Article

Mood State in Patients with Post-traumatic Stress Disorder due to Lung Cancer: A Clinical Application Study of Intensive Cognitive Management

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Abstract

Background: Post-traumatic stress disorder (PTSD) due to lung cancer seriously affects the mood state of patients. Intensive cognitive management is a structured management method based on cognitive behavioral therapy, which can correct cognitive distortions and regulate adverse emotions. This study mainly explored the effect of intensive cognitive management on the mood state of patients with PTSD due to lung cancer.

Methods: A retrospective analysis was conducted on the clinical data of 169 patients with PTSD due to lung cancer admitted to our hospital from June 2020 to June 2021. Based on different clinical management schemes, these patients were divided into the reference group (RG, $n = 87$, routine management) and the study group (SG, $n = 82$, routine management+intensive cognitive management). The sleep status and degree of depression and anxiety were evaluated using the Pittsburgh Sleep Quality Index (PSQI), Self-rating Anxiety Scale (SAS), Depression Scale (D), and Post-traumatic Stress Disorder Check List (PCL).

Results: After 2 weeks (T1) and 4 weeks (T2) of nursing, the scores on the PSQI ($p < 0.001$), SAS (T0–T1: $p < 0.001$; T0–T2: $p < 0.001$) and D (T0–T1: $p = 0.026$, $p < 0.001$; T0–T2: $p < 0.001$), as well as three PCL factors ($p < 0.001$) of the two groups were significantly lower than those before nursing (T0). At the T1 and T2 stages, difference scores for the PSQI (difference score 1: $p = 0.003$; difference score 2: $p = 0.006$), SAS (difference score 1: $p = 0.002$; difference score 2: $p = 0.007$), and D (difference score 1: $p < 0.001$; difference score 2: $p = 0.002$) were higher in the SG compared with the RG. At the T1 stage, the difference score of the PCL high-alert factor ($p = 0.008$) was higher in the SG compared with the RG, with no significant difference in difference scores of other two factors ($p > 0.05$). At the T2 stage, the SG had higher difference scores for the three PCL factors compared with the RG ($p < 0.001$, $p = 0.011$, $p < 0.001$).

Conclusion: Intensive cognitive management can effectively improve sleep quality and adverse emotions and has potential for clinical management of PTSD in patients with lung cancer.

Keywords

lung cancer; post-traumatic stress disorder; depression; anxiety; dyssomnia

Introduction

Lung cancer is one of the most common malignant tumors and is the leading cause of cancer-related deaths worldwide. As of 2018, 1.8 million deaths from lung cancer were recorded globally, accounting for 18.4% of all tumor-related deaths and ranking first among cancer-related deaths [1,2]. Lung cancer is a chronic disease that causes not only somatic pain but also serious psychological trauma. Negative emotions occur throughout the whole process from disease onset to death. The strong and lasting traumatic events associated with lung cancer can lead to irritability,

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high alertness, intrusive thoughts, numbness, and dissociation [3], resulting in post-traumatic stress disorder (PTSD). PTSD is a psychological disorder that arises and persists due to inability to withstand the pressure of major events [4,5]. Patients with PTSD may experience anxiety and depression, which generate multiple clinical symptoms, such as autonomic nervous dysfunction and decreased immune function. The suicide rate of such patients is six times higher than that of the general population [6], so timely targeted management is important.

Patients with PTSD have obvious physical symptoms caused by emotional changes. They feel physically and mentally exhausted with the emergence of psychological problems. Cognitive behavioral management therapy is an effective method used to improve the mood of patients with PTSD; it can provide highly targeted management measures and restructure maladaptive thought patterns to improve prognosis. Intensive cognitive management is an intensive cognitive training based on cognitive behavior management [7]; it can improve patients' cognition, alleviate negative emotions, and strengthen effects of clinical treatment. Few studies have analyzed the effect of intensive cognitive management on PTSD due to lung cancer. We hypothesized that intensive cognitive management could improve the prognosis in patients with PTSD due to lung cancer and provide a reference for clinical management.

