

ORIGINAL RESEARCH ARTICLE

Effects of integrated mindfulness-based intervention and traditional Chinese medicine nursing on psychological distress in patients undergoing lung cancer radiotherapy

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Abstract

Lung cancer patients undergoing radiotherapy often experience substantial psychological distress, highlighting the need for effective interventions such as mindfulness-based stress reduction (MBSR) and traditional Chinese medicine (TCM) emotional nursing to improve their emotional well-being. This study investigates the combined effects of MBSR with TCM emotional nursing on perceived stress, anxiety, and depression in lung cancer patients undergoing radiotherapy. A total of 140 lung cancer patients who received radiotherapy at a hospital between January 2023 and January 2025 were enrolled. They were divided into a control group ($n = 70$) and an intervention group ($n = 70$) using a random-number table method. The control group received conventional nursing care combined with TCM emotional nursing, while the intervention group received additional MBSR interventions. The Chinese Perceived Stress Scale (CPSS), Self-Rating Anxiety Scale (SAS), Self-Rating Depression Scale (SDS), and Strategies Used by People to Promote Health (SUPPH) scores were assessed and compared between groups before and after 6 weeks of intervention. Before the intervention, no significant differences were observed between groups in any of the scale scores ($p > 0.05$). After the intervention, the intervention group showed significantly lower CPSS, SAS, and SDS scores and significantly higher SUPPH scores compared with the control group ($p < 0.05$). These findings suggest that MBSR combined with TCM emotional nursing effectively reduces perceived stress, alleviates anxiety and depression levels, and improves self-efficacy in lung cancer patients undergoing radiotherapy.

Keywords: Mindfulness-based stress reduction; Traditional Chinese medicine emotional nursing; Lung cancer radiotherapy; Perceived stress; Anxiety; Depression

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1. Introduction

Lung cancer is a malignant tumor with high morbidity and mortality rates, and it has been reported that there were approximately 2.2 million new cases of lung cancer and 1.8 million lung cancer-related deaths globally in 2020, with the incidence of lung cancer in the Chinese population showing an increasing trend.¹ Therefore, lung cancer represents a massive and growing global disease burden. In addition, lung cancer is the

leading cause of cancer-related death and is responsible for a tremendous number of disability-adjusted life years (DALYs) lost worldwide. For men, it is the most common cause of cancer DALYs, accounting for 28.4 million DALYs and highlighting its profound impact on both survival and quality of life.²

Radiotherapy, as an important treatment for lung cancer, can kill or inhibit the growth of cancerous cells through irradiation of the tumor site with high-energy rays.³ While radiotherapy, chemotherapy, immunotherapy, and targeted therapy are cornerstone treatments, they often come with significant limitations, including severe side effects, toxicity to healthy tissues, and the development of treatment resistance. Novel approaches, such as those utilizing magnetic nanomaterials, show promise for improved diagnosis and targeted drug delivery, but currently face challenges related to biocompatibility, potential cytotoxicity, and translation into routine clinical therapy.^{4,5} These limitations underscore the critical need for complementary supportive interventions that can mitigate the physical and psychological distress associated with conventional cancer treatments.

However, radiotherapy is not risk-free, and patients often suffer from multiple discomforts and side effects during the treatment. These side effects not only include local reactions, such as skin redness, swelling, pain, and fatigue, but may also contribute to psychological symptoms, such as anxiety and depression.^{6,7} These negative emotions and experiences not only affect the patients' treatment outcomes but also severely impact their quality of life and psychological health.⁸

To reduce the pain and distress of radiotherapy patients and improve their treatment compliance and quality of life, clinical practice has been actively exploring and trying various effective psychological care intervention methods. As an emerging psychotherapeutic approach, mindfulness-based stress reduction (MBSR) has demonstrated significant nursing effects in cancer patients. This standardized program cultivates non-judgmental awareness of the present moment through core practices including guided meditation, body scanning, and Hatha yoga. The fundamental treatment strategy involves facilitating a shift in patients' relationship with their thoughts, emotions, and physical sensations, thereby reducing reactive distress and enhancing adaptive coping. This method reduces perceived stress and improves emotional state by guiding patients to become aware of their present experience with a non-judgmental attitude, minimizing their overreaction to pain and discomfort.⁹ Previous studies have reported that the MBSR protocol has a positive impact on the psychological state of lung cancer patients.¹⁰

