

Effectiveness of Mindfulness-Based Stress Reduction Therapy on the Quality of Life of Patients with Lung Cancer

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Background: Lung cancer is one of the most common and life-threatening cancers in men around the world. Therefore, it is important to pay particular attention to the psychological status of patients with lung cancer due to their greater vulnerability during treatment. This study aimed to evaluate the effectiveness of mindfulness-based stress reduction therapy on the quality of life of patients with lung cancer.

Materials and Methods: This quasi-experimental study, with a pretest-posttest design and a three-month follow-up, was conducted in the summer of 2019. Thirty patients with lung cancer, who were referred to Masih Daneshvari Hospital in Tehran, Iran, were selected through purposive sampling and randomly assigned to experimental (n=15) and control (n=15) groups. In the pretest stage, the Short-Form Health Survey (SF-36) was completed by both groups. The experimental group received mindfulness-based stress reduction therapy for eight sessions, while the control group did not receive any intervention. In the posttest stage, both groups were examined again, and data were analyzed using SPSS version 21 by repeated measures multivariate analysis of variance (MANOVA).

Results: The findings showed a significant difference between the experimental and control groups after mindfulness-based stress reduction therapy. In other words, the mean score of quality of life increased in the experimental group as compared to the control group ($P < 0.001$).

Conclusion: Based on the results of this study, the effectiveness of mindfulness-based stress reduction therapy in increasing the quality of life of patients with lung cancer was confirmed. Therefore, psychological screening is suggested to improve the quality of life of patients by taking advantage of clinical trials and appropriate intervention models during medical treatment.

Keywords: Lung cancer; Mindfulness-based stress reduction therapy; Quality of life

INTRODUCTION

Cancer is the third leading cause of death after cardiovascular disease and cerebrovascular accidents. It is a prevalent debilitating disease in both developed and developing countries (1). Lung cancer is recognized as one of the most common, severe, and life-threatening types of

cancer among men worldwide (2). Evidence shows that the number of people dying from lung cancer is higher than the total number of deaths due to breast, prostate, and colorectal cancers (3).

Cancer diagnosis has significant effects on the patients' physical, social, psychological, and spiritual aspects of life

(4). The quality of life (QOL) is markedly reduced in patients with lung cancer (5). Reports suggest that 50% of patients with lung cancer, 35% of patients with various types of gastrointestinal cancers, and 39% of patients with any type of cancer also suffer from major depression (6). These patients also experience pain due to metastasis, reduced social activity, and disability (7). Anxiety, stress, and other mood disorders may also occur in these patients. However, these conditions may change over time in response to diagnosis, relapse, or improvement of the disease (8).

Numerous studies have shown a relationship between the mental status and the immune system. Emotional disorders, such as depression, anxiety, and stress, tend to compromise the immune system (9). Improvement of the patients' QOL by controlling and alleviating the psychological symptoms due to physical diseases not only develops their skills and determination, but also strengthens their immune system, reduces their physical symptoms, and facilitates the recovery process (10).

Psychological problems in cancer patients affect their QOL, increase the risk of suicidal tendencies, successful suicide, and prolonged hospitalization, and even reduce their life expectancy (11). Modern oncology emphasizes on maintaining or improving the QOL of cancer patients. Accordingly, clinical trials are needed to report changes in the patients' QOL, besides evaluating the efficacy and effectiveness of prescribed medications (12). Since the prognosis of patients improves after cancer treatment, maintaining and promoting health-related QOL has become an important factor during and after treatment.

Many cancer patients, especially those with a lower QOL, require serious attention by therapists (13). Regardless of whether medical treatments can help cure cancer or not, non-pharmacological interventions, along with medical interventions, can reduce the psychological problems associated with cancer. Therefore, it is necessary to design and implement therapeutic interventions to reduce emotional disorders for strengthening the immune system and increasing the QOL of these patients (14).

Various psychological therapy models have been designed and studied for cancer patients. Mindfulness-based stress reduction (MBSR) therapy was first developed by Kabat-Zinn et al. for people with a wide range of stress-related disorders and cancer (15). They examined the effects of moment-by-moment awareness training on the brain and emotional processing. Their study increased the popularity of MBSR therapy in Western countries (16). Overall, MBSR therapy is one of the complementary medicine methods, which has been used in more than 200 American hospitals. It has been also the subject of various research studies at the National Center for Complementary and Integrative Health (NCCIH) (17).

MBSR is a behavioral intervention based on concentration. Exercises are performed by concentrating on thoughts, feelings, and perceptions (18). The skills are acquired by concentrating on breathing during daily life activities. In MBSR therapy, individuals learn to develop acceptance and compassion toward themselves instead of judging their experiences. They learn to be present in the moment rather than reacting spontaneously and learn new ways of responding to situations (19). In this type of therapy, the specific nature of the individual's medical problem is not directly addressed (20).