Research Subjects and Methods

Research Subjects

For this retrospective study, we selected the clinical data of 169 patients with PTSD due to lung cancer in our hospital from June 2020 to June 2021. These patients were divided into the reference group (RG, $n = 87$, routine management) and the study group (SG, $n = 82$, routine management+intensive cognitive management) based on different clinical management schemes. This study conformed to the principles of Declaration of Helsinki (2013) [8]. The study design is shown in Fig. 1.

Inclusion and Exclusion Criteria

The inclusion criteria were as follows: (1) patients were diagnosed with lung cancer by pathological examination; (2) patients had clear consciousness and were in stable condition; (3) patients were aged ≥18 years; and (4) patients met the diagnostic criteria for PTSD symptoms in the *Diagnostic and Statistical Manual of Mental Disorders (5th edition)* [9].

The exclusion criteria included the following: (1) patients with other malignant tumors; (2) patients with schizophrenia, mood disorders, delusional disorders, or anxiety disorders; and (3) patients with systemic infectious diseases, such as hepatitis, tuberculosis, and syphilis.

Methods

The RG received routine nursing management. The medical staff informed the patients of the possible risks in the treatment process to alleviate their adverse emotions; they also focused on medicine use and prevention and treatment of complications after chemotherapy. In addition, the medical staff monitored dynamic vital signs and promptly contacted doctors if any abnormalities were found. During the treatment, questions raised by the patients and their families were answered promptly.

The SG received intensive cognitive management. (1) The team members actively communicated with the patients and gave them sufficient respect, understanding, and spiritual support. (2) By asking questions, self-presentation, or imitation, the team members encouraged the patients to express their views on certain events, identified their unreasonable thoughts, and analyzed their negative psychological state. (3) The team members guided the patients to change unreasonable cognition and gradually accept a positive coping mode by using real experience, reaction prevention, and other methods. (4) The team members encouraged positive behavior and discouraged negative behavior to motivate the patients to adopt the correct behavior. Meanwhile, rehabilitation activities including yoga, calligraphy, and walking were arranged for the patients to improve their inner negative emotions.

Data Collection

Demographic and Clinical Data of Patients

Demographic (gender, age, and marital status) and clinical data (pathological types, Tumor Node Metastasis (TNM) staging, and treatment methods) for the two groups were collected from the hospital electronic medical record system.

Sleep Status

The Pittsburgh Sleep Quality Index (PSQI) [10] contains seven dimensions (including sleep quality, time before falling asleep, sleep time, sleep efficiency, sleep disorder, hypnotic drugs, and daytime dysfunction) and 18 items,

