to identify the stimulants of anger in response to illness and train patients in anger management strategies, something which can help improve their HRQoL. Finally, the patients in the CBT group are trained to learn the useful and harmful sources of social support and learn how to expand the social support network, something which can also improve their HRQoL (Moradi Manesh & Babakhani, 2018). CBT mitigates a patient's cognitive and physical symptoms by changing their ways of thinking, making cognitive reconstructions, replacing logical thoughts, and suggesting relaxation techniques. The techniques of challenging and changing beliefs can be effective in mitigating depression and improving the HRQoL (Hayes et al., 2013).

The results also indicated that MIE improved the HRQoL of the subjects, which was consistent with the previous studies (Arntz, 2012; Telles et al., 2019). In MIE, with the help of mental imagery, positive and direct conscious suggestions are presented in the form of sentences. In this method, the eyes are closed, and the body is in a state of tranquility. The patient starts breathing slowly and imagines that their immune system consists of many fighting soldiers attacking the pathogens that are considered enemies. This technique helps communicate with the subconscious mind and thus helps the body function properly (Rossman, 2019). In other words, MIE allows people to control and manage their mental images. This ability prevents negative imaginations from entering the mind; therefore, the patient's mood and HRQoL improve.

Finally, the research results indicated no significant differences between the effectiveness of the CBT and that of MIE on the HRQoL of patients. No study was found comparing the effects of these therapies on HRQL. Therefore, we cannot remark on the consistency or inconsistency of this finding with the previous studies. However, it can be stated that cancer and its different treatments have various effects on patients and their families by changing their personal lives, daily activities, occupations, communications, and familial roles. Cancer and its treatments cause high levels of psychological stress among patients (Reed et al., 2012). After being diagnosed with cancer, a patient faces a near-death experience, negatively affecting their HRQoL. In other words, encountering death make patients experience emptiness, uselessness, and senselessness in life, which can change their HRQoL more than ever (Gonen et al., 2012).

5. Conclusion

According to the research findings, CBT and MIE had a significant positive effect on HRQoL of patients with lymphoma and leukemia. Still, no difference was found between these two therapies in terms of their effectiveness on the HRQoL of the patients. Hence, patients with cancer need such interventions besides medical treatments to cope with complications, improve their HRQoL, and tolerate extreme stress and distress caused by the critical conditions of their diseases.

It should be borne in mind that the study participants were cancer patients, so further research is needed to generalize the results to other cancer populations. In addition, due to the limitations caused by the COVID-19 pandemic and the loss and illness of some participants, it was impossible to assess the retention of therapy at follow-up, which is recommended for future research. Regarding the major services and care provided by medical organizations and the insurance coverage for families on the treatment process and psychological characteristics of patients, it is suggested to conduct a similar study on individuals while controlling their socioeconomic status and the medical service they receive. Given the effectiveness of these therapies, it is recommended to apply them in medical centers along with medicinal treatments.

Acknowledgments

References

Arntz, A., 2012. Imagery rescripting as a therapeutic technique: Review of clinical trials, basic studies, and research agenda. *Journal of Experimental Psychopathology*, 3(2), pp. 189-208. [DOI:10.5127/jep.024211]

Bennebroek Evertsz', F., et al. 2017. Effectiveness of cognitive-behavioral therapy on quality of life, anxiety, and depressive symptoms among patients with inflammatory bowel disease: A multicenter randomized controlled trial. *Journal of consulting and Clinical Psychology*, 85(9), pp. 918-25. [DOI:10.1037/ccp0000227] [PMID]

Carlson, L. E., et al. 2019. Prevalence of psychosocial distress in cancer patients across 55 North American cancer centers. *Journal of Psychosocial Oncology*, 37(1), pp. 5-21. [DOI:10.1080/07347332.2018.1521490] [PMID]

Chou, Y. Y., et al. 2017. Impact of fatigue characteristics on quality of life in patients after heart transplantation. *The Journal of Cardiovascular Nursing*, 32(6), pp. 551-9. [DOI:10.1097/JCN.0000000000000400] [PMID]

Corren, J., et al. 2019. Dupilumab improves symptoms, quality of life, and productivity in uncontrolled persistent asthma. *Annals of Allergy, Asthma & Immunology*, 122(1), pp. 41-9.e2. [DOI:10.1016/j.anai.2018.08.005] [PMID]

Fallahzade, H. & Balanian, S., 2020. [Evaluation of Sf-36 questionnaire dimensions in quality of life of postmenopausal women referring to Yazd city health centers in 2019 (Persian)]. *The Journal of Toloo-e-behdash*, 19(5), pp. 78-93. [DOI:10.18502/tbj.v19i5.5169]

Gennaro, A., et al. 2019. Training in psychotherapy: A call for embodied and psychophysiological approaches. *Research in Psychotherapy*, 22(3), p. 395. [DOI:10.4081/ripppo.2019.395] [PMID] [PMCID]

Getu, M. A., et al. 2021. Study protocol of CBT-AP trial: A randomized controlled trial of cognitive behavioral therapy integrated with activity pacing for fatigued breast cancer patients undergoing chemotherapy. *Integrative Cancer Therapies*, 20, p. 15347354211032268. [DOI:10.1177/15347354211032268] [PMID] [PMCID]

Gonen, G., et al. 2012. The factors contributing to death anxiety in cancer patients. *Journal of Psychosocial Oncology*, 30(3), pp. 347-58. [DOI:10.1080/07347332.2012.664260] [PMID]

Hayes, S. C., et al. 2013. Acceptance and commitment therapy and contextual behavioral science: examining the progress of a distinctive model of behavioral and cognitive therapy. *Behavior Therapy*, 44(2), pp. 180-98. [DOI:10.1016/j.beth.2009.08.002] [PMID] [PMCID]