Meanwhile, traditional Chinese medicine (TCM) emotional nursing, a core component of TCM, aims to restore physical-mental harmony and enhance health by regulating emotional states. According to TCM, emotional nursing is closely related to the functions of the internal organs: a poor emotional state leads to the dysfunction of the internal organs, thereby causing a variety of diseases. Therefore, TCM emotional nursing can help patients adjust their emotions and alleviate anxiety and depression by adopting various means, such as music therapy, emotion-oriented counseling, and empathetic communication.¹¹ Previous studies have also confirmed that TCM emotional nursing has a favorable impact on the psychological state of lung cancer patients.¹²

Radiotherapy is widely used in the management of lung cancer and may also contribute to improvements in patients' psychological status when treatment responses are favorable. However, few studies have explored the combined application of MBSR and TCM emotional nursing among lung cancer patients undergoing radiotherapy. Furthermore, the distinct theoretical foundations and methodologies of MBSR and TCM emotional nursing necessitate further research to optimize their combined intervention strategies.

Therefore, this study investigates the combined effects of MBSR with TCM emotional nursing on perceived stress, anxiety, and depression in patients undergoing radiotherapy for lung cancer to provide a new and effective psychological care intervention for these patients and to help them better cope with the psychological challenges in the treatment process. It also offers useful inspiration and reference for the combined application of TCM emotional nursing and modern psychotherapeutic methods, promoting the theoretical and practical development of related fields.

2. Patients and methods

2.1. Study design and participants

This prospective study enrolled lung cancer patients undergoing radiotherapy at our hospital, Shanxi Bethune Hospital, between January 2023 and January 2025. The inclusion criteria were:

- Patients with pathologically confirmed stage III–IV non-small cell lung cancer who received radical radiotherapy for the first time
- Patients aged 18–75 years with a Karnofsky Performance Status (KPS) score of ≥ 70
- Patients able to read Chinese and independently complete questionnaire assessments
- Patients who voluntarily participated in the study and committed to cooperating with the intervention program throughout the study.

The exclusion criteria were:

- Patients with severe cardiorespiratory insufficiency or cognitive impairment
- Patients with a previous diagnosis of schizophrenia, bipolar disorder, and other major mental illnesses or patients taking antidepressant medication in the past 3 months
- Patients who participated in other psychological interventions within the past month
- Patients with sensory aphasia or visual impairment that could affect participation in the intervention
- Patients with an expected life expectancy of <3 months.

A total of 140 eligible patients were randomly allocated to a control group ($n = 70$) or an intervention group ($n = 70$) through a random-number table method. The study protocol was approved by the ethics committee of our hospital (Approval No.: YXLL-2023-175). All procedures performed in the studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All participants provided written informed consent.

The control group comprised 59 males and 11 females, with a mean age of 60.16 ± 4.79 years and a mean body mass index (BMI) of 23.50 ± 1.03 kg/m². Among them, 28 cases were stage III and 42 cases were stage IV. The intervention group consisted of 62 males and 8 females, with a mean age of 59.67 ± 4.64 years and a mean BMI of 23.26 ± 2.05 kg/m². Among them, 26 cases were stage III and 44 were stage IV. All enrolled patients were of Han Chinese ethnicity, mitigating potential bias related to racial or ethnic differences in treatment response or psychological assessment.