Based on previous studies, MBSR therapy seems to play a role in improving the QOL of patients with lung cancer. Therefore, this study aimed to evaluate the effectiveness of MBSR therapy on the QOL of patients with lung cancer.

MATERIALS AND METHODS

This quasi-experimental study, with a pretest, posttest, control-group design, was carried out on all patients with lung cancer, who were referred to Masih Daneshvari Hospital in Tehran, Iran, during the study. Since the minimum acceptable sample size in experimental studies is 15 subjects per group (21), a sample size of 15 was calculated for each group.

The inclusion criteria in the present study were as follows: 1) diagnosis of lung cancer based on clinical

findings and cytological studies by a specialist; 2) informed consent and willingness to participate in the study; 3) ability to attend the treatment sessions and complete the assignments; 4) willingness to complete the instruments; 5) physical and psychological stability during the study (no obvious physical or psychological symptoms interfering with the sessions, such as relapse or metastasis to various parts of the body); 6) being diagnosed with lung cancer for at least one month; 7) education level above high school diploma; and 8) age range of 30-55 years.

The exclusion criteria were as follows: 1) other types of cancer; 2) being treated for another physical or psychological disease; 3) cognitive impairment or poor cognitive functioning; 4) acute or severe symptoms of the disease, making it difficult or impossible for the patient to participate in the study; and 5) presence of other psychological conditions (e.g., anxiety). Finally, among lung cancer patients referred to Masih Daneshvari Hospital in Tehran, Iran, a random sample was selected, and those who met the inclusion criteria were randomly divided into experimental and control groups.

A pretest-posttest design was applied in this study to evaluate the effectiveness of MBSR therapy on the QOL of patients with lung cancer in the following steps. First, among patients referred to Masih Daneshvari Hospital, who had a medical file and visited a specialist regularly on specific dates, 30 patients were selected based on the inclusion criteria. Next, 30 pages were prepared, with letter "A" written on 15 pages and letter "B" written on the other 15 pages. In the pretest stage, based on the Structured Clinical Interview for DSM (SCID) guidelines, the 36-Item Short Form Health Survey (36-SF) was completed by the researcher for each patient individually.

Each patient was asked to choose a page from the stack of pages. Accordingly, all patients were randomly assigned to group A or group B. Then, one group was randomly selected as the control group, and the other group was treated with MBSR therapy. Patients in the experimental group received MBSR therapy in the oncology ward of Masih Daneshvari Hospital by a psychological therapist,

who had passed MBSR therapy courses and had expertise and experience in this field. Treatment was administered during eight weeks (two-hour sessions).

Demographic information form: The demographic information form included age, sex, level of education, and marital status of the patient. It was prepared and evaluated by the researchers.

SF-36: This instrument was designed by Oreley in 1992. It is a comprehensive questionnaire to measure the health-related QOL. It generally examines eight QOL subscales, using 36 items that are completed by the subjects themselves or through interviews and can be administered for different age groups and health conditions (22). The subscales of this questionnaire include physical functioning (PF), role-physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional (RE), and mental health (MH) (23). This questionnaire has acceptable reliability and validity for all populations. It has been translated into Farsi by the Iranian Institute for Health Sciences Research, and its reliability and validity have been reviewed and approved. Cronbach's alpha coefficient for the reliability of all subscales ranged between 77% and 95%, except for vitality (65%) (24). In the present study, the reliability of this questionnaire was measured as follows (Table 1):

Table 1. The reliability of this questionnaire

Subscale	Cronbach's alpha	Subscale	Cronbach's alpha
Physical functioning	84%	Mental health	80%
Role-physical	82%	Bodily pain	76%
Role-emotional	73%	General health	73%
Vitality	75%	Social functioning	71%

The protocol of MBSR therapy is presented in Table 2. The instruments used in this study included a demographic information form and SF-36.

To analyze the research data, descriptive statistics, such as mean, standard deviation (SD), and frequency percentage, as well as inferential tests, such as repeated

measures multivariate analysis of variance (MANOVA), were measured in SPSS version 21.

RESULTS

The demographic characteristics of the study sample are presented in Table 3. In this study, the effectiveness of MBSR therapy on the QOL components was investigated in a sample of 30 patients with lung cancer (15 subjects in the control group and 15 subjects in the experimental group). Table 3 presents the mean and SD of demographic variables in each group.

The results presented in Table 3 showed that the mean age of the subjects was 45.03±4.59 years in the control group and 44.50±4.52 years in the experimental group. Moreover, comparison of the mean values using analysis of variance indicated no significant difference in the mean age of the two groups. Also, the mean age of the subjects at the time of diagnosis was 41.84±3.50 years in the control group and 41.84±3.48 years in the experimental group. The analysis of variance for examining the difference in the mean age of diagnosis indicated no significant difference

between the two groups. Also, based on Chi-square test, the frequency difference between the experimental and control groups was not significant in terms of marital status, education level, and income.