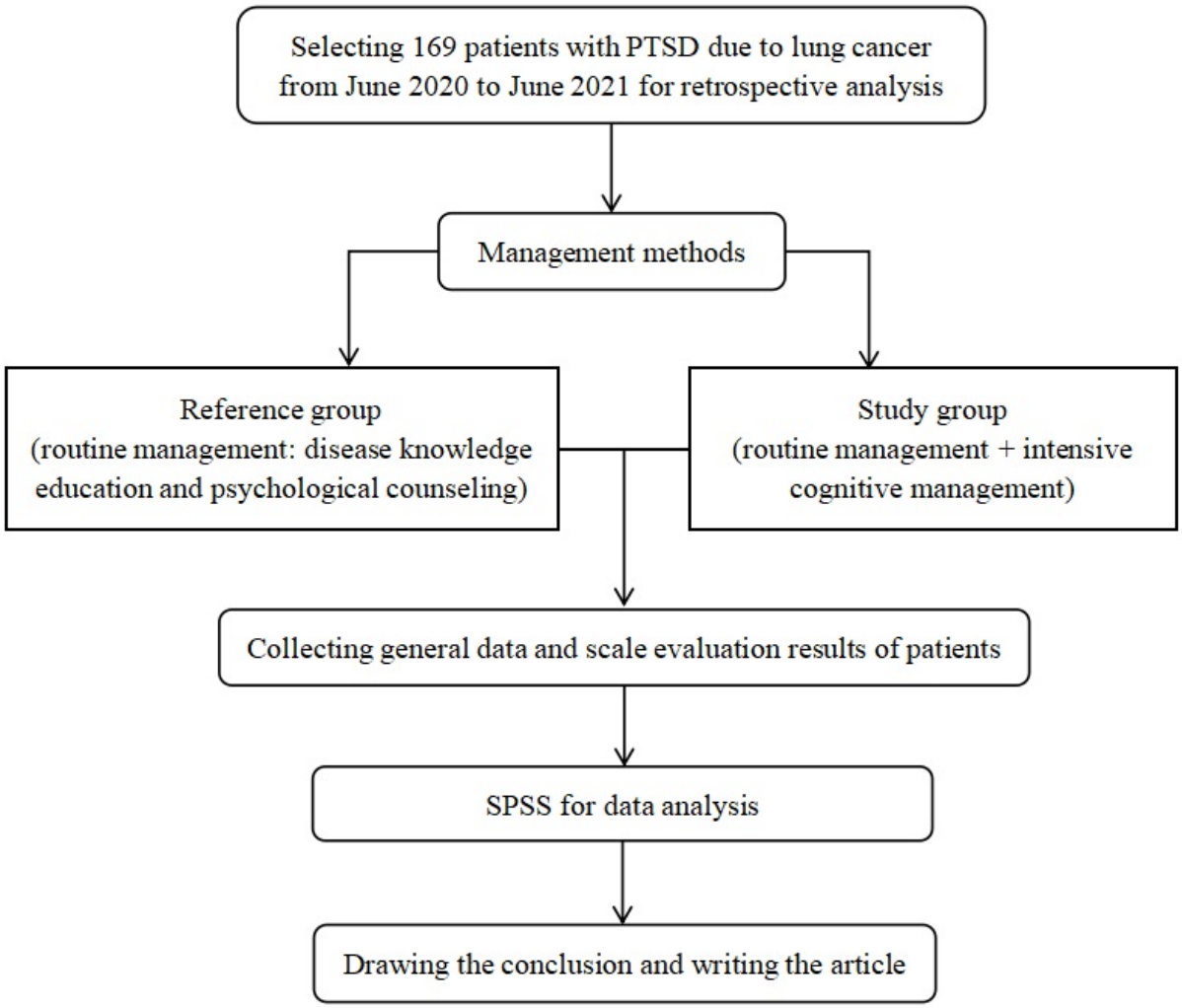

Fig. 1. Study design. PTSD, post-traumatic stress disorder.

with a total score of 21 points. Higher scores indicate worse sleep quality, and a total score >7 points indicates the presence of a sleep disorder.

Anxiety and Depression

The Self-rating Anxiety Scale (SAS) [11] consists of 20 items, each with 4-point Likert scoring, and items 5, 9, 13, 17, and 19 are reverse items. The scores for each item are summed and multiplied by 1.25 to obtain a round number. The score range is 25–100, and a total score >50 points indicates the presence of severe anxiety. The Depression Scale (D) [12] includes 20 items, each with 4-point Likert scoring, and items 4, 8, 12, and 16 are scored in reverse. The score range is 0–60 points, and a total score >16 points indicates the presence of depression.

Post-Traumatic Stress Disorder (PTSD)

The Post-traumatic Stress Disorder Check List (PCL) [13] is divided into 17 items according to the third edition of the *Diagnostic and Statistical Manual of Mental Disorders* [14], and includes re-experience, avoidance, and high-alert factors. Each item is scored on a 5-point Likert scale and a higher score indicates greater trauma.

Statistical Methods

This study used SPSS 25.0 (International Business Machines Corporation, Armonk, NY, USA) for data analysis.