2.2. Intervention protocols

2.2.1. Intervention protocols for the control group

The control group was given conventional nursing combined with TCM emotional nursing:

- Routine nursing:
 - Radiotherapy education: Nurses provided detailed explanations of radiotherapy principles, procedures, and anticipated outcomes, including its mechanism of action on cancer cells, treatment cycles, potential side effects, and necessary precautions
 - Symptom management: Strategies were implemented to address common radiotherapy-related symptoms (e.g., skin reactions, fatigue, and nausea). A personalized pain control plan integrating pharmacological treatments and non-

pharmacological interventions (e.g., relaxation exercises and hot compress therapy) was developed. A rehabilitation program that promotes appropriate physical activity to enhance functional capacity and quality of life was established

- Psychological support: Patients and families received psychoeducation on emotional challenges during cancer treatment (e.g., anxiety and depression). Healthcare providers allocated dedicated time for confidential discussions, practicing active listening to address patients' concerns.
- TCM emotional nursing:
 - Empathic engagement: Conducted twice weekly for 45 min per session, patients engaged in traditional Chinese painting or calligraphy, or Five-Elements Music Therapy to redirect focus from pain
 - Acupressure therapy: Licensed TCM practitioners performed daily acupressure on *Taichong* (LR3), *Shenmen* (HT7), and *Tangzhong* (CV17) acupoints. Each point was massaged clockwise for 3 min, with pressure intensity adjusted based on patient-reported soreness or distension.

2.2.2. Intervention protocols for the intervention group

The intervention group received the conventional interventions that were also applied to the control group, combined with a structured MBSR program over 6 weeks. Key components of the MBSR protocols are summarized in Table 1.

2.3. Outcome measures

2.3.1. Perceived stress level

Perceived stress was assessed using the Chinese Perceived Stress Scale (CPSS), a 14-item instrument scored on a 5-point Likert scale (0 = never, 4 = very often). It consists of two subscales: stress perception (items 1–7) and coping ability (items 8–14), with total scores ranging from 0 to 56.¹³ Higher scores indicate greater perceived stress. Assessments were conducted at baseline and 6-week post-intervention.

2.3.2. Anxiety level

Anxiety level was assessed using the Self-Rating Anxiety Scale (SAS), a 20-item questionnaire with responses graded on a 4-point scale (1 = rarely/never, 4 = most/all of the time). Fifteen items were positively scored, while five items (items 5, 9, 13, 17, and 19) were reverse-scored.¹⁴ Higher total scores indicate more severe anxiety. Assessment timing matched the CPSS protocol.

Table 1. Mindfulness-based stress reduction (MBSR) intervention protocols

Week	Theme	Practices	Delivery protocol
1	Mindfulness foundation	Psychoeducation on MBSR principles and mechanisms; introduction to mindful breathing; TCM breath-regulation theory.	90-min group session (8–10 participants) including 20-min mindful raisin exercise; five-element breathing technique (metal element rhythm: inhalation: hold: exhalation=4:2:6).
2	Body–mind integration	Progressive body scan meditation; application of body awareness to radiation field; TCM <i>Neiguan</i> (inner observation) philosophy.	60-min guided practice session conducted in the radiotherapy waiting area, incorporating meridian-pathway visualization (Governor and Conception Vessels).
3	Mindful movement	Modified seated <i>Baduanjin</i> (Eight Brocades): (a) “Regulating triple burners by lifting the sky”; (b) “Drawing bows to shoot eagles”; principles of breath-movement synchronization.	45-min session led by a physiotherapist, with biofeedback monitoring to enhance mind–body connection.
4	Emotional regulation	The suspend, take a breath, observe, and proceed (STOP) technique for managing treatment-related anxiety; TCM emotion-restraint exercises.	60-min session involving role-playing exercises based on common radiotherapy complication scenarios.
5	Interpersonal mindfulness	Compassion meditation focused on caregiving relationships; application of the TCM <i>Ren–He</i> (benevolence–harmony) framework.	90-min group therapy session featuring structured exercises such as the three-line relaxation dialogue.
6	Maintenance planning	Co-creation of a personalized mindfulness-TCM chronotherapy schedule; instruction on acupoint-based self-care strategies.	60-min individual coaching session, supplemented with a detailed protocol manual for future reference; acupressure guidance.

Abbreviation: TCM: Traditional Chinese medicine.

2.3.3. Depression level

Depression level was assessed using the Self-Rating Depression Scale (SDS), a 20-item tool structurally analogous to the SAS. Ten items were positively scored, and 10 were reverse-scored.¹⁵ Higher total scores indicate more severe depression. Assessments were synchronized with the CPSS timeline.