Table 4 presents the mean scores of QOL in each group in three stages (pretest, posttest, and follow-up). The results of Box's M test and Levene's test in the experimental group showed that this assumption was valid for the QOL subscales ($P>0.05$). Since the calculated F statistic (9.150) was above $F_{0.01}$, with a degree of freedom of 16.70 (1.79), the null hypothesis, suggesting the equality of differential QOL scores in the two groups, was rejected at 99% confidence interval. The average and standard deviation of the research data (15 persons) is reported in Table 4.

The assumption of similar covaries and variances and the multivariate one-way variance table to compare differential scores of quality of life subscales are reported in Table 5 and Table 6.

Table 2. The mindfulness-based stress reduction (MBSR) therapy protocol (25)

	Intervention
First session	Introduction of the automatic guidance system /how to be present at the moment and be aware of bodily feelings, thoughts, and emotions to reduce stress /practice eating raisins with mindfulness and giving feedback, and discussing the exercise /three-minute breathing space /giving next week assignments and distribution of the first session pamphlets and meditation CDs
Second session	Practice how to examine the body /giving feedback and discussing the body examination practice /practice mindful breathing meditation /practice yoga stretches /distribution of the second session pamphlets and meditation CDs
Third session	Practice meditation and sitting while concentrating on breathing /performing yoga exercises /practice three-minute breathing space /distribution of the third session pamphlets and a tape on yoga movements
Fourth session	Practice body examination /practice conscious yoga /five-minute practice of "seeing or hearing" /practice meditation and conscious sitting with awareness of breathing and body /distribution of the fourth session pamphlets and meditation CDs
Fifth session	Breathing exercise /practice conscious sitting (awareness of breathing, body, sounds, thoughts) /explaining stress and identifying the participants' reactions to stress / examine awareness about pleasant and unpleasant events and their effects on feelings, thoughts and bodily sensations /doing conscious yoga exercises /practice three-minute breathing space / distribution of pamphlets
Sixth session	Practice conscious yoga /sitting meditation (mindfulness about sounds and thoughts) /distribution of the sixth session pamphlets and tape number 4
Seventh session	Doing mountain meditation /sleep hygiene /repeating the previous sessions' exercises / preparing a list of enjoyable activities / distribution of the seventh session pamphlets
Eighth session	Practice body examination /review of the entire program /review and discussion about the program /marble stone beads meditation

Table 3. Mean and standard deviation of age and age at the time of diagnosis variables separated based on their groups.

	Group	Number	Mean	Standard Deviation	F	Sig
Age	Mindfulness-based stress reduction therapy	15	44.50	4.52	0.480	0.620
	Control	15	45.03	4.59		
Age at the time diagnosis	Mindfulness-based stress reduction therapy	15	41.84	3.48	0.129	0.879
	Control	15	42.34	3.50		

Table 4. Mean and standard deviation of research data (n = 15)

Variable	Components (Subscales)	Administration schedule	Mindfulness-based stress reduction (MBSR)		Control	
			Mean	Standard Deviation	Mean	Standard Deviation
Quality of life	Physical functioning	Pre-test	79.20	9.65	71.67	6.73
		Post-test	96.67	4.58	70.35	6.67
	Role-physical	Follow-up	93.90	4.58		
		Pre-test	34.33	24.76	34.93	31.15
		Post-test	64.39	22.09	43.33	30.57
	Role-emotional	Follow-up	61.08	20.70		
		Pre-test	22.29	27.22	21.09	18.62
		Post-test	32.16	32.04	20.00	19.21
	Vitality	Follow-up	20.91	27.79		
		Pre-test	27.33	12.37	31.33	14.08
		Post-test	22.33	8.42	33.00	12.17
	Mental health	Follow-up	21.67	10.80		
		Pre-test	38.64	8.79	32.27	10.18
		Post-test	58.13	10.01	38.13	11.25
	Social functioning	Follow-up	53.60	6.73	48.33	17.61
		Pre-test	49.49	16.95	45.83	16.19
		Post-test	78.60	12.41		
	Bodily pain	Follow-up	70.73	16.14	61.83	23.68
		Pre-test	69.83	19.54	60.33	22.95
		Post-test	50.17	11.36		
General health	Follow-up	44.87	12.95			
	Pre-test	39.06	10.39	37.00	11.79	
	Post-test	72.00	10.32	42.33	10.86	
Total score	Pre-test	61.96	5.27	61.86	8.35	
	Post-test	767.28	4.79	55.41	10.65	

Table 5. Assumption of similar covariances and variances (quality of life subscales)