Table 1. Comparison of demographic and clinical data between the two groups [Median (P_{25}, P_{75}), n (%)].

Items	RG (n = 87)	SG (n = 82)	z/χ^2	p
Sex			0.001	0.977
Male	49 (56.32)	46 (56.10)		
Female	38 (43.68)	36 (43.90)		
Age (years)	55.00 (49.50, 59.00)	53.00 (49.00, 57.00)	–1.478	0.139
Marital status			0.139	0.933
Unmarried	19 (21.84)	16 (19.51)		
Married	36 (41.38)	35 (42.68)		
Divorced	32 (36.78)	31 (37.80)		
Family monthly income			0.360	0.835
≤552 USD	30 (34.48)	26 (31.71)		
552–828 USD	37 (42.53)	34 (41.46)		
≥828 USD	20 (22.99)	22 (26.83)		
Pathological types			0.029	0.999
Squamous cell carcinoma	22 (25.29)	20 (24.39)		
Adenocarcinoma	27 (31.03)	26 (31.71)		
Large cell carcinoma	26 (29.89)	25 (30.49)		
Small cell carcinoma	12 (13.79)	11 (13.41)		
TNM staging			0.038	0.998
Stage I	13 (14.94)	12 (14.63)		
Stage II	29 (33.33)	27 (32.93)		
Stage III	28 (32.18)	26 (37.71)		
Stage IV	17 (19.54)	17 (20.73)		
Treatment methods			0.207	0.976
Surgery	14 (16.09)	12 (14.63)		
Surgery+chemotherapy	26 (29.89)	27 (32.93)		
Surgery+targeted therapy	20 (22.99)	18 (31.95)		
Chemotherapy+radiation therapy	27 (30.03)	25 (30.49)		

Notes. TNM, Tumor Node Metastasis; RG, reference group; SG, study group.

The Shapiro–Wilk test was used to assess normality for continuous variables, and normally distributed variables are expressed as ($\bar{x} \pm s$). The independent t-test was used for comparison between groups, and the paired sample t-test was utilized for comparison within groups. Non-normal data were expressed as the median (P_{25}, P_{75}) and evaluated using the Mann–Whitney U test and the Wilcoxon signed-rank test was used for comparison within groups. Categorical variables were expressed as n (%) and associations were assessed using the chi-square test. p values < 0.05 indicated statistically significant differences.

Fig. 1 was drawn using Microsoft Office Word 2016 (Microsoft Corporation, Redmond, WA, USA).

Results

Demographic and Clinical Data of Patients

There were no significant differences in demographic characteristics, pathological types, TNM clinical stages, or treatment methods between the two groups ($p > 0.05$, Table 1).

Sleep Status

The PSQI scores of the two groups at the T1 and T2 stages were significantly lower than those at the T0 stage ($p < 0.001$). The SG had significantly higher PSQI difference scores than the RG at the T1 and T2 stages ($p = 0.003$, $p = 0.006$, Table 2).

Table 2. Comparison of PSQI scores within and between groups [points, Median (P_{25}, P_{75})].

Groups		RG	SG
Within groups	T0	14.00 (12.00, 16.00)	14.00 (12.00, 16.00)
	T1	11.00 (10.00, 13.00)*	9.50 (8.00, 12.00)*
	T2	9.00 (7.00, 11.00)*	8.00 (6.00, 10.00)*
Between groups	Difference score 1	–3.00 (–4.00, 0.00)	–3.50 (–7.00, –1.00)#
	Difference score 2	–5.00 (7.00, –3.00)	–6.00 (–8.00, –4.00)#

Notes. T0, T1, and T2 stages indicate before nursing, after 2 weeks of nursing, and after 4 weeks of nursing, respectively. Difference score 1 = T1 – T0, and difference score 2 = T2 – T0. # indicates $p < 0.05$ for comparison of difference score with RG, and * indicates $p < 0.001$ compared with the T0 stage within groups. PSQI, Pittsburgh Sleep Quality Index.