2.3.4. Self-efficacy

Self-efficacy was assessed using the Strategies Used by People to Promote Health (SUPPH), a 28-item scale with three subscales: stress reduction (10 items), decision-making (9 items), and positive attitude (9 items). Items were rated on a 5-point Likert scale (1 = not confident and 5 = extremely confident).¹⁶ Higher total scores indicate stronger self-efficacy. Assessments were synchronized with the CPSS timeline.

2.4. Statistical analysis

Statistical analyses were performed using SPSS 22.0 (IBM, United States). Continuous data are presented as mean $\pm$ standard deviation (SD), and between-group differences were analyzed using independent *t*-tests. Categorical data are expressed as percentages (%), with comparisons conducted using Chi-square (χ^2) tests. A two-tailed $p < 0.05$ defined statistical significance.

3. Results

3.1. Comparison of baseline characteristics between the two groups

No significant differences were observed between the two groups in baseline demographic and clinical

characteristics, including gender, age, BMI, educational attainment, marital status, and tumor staging ($p > 0.05$). This equivalence in baseline parameters confirms the comparability of the study cohorts (Table 2).

3.2. Comparison of CPSS scores between the two groups before and after intervention

Before the intervention, the difference in CPSS scores between the two groups was not statistically significant ($p > 0.05$). After the intervention, the CPSS scores of both groups were significantly lower than their respective pre-intervention scores ($p < 0.001$). The CPSS scores of the intervention group were significantly lower than those of the control group ($p < 0.001$) (Table 3 and Figure 1).

3.3. Comparison of SAS scores between the two groups before and after intervention

Before the intervention, the difference in SAS scores between the two groups was not statistically significant ($p > 0.05$). After the intervention, the SAS scores of both groups were significantly lower than their respective pre-intervention scores ($p < 0.001$). The SAS scores of the intervention group were significantly lower than those of the control group ($p < 0.001$) (Table 4 and Figure 2).

3.4. Comparison of SDS scores between the two groups before and after intervention

Before the intervention, the difference in SDS scores between the two groups was not statistically significant ($p > 0.05$). After the intervention, the SDS scores of both groups were significantly lower than their respective pre-intervention scores ($p < 0.001$). The SDS scores of the

Table 2. Comparison of baseline characteristics between the two groups

Group	Control group (n=70)	Intervention group (n=70)	χ^2/t -value	p-value
Gender (%)			0.548	0.459
Male	59 (84.29)	62 (88.57)		
Female	11 (15.71)	8 (11.43)		
Age (years)	60.16±4.79	59.67±4.64	0.615	0.540
BMI (kg/m ²)	23.50±1.03	23.26±2.05	0.875	0.383
Education (%)			0.295	0.587
Middle school and below	49 (70.00)	46 (65.71)		
High school and above	21 (30.00)	24 (34.29)		
Marital status (%)			0.282	0.595
Married	63 (90.00)	61 (87.14)		
Unmarried/Divorced/Widowed	7 (10.00)	9 (12.86)		
TNM stage (%)			0.121	0.728
III	28 (40.00)	26 (37.14)		
IV	42 (60.00)	44 (62.86)		

Abbreviations: BMI: Body mass index; TNM: Tumor, node, and metastasis.

Table 3. Comparison of CPSS scores between the two groups before and after intervention

Group	Control group (n=70)	Intervention group (n=70)	t-value	p-value
Pre-intervention	39.04±3.54	38.84±3.51	0.336	0.738
Post-intervention	32.11±3.89***	28.23±2.93***	6.666	<0.001

Note: *** p <0.001 compared to the respective pre-intervention scores.
Abbreviation: CPSS: Chinese Perceived Stress Scale.