Johnson, J. A., et al. 2016. A systematic review and meta-analysis of randomized controlled trials of Cognitive Behavior Therapy for Insomnia (CBT-I) in cancer survivors. *Sleep Medicine Reviews*, 27, pp. 20-8. [DOI:10.1016/j.smrv.2015.07.001] [PMID]

Kashani, F., et al. 2012. The effects of relaxation on reducing depression, anxiety and stress in women who underwent mastectomy for breast cancer. *Iranian Journal of Nursing and Midwifery Research*, 17(1), pp. 30-3. [PMID] [PMCID]

Kaur, J., et al. 2019. Mental imagery training for treatment of central neuropathic pain: A narrative review. *Acta Neurologica Belgica*, 119(2), pp. 175-86. [DOI:10.1007/s13760-019-01139-x] [PMID]

Kunzler, L. S., Naves, L. A. & Casulari, L. A., 2018. Cognitive-behavioral therapy improves the quality of life of patients with acromegaly. *Pituitary*, 21(3), pp. 323-33. [DOI:10.1007/s11102-018-0887-1] [PMID]

Moradi Manesh, F., & Babakhani, K. 2018. Effectiveness of cognitive-behavioral group therapy on self-efficacy and quality of life in women with breast cancer: A clinical trial. *Iranian Journal of Breast Diseases*, 10(4), pp. 7-17. https://ijbd.ir/browse.php?a_id=662&slc_lang=en&sid=1&printcase=1&hbnr=1&hmb=1

Nayak, M. G., et al. 2017. Quality of life among cancer patients. *Indian Journal of Palliative Care*, 23(4), pp. 445-50. [DOI:10.4103/IJPC.IJPC_82_17] [PMID] [PMCID]

Poorcheraghi, H., Hekmatpou, D. & Mehrabi, F., 2019. The quality of life of patients with different leukemia types. *Journal of Client-centered Nursing Care*, 5(2), pp. 97-104. [DOI:10.32598/JCCNC.5.2.97]

Rafii, F., Haghani, H. & Heidari Beni, F., 2017. Health-related quality of life and related factors in patients with chronic obstructive pulmonary disease. *Journal of Client-centered Nursing Care*, 3(1), pp. 45-50. [DOI:10.32598/jccnc.3.1.45]

Rahimi Pordanjani, S., et al. 2016. [Epidemiology of colorectal cancer: Incidence, mortality, survival rates and risk factors (Persian)]. *Razi Journal of Medical Sciences*, 23(144), pp. 41-50. http://rjms.iums.ac.ir/article-1-4116-en.html

Rawla, P., Sunkara, T. & Barsouk, A., 2019. Epidemiology of colorectal cancer: Incidence, mortality, survival, and risk factors. *Przeglad Gastroenterologiczny*, 14(2), pp. 89-103. [DOI:10.5114/pg.2018.81072] [PMID] [PMCID]

Reed, E., et al. 2012. Quality of life and experience of care in women with metastatic breast cancer: A cross-sectional survey. *Journal of Pain and Symptom Management*, 43(4), pp. 747-58. [DOI:10.1016/j.jpainsymman.2011.05.005] [PMID]

Rodin, G., et al. 2018. Managing Cancer and Living Meaningfully (CALM): A randomized controlled trial of a psychological intervention for patients with advanced cancer. *Journal of Clinical Oncology*, 36(23), pp. 2422-32. [DOI:10.1200/JCO.2017.77.1097] [PMID] [PMCID]

Rossman, M. L., 2019. Imagine health! Imagery in medical self-care. Milton Park: Routledge; [DOI:10.4324/9781315227450-10]

Sun, H., et al. 2019. The efficacy of cognitive behavioral therapy to treat depression and anxiety and improve quality of life among early-stage breast cancer patients. *Integrative Cancer Therapies*, 18, p. 1534735419829573. [DOI:10.1177/1534735419829573] [PMID] [PMCID]

Syrowatka, A., et al. 2017. Predictors of distress in female breast cancer survivors: A systematic review. *Breast Cancer Research and Treatment*, 165(2), pp. 229-45. [DOI:10.1007/s10549-017-4290-9] [PMID] [PMCID]

Telles, S., et al. 2019. Mental wellbeing, quality of life, and perception of chronic illness in yoga-experienced compared with yoga-naïve patients. *Medical Science Monitor Basic Research*, 25, pp. 153-63. [DOI:10.12659/MSMBR.914663] [PMID] [PMCID]

van der Meulen, M., et al. 2018. Cognitive functioning and health-related quality of life in patients with newly diagnosed primary CNS lymphoma: A systematic review. *The Lancet. Oncology*, 19(8), pp. e407-18. [DOI:10.1016/S1470-2045(18)30356-5] [PMID]

Wang, T. C., et al. 2016. Effects of a supportive educational nursing care programme on fatigue and quality of life in patients with heart failure: A randomised controlled trial. *European Journal of Cardiovascular Nursing*, 15(2), pp. 157-67. [DOI:10.1177/1474515115618567] [PMID]

Whitaker, K. L., Brewin, C. R. & Watson, M., 2010. Imagery rescripting for psychological disorder following cancer: A case study. *British Journal of Health Psychology*, 15(Pt 1), pp. 41-50. [DOI:10.1348/135910709X425329] [PMID]

Zhang, Y., et al. 2012. The 36-item short form health survey: Reliability and validity in Chinese medical students. *International Journal of Medical Sciences,* 9(7), pp. 521-6. [DOI:10.7150/ijms.4503] [PMID] [PMCID]

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