Table 3. Comparison of SAS and D scores within and between groups [points, Median (P_{25}, P_{75}), $\bar{x} \pm$ sd].

Groups			RG	SG
Within groups	SAS	T0	86.00 (76.00, 90.00)	85.50 (78.00, 89.00)
		T1	73.00 (67.00, 77.00)*	68.00 (62.00, 73.00)*
		T2	58.00 (52.00, 61.50)*	52.00 (48.00, 58.00)*
	D	T0	40.00 (36.00, 46.00)	42.50 (37.00, 49.00)
		T1	39.00 (33.00, 44.00)#	34.00 (29.00, 42.00)*
		T2	31.00 (25.00, 37.00)*	29.00 (24.00, 34.00)*
Between groups	SAS	Difference score 1	–12.00 (18.50, –5.00)	–17.00 (–22.00, –10.00)#
		Difference score 2	–27.06 ± 9.76	–31.06 ± 9.39#
	D	Difference score 1	–2.41 ± 8.62	–7.52 ± 9.67*
		Difference score 2	–10.13 ± 8.27	–14.12 ± 7.98#

Notes. SAS, Self-rating Anxiety Scale; D, Depression Scale. T0, T1, and T2 stages indicate before nursing, after 2 weeks of nursing, and after 4 weeks of nursing, respectively. Difference score 1 = T1 – T0, and difference score 2 = T2 – T0. # indicates $p < 0.05$ for with-group and between-group differences compared with the T0 stage, and * indicated $p < 0.001$ for with-group and between-group differences compared with the T0 stage.

Anxiety and Depression

The SAS (T0–T1: $p < 0.001$; T0–T2: $p < 0.001$) and D scores (T0–T1: $p = 0.026$, $p < 0.001$; T0–T2: $p < 0.001$) of the two groups at the T1 and T2 stages were significantly lower than those at the T0 stage. The SG had significantly higher SAS (difference score 1: $p = 0.002$; difference score 2: $p = 0.007$) and D difference scores (difference score 1: $p < 0.001$; difference score 2: $p = 0.002$) than the RG at the T1 and T2 stages (Table 3).

PCL Scores

The scores for the three PCL factors in both groups at the T1 and T2 stages were significantly lower than those at the T0 stage ($p < 0.001$). At the T1 stage, the difference score for the PCL high-alert factor in the SG was higher than that in the RG ($p = 0.008$), with no significant difference in difference scores for the other two factors ($p > 0.05$). At the T2 stage, the SG had higher difference scores for the three PCL factors than the RG ($p < 0.001$, $p = 0.011$, $p < 0.001$), as shown in Table 4.

Discussion

Patients with lung cancer may experience altered brain structure and PTSD due to surgery and long-term chemoradiotherapy [15]. PTSD is characterized by increased alertness, enhanced startle reaction, lack of concentration, difficulty falling asleep, susceptibility to waking up after falling asleep, anxiety, and somatic discomfort, which seriously affect the daily life of patients. Therefore, the implementation of clinical management is particularly critical. Intensive cognitive management is different from conventional management, and reduces physical symptoms, such as high alertness and fatigue of patients, by changing negative cognition and intrusive thoughts, thereby improving depression and anxiety and effectively alleviating physical and mental symptoms [16].

Table 4. Comparison of PCL scores within and between groups [points, Median (P_{25}, P_{75}), $\bar{x} \pm$ sd].