Table 4. Comparison of SAS scores between the two groups before and after intervention

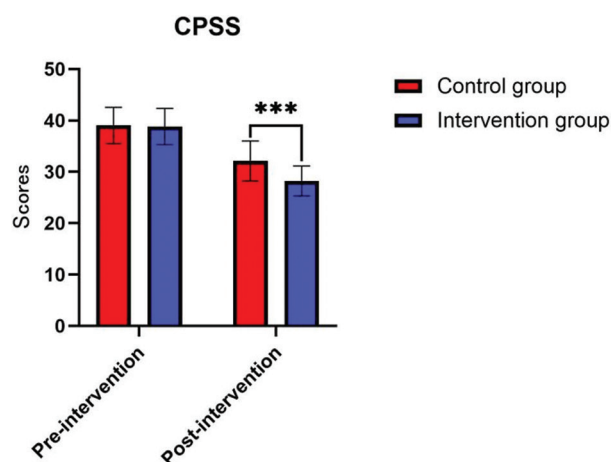
Group	Control group (n=70)	Intervention group (n=70)	t-value	p-value
Pre-intervention	58.06±4.44	58.69±4.38	0.845	0.400
Post-intervention	48.79±4.91***	44.30±5.53***	5.080	<0.001

Note: *** p <0.001 compared to the respective pre-intervention score.
Abbreviation: SAS: Self-Rating Anxiety Scale.

intervention group were significantly lower than those of the control group (p <0.001) (Table 5 and Figure 3).

3.5. Comparison of SUPPH scores between the two groups before and after intervention

Before the intervention, there was no significant difference in the dimensional scores of stress reduction, decision-making, and positive attitude between the two groups (p >0.05). After the intervention, the dimensional scores for stress reduction, decision-making, and positive attitude in both groups were significantly higher than their respective pre-intervention scores (p <0.001). The scores for these

**Figure 1.** Comparison of CPSS scores between the two groups before and after intervention

Note: *** p <0.001.

Abbreviation: CPSS: Chinese Perceived Stress Scale.

dimensions in the intervention group were significantly higher than those in the control group (p <0.001) (Table 6 and Figure 4).

4. Discussion

As an evidence-based stress-reduction intervention, MBSR encourages participants to cultivate attention and awareness of the present moment and learn to face their inner stressors with a non-judgmental attitude—an approach that may help patients break the vicious cycle of stress response, thereby reducing their overall psychological burden. During radiotherapy for lung cancer, patients often

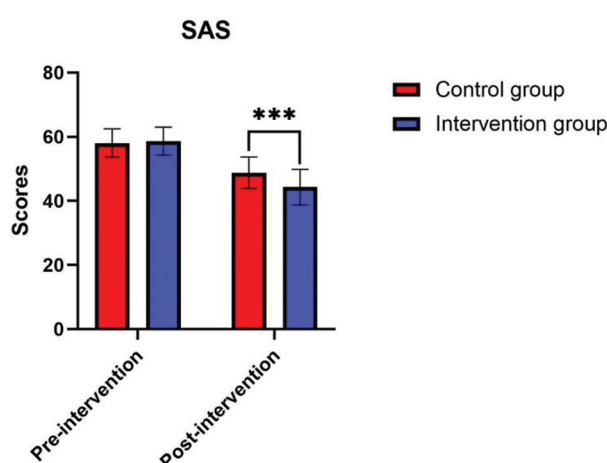


Figure 2. Comparison of SAS scores between the two groups before and after intervention

Note: *** $p < 0.001$.

Abbreviation: SAS: Self-Rating Anxiety Scale.

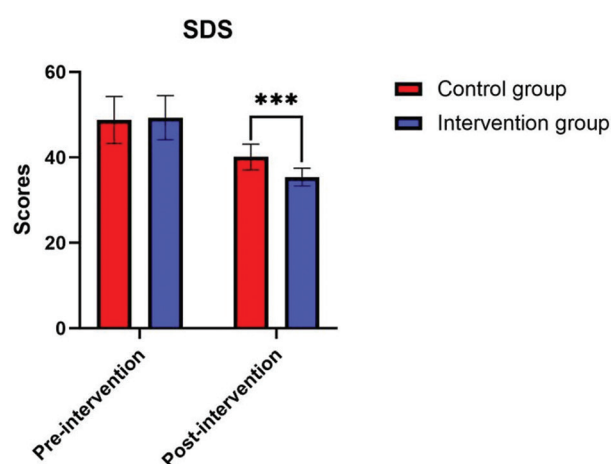


Figure 3. Comparison of SDS scores between the two groups before and after intervention

Note: *** $p < 0.001$.