Assumption	Test	df 1	df 2	F	Sig	
Similar covariances	Box	2	4915.074	1.401	0.210	
Similar Variances	Levene	Physical functioning	2	42	3.174	0.051
	Levene	Role-physical	2	42	2.699	0.105
	Levene	Role-emotional	2	42	2.337	0.133
	Levene	Vitality	2	42	1.128	0.336
	Levene	Mental health	2	42	0.496	0.613
	Levene	Social functioning	2	42	1.989	0.150
	Levene	Bodily pain	2	42	2.081	0.138
	Levene	General health	2	42	2.793	0.073

Table 6. Multivariate one-way variance table to compare differential scores of quality of life subscales

	Multivariate analysis of variance	Univariate analysis of variance							
		Physical functioning	Role- physical	Role- emotional	Vitality	Mental health	Social functioning	Bodily pain	General health
Source of variation (mindfulness-based stress reduction- control)	$F_{16,74}$ 9.180 **	$F_{(2,44)}$ 8.94 **	$F_{(2,42)}$ 5.25**	$F_{(2,42)}$ 0.918	$F_{(2,42)}$ 37.24**	$F_{(2,42)}$ 14.66**	$F_{(2,42)}$ 15.73**	$F_{(2,42)}$ 18.27**	$F_{(2,42)}$ 21.55**
Effect size (partial eta squared)	0.679	0.295	0.202	-----	0.637	0.414	0.424	0.464	0.505

** $P < 0.01$

DISCUSSION

The present study aimed to evaluate the effectiveness of MBSR therapy on the QOL of patients with lung cancer. The results of repeated measures MANOVA showed that MBSR therapy led to improved QOL in lung cancer patients. This finding is consistent with the results reported by Rahmani et al. (26, 27), and Albahadlv et al. (28) and can be explained by the content of MBSR sessions that emphasizes on the use of techniques to reduce one's stress and increase awareness.

The central tenet of MBSR programs is to stop struggling and accept the present situation without judgment. In other words, a change toward acceptance without judgment is associated with an improvement in QOL. Since QOL is significantly correlated with stress and depression, regular mindfulness exercises are expected to cause positive psychological changes, such as stress relief, increased mental health and well-being, and ultimately, improved QOL in patients with lung cancer. Through mindfulness-based exercises and techniques, one becomes aware of daily activities and automatic functioning of the mind, which tends to focus on the past or the future. By being present in the moment and maintaining awareness of thoughts, feelings, and physical states, one can gain control over these aspects of life and be free from a habitual lifestyle and an automatic mind that focuses on the past or the future (29).

Mindfulness-based interventions, aimed at reducing the psychological symptoms of distress and improving QOL (30), are being increasingly used to improve both

mental and physical health (31). In this regard, a study was conducted by Jalali et al. (32) on the QOL of people, who participated in MBSR therapy for the first time at Iran. The results of this study showed that statistically, there was an improvement in the subjects' QOL, mental, physical, emotional, and spiritual well-being, and level of social activity.

Moreover, it can be argued that all exercises in MBSR programs are designed to increase the individual's attention to the body. The important role of the body has been emphasized in new interdisciplinary fields, such as mind-body medicine. In studies using mindfulness strategies, interactions between bodily, cognitive, and emotional processes are also emphasized (33). Mindfulness training is designed to integrate meditation and physical examination techniques to increase one's understanding and awareness of automatic and spontaneous thoughts, feelings, and bodily senses. Through such training, responses based on thoughts, feelings, and bodily sensations can be switched from an automatic mode (34). This finding can be important for shaping the future of clinical interventions and is considered a promising strategy to improve the QOL of these patients.

In the present study, we conducted a clinical trial of MBSR therapy and assessed its effects on the QOL of patients with lung cancer. The results indicated the effectiveness of this treatment as compared to the control group. Overall, our findings revealed the effectiveness of this treatment in improving the components of QOL; therefore, it can have clinical applications.

There were some limitations in this study. First, due to the small sample size for practical reasons, the results should be interpreted as preliminary data; this limits our ability to statistically evaluate the effects of intervention and reliability of our results. Second, the cross-sectional design of this study prevented general inferences and comprehensive predictions. Third, self-report evaluation methods often motivate the person to present a favorable social image of him/herself; therefore, the use of self-report methods is associated with the possibility of bias. It is suggested that future studies focus on comparing the effectiveness of new psychological therapies in reducing the psychological symptoms of patients with lung cancer.

Moreover, treatment of other groups with drug therapy or placebo can be considered alongside experimental and control groups to allow a broader comparison. Another limitation of this study was the lack of a long-term follow-up (one year or longer) due to the lack of access to all participants over time. Therefore, in future studies, researchers need to investigate the long-term effects of such interventions. Finally, due to certain limitations in this study, it was not possible to study this variable in women. It is suggested to conduct similar studies on a sample of women with cancer.

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