Groups			RG	SG
Within groups	Re-experience factor	T0	20.00 (18.00, 22.00)	19.00 (17.00, 21.00)
		T1	17.00 (14.00, 19.00)*	16.00 (15.00, 20.00)*
		T2	14.00 (11.00, 16.00)*	11.00 (9.00, 12.00)*
	Avoidance factor	T0	27.00 (24.00, 30.50)	27.00 (23.00, 31.00)
		T1	24.00 (19.50, 26.00)*	22.00 (19.00, 24.00)*
		T2	17.00 (15.00, 20.00)*	16.00 (12.00, 18.00)*
	High alert factor	T0	19.00 (17.00, 21.00)	19.00 (16.00, 21.00)
		T1	16.00 (14.00, 18.00)*	14.00 (12.00, 16.00)*
		T2	15.00 (12.00, 17.00)*	11.00 (8.00, 14.00)*
Between groups	Re-experience factor	Difference score 1	–2.61 ± 3.31	–2.98 ± 3.48
		Difference score 2	–5.93 ± 3.40	–8.45 ± 3.15*
	Avoidance factor	Difference score 1	–3.92 ± 5.02	–5.05 ± 5.52
		Difference score 2	–9.31 ± 4.88	–11.39 ± 5.67#
	High alert factor	Difference score 1	–4.00 (–6.00, –0.50)	–5.00 (–8.00, –2.00)#
		Difference score 2	–5.00 (–7.00, –1.00)	–7.00 (–11.00, –4.00)*

Notes. PCL, Post-traumatic Stress Disorder Check List. T0, T1, and T2 stages indicate before nursing, after 2 weeks of nursing, and after 4 weeks of nursing, respectively. Difference score 1 = T1 – T0, and difference score 2 = T2 – T0. # indicates $p < 0.05$ for with-group and between-group differences compared with the T0 stage, and * indicates $p < 0.001$ for with-group and between-group differences compared with the T0 stage.

Liu Shengmin *et al*. [17] confirmed that PTSD has a direct negative effect on sleep quality in patients with lung cancer. The present study used sleep quality as one of the indicators to measure the PTSD symptoms of patients. The results showed that the SG had significantly higher PSQI difference scores than RG at T1 and T2 stages, indicating that intensive cognitive management effectively improved the sleep quality of patients. Intensive cognitive management can promote rehabilitation exercise, reduce the nervous system inhibition of mental function [18], repair cognitive function, and improve sleep quality.

The sustained decrease in atrial natriuretic peptide levels causes anxiety in patients with PTSD. When patients with PTSD due to lung cancer face traumatic exposures, the brain cannot inhibit the generation of intrusive memory due to decreased activity in the central prefrontal cortex [19]. As a result, patients cannot adjust their emotions in time in respond to changes in the external environment. This study showed that the two groups had obvious depression and anxiety before the nursing intervention, with no statistical significance between the groups. The SG had higher SAS and D difference scores than RG at T1 and T2 stages, indicating that intensive cognitive management had a significant effect on emotion regulation in the patients. Intensive cognitive management focuses on improving psychological symptoms related to disease occurrence, development, treatment, and recovery [20,21], and can provide positive management tailored to the patients' current state. Moreover, intensive cognitive management attaches importance to enhancing patients' disease knowledge, which can help patients reduce erroneous ideas, establish correct cognition and vent bad emotions, thus improving their mental status and somatic symptoms.

Intensive cognitive management is a psychological concept which maintains that people's cognition and thoughts determine their emotions and behavior; this type of management can help patients identify, test, and cross-examine the correctness of negative thoughts to establish correct cognition and improve mental symptoms [22,23]. Correct cognitive behavior has a remarkable therapeutic effect on improving the biological symptoms of patients with PTSD. The present results revealed that the SG had significantly greater difference scores for the three PCL factors at the T2 stage compared with the RG ($p < 0.05$), whereas difference scores for the re-experience and avoidance factors were not significantly different between groups at the T1 stage. Hence, intensive cognitive management may not completely alleviate the dysfunctional cognition of patients.

The limitations of this study were as follows. This study utilized subjective questionnaires, and the research data may have been biased due to the subjective responses of patients, resulting in bias in statistical calculations. In addition, the study sample sizes were relatively small and patients were identified from a single institution. Finally, no longitudinal