Abbreviation: SDS: Self-Rating Depression Scale.

face severe physical or psychological stress; MBSR may help them to maintain greater emotional stability by enhancing awareness and adaptive coping capacity.¹⁷ At the same time, the empathy-ease method of TCM emotional nursing emphasizes the use of emotional regulation and distraction to reduce patients' excessive focus on their illnesses and pains. This nursing intervention may also be a new way of psychological adjustment for radiotherapy-treated lung cancer patients, enabling them to manage their emotional responses more effectively when facing the severe treatment environment.¹⁸ The present study innovatively constructed an empathic and emotional nursing approach to reduce patients' anxiety and depression. We innovatively proposed a joint intervention model of positive thinking-emotional thinking and explored the combined effects of MBSR with TCM emotional nursing on the perceived stress, anxiety, and depression, as well as self-efficacy, of patients undergoing radiotherapy for lung cancer in a randomized controlled trial.

The results of this study showed that the CPSS scores of the intervention group were significantly lower than those of the control group after the intervention, suggesting that the combined intervention was more effective in relieving stress. To evaluate the clinical relevance of this reduction, we considered the magnitude of change within the context of our study. The reduction was substantial not only in statistical terms but also in relation to the baseline scores and the more modest change in the control group. This

Table 5. Comparison of SDS scores between the two groups before and after intervention

Group	Control group (n=70)	Intervention group n=70)	t-value	p-value
Pre-intervention	48.77±5.48	49.33±5.16	0.622	0.535
Post-intervention	40.10±3.01***	35.39±2.07***	10.787	<0.001

Note: *** $p < 0.001$ compared to the respective pre-intervention score.

Abbreviation: SDS: Self-Rating Depression Scale.

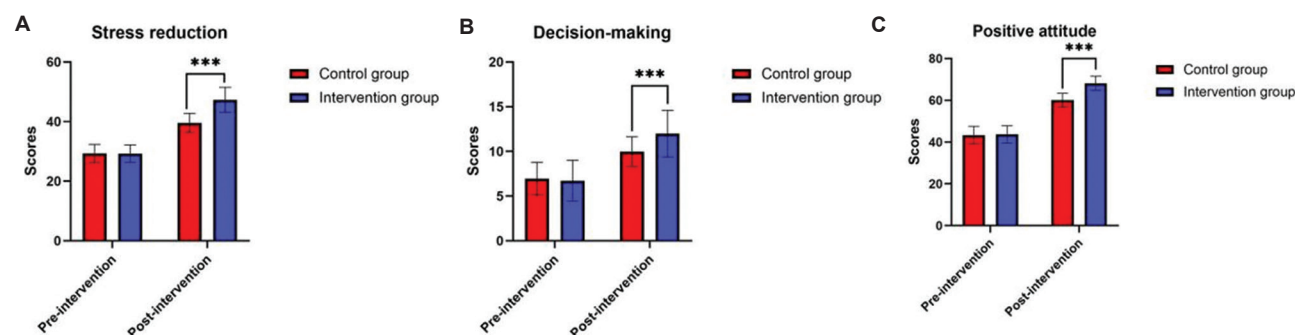


Figure 4. Comparison of SUPPH scores between the two groups before and after intervention. (A) Stress reduction. (B) Decision-making. (C) Positive attitude.

Note: *** $p < 0.001$.

Table 6. Comparison of SUPPH scores between the two groups before and after intervention

Group	Pre/Post-intervention	Control group (n=70)	Intervention group (n=70)	t-value	p-value
Stress reduction	Pre-intervention	29.30±3.03	29.26±2.92	0.080	0.937
	Post-intervention	39.57±3.19***	47.33±4.16***	12.385	<0.001
Decision-making	Pre-intervention	6.96±1.82	6.73±2.28	0.660	0.511
	Post-intervention	9.97±1.67***	11.99±2.61***	5.454	<0.001
Positive attitude	Pre-intervention	43.34±4.24	43.67±4.17	0.464	0.643
	Post-intervention	60.09±3.30***	68.16±3.38***	14.293	<0.001

Note: *** $p < 0.001$ compared to the respective pre-intervention score.

Abbreviation: SUPPH: Strategies Used by People to Promote Health.

pronounced improvement, occurring alongside significant reductions in SAS/SDS scores and a marked increase in the SUPPH score, provides strong convergent evidence that the intervention yielded a meaningful multifaceted psychological benefit. The simultaneous improvement across these interrelated domains of distress and coping suggests that the reduction in perceived stress was not an isolated finding but represented a clinically valuable enhancement in patients' overall capacity to manage the challenges of radiotherapy.

In addition, the combined intervention was more effective in reducing perceived stress than single TCM emotional nursing, mainly due to its multifaceted mechanism of action and complementary effects. Ding *et al.*¹⁹ reported that MBSR intervention could reduce patients' perceived stress. MBSR enabled patients to understand and regulate their emotions and stress responses proactively by fostering their ability to be aware of their emotions and non-judgmental attitudes. This improved self-regulation helps lung cancer patients adopt effective coping strategies when facing radiotherapy stress, thus weakening the negative effects of stress on the body and mind.²⁰

In contrast, TCM emotional nursing relies mainly on reducing patients' negative emotions through distraction and affective regulation. It acts as an external regulator, focusing on helping patients to relieve negative emotions and reduce excessive focus on illnesses. This approach is effective but relatively passive. When the two approaches are used in combination, the positive thinking exercises of MBSR and the emotional regulation strategies of TCM emotional nursing complement each other. Positive mindfulness training improves patients' internal mental toughness to flexibly cope with stress,²¹ whereas TCM emotional nursing helps patients cope with internal conflicts by regulating the external emotional environment. These complementary influences create an additive effect, allowing patients to experience more significant results in managing and relieving stress. In addition, the combined

intervention approach strengthened patients' ability to regulate their emotions and cognitive restructuring. MBSR helped lung cancer patients to re-evaluate and re-conceptualize stressors rationally and in a healthy way when faced with negative events during their treatment. This cognitive restructuring led to a reduction in the patient's perception of stress.²²

In terms of anxiety and depression, the results of this study showed that the SAS and SDS scores of the intervention group were significantly lower than those of the control group after the intervention, indicating that the combined intervention was more effective in alleviating the negative emotions of the patients. This can be attributed to the ability of MBSR to support patients in maintaining better psychological stability and coping ability in the face of inevitable uncertainties during radiotherapy by cultivating awareness and acceptance rather than avoidance or rumination. After receiving MBSR training, patients can improve their awareness and understanding of their emotional fluctuations and reduce the impact of anxiety and depression induced by radiotherapy. This intrinsic awareness helps patients to recognize and regulate negative emotions promptly, thus reducing anxiety levels.⁸ In contrast, TCM emotional nursing may only temporarily relieve symptoms by diverting attention; it does not fundamentally alter the patient's cognitive and emotional response patterns to the disease.²³ MBSR, on the other hand, through long-term training, helps patients to reconstruct their way of living with the disease, allowing them to accept and manage their inner fears and anxieties. The combination of these two approaches can create a synergistic effect. While TCM emotional nursing helps patients shift their focus away from pain or discomfort in the short term, MBSR improves patients' emotional regulation and psychological resilience at a deeper level, helping them face the psychological challenges of cancer and its treatment in a more sustained way.⁷ This combined strategy can alleviate the negative emotions brought about by radiotherapy at different levels.

In this study, it was also found that the SUPPH scores for all dimensions in the intervention group were significantly higher than those in the control group, indicating that the combined intervention could more effectively improve patients' self-efficacy in areas such as stress reduction, decision-making, and positive attitude. This can be mainly attributed to the following aspects: first, the improvement in stress reduction relies on patients' ability to effectively identify and manage stressors, which is the core content of mindfulness training emphasized in MBSR. Through positive thinking exercises, patients not only become more acutely aware of their own emotional and physiological stress signals but also learn how to remain calm and adopt positive coping strategies in stressful situations.²⁴ In contrast, TCM emotional nursing, although helping patients regulate their emotions, may not be as intuitive and effective as MBSR in providing clear techniques and methods for stress reduction. Second, in terms of decision-making ability, the combined intervention provided more comprehensive guidance and support. MBSR enabled patients to more rationally analyze and evaluate the pros and cons of various options when faced with complex or uncertain treatment choices by enhancing their awareness and cognitive restructuring abilities. This enhanced decision-making ability increases the self-confidence and self-efficacy of lung cancer patients. Meanwhile, TCM emotional nursing focuses more on helping patients regulate their mood swings, indirectly fostering an optimal psychological state for decision-making.²⁵ Third, the advantages of the combined intervention are significant in terms of fostering positive attitudes. Mindfulness practice in MBSR encourages patients undergoing radiotherapy for lung cancer to face their challenges and difficulties with an open, accepting, and positive mindset. This mindset enables patients to better cope with negative events during treatment and recognize opportunities for growth and learning.²⁶ Meanwhile, TCM emotional nursing helps patients maintain an optimistic emotional attitude by regulating their affective states. However, compared with MBSR, affective care alone may have a more limited effect in sustaining the development and enhancement of positive attitudes in patients. The variety and comprehensiveness of the combined intervention also provide strong support for improving patient self-efficacy. This intervention combines the strengths of MBSR and TCM emotional nursing to provide patients undergoing radiotherapy for lung cancer with multidimensional support and guidance. Patients not only learn effective stress-reduction techniques and decision-making methods but also cope better with the challenges during the treatment process by developing a positive attitude and increasing self-efficacy.

In summary, compared with TCM emotional nursing, the combined intervention model further reduces perceived stress, decreases anxiety and depression levels, and improves self-efficacy in patients undergoing radiotherapy for lung cancer. This study is the first to combine MBSR with TCM emotional nursing to provide a multidimensional psychological support program for this patient population. Although the findings demonstrate the efficacy of this novel MBSR-TCM emotional nursing integration, the study did not compare this combined approach with other established TCM mind-body therapies or with each component applied individually. Future research employing a multi-arm randomized controlled design is warranted to directly compare the efficacy, cost-effectiveness, and mechanistic pathways of these standalone and combined interventions. Nevertheless, this study has the following limitations: (i) the follow-up duration was short, failing to assess the long-term maintenance of the intervention effects and (ii) biological indicators were not included to explore potential neuroendocrine mechanisms. Future studies should extend the follow-up period and incorporate multi-omics techniques to better understand the mechanisms of the intervention.

5. Conclusion

The integrated intervention of MBSR and TCM emotional nursing demonstrated significant benefits for lung cancer patients undergoing radiotherapy. It effectively reduced patients' perceived stress, alleviated symptoms of anxiety and depression, and enhanced their self-efficacy. This combined approach presents a promising and holistic supportive care model for managing psychological distress in this patient population during a challenging treatment period. Future research with longer follow-up durations and the inclusion of biomarker assessments is warranted to validate the long-term benefits and explore the underlying mechanisms.

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Conflict of interest

The authors declare that they have no competing of interests.

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Conceptualization: Xiaoping Wang, Yanli Wang

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Formal analysis: Xiaoping Wang, Yanli Wang

Investigation: Juan Feng

Methodology: Xiaoping Wang

Supervision: Juan Feng

Validation: Huijing Feng

Writing—original draft: Xiaoping Wang

Writing—review & editing: Yanli Wang, Huijing Feng, Juan Feng

Ethics approval and consent to participate

The study was approved by the Medical Ethical Committee of Shanxi Bethune Hospital (IRB No. YXLL-2023-175). All participants provided written informed consent before enrollment.

Consent for publication

All participants provided written informed consent for publication of their anonymized data.

Availability of data

The data supporting the findings of this study are available within the article. Additional data can be obtained from the corresponding author upon reasonable request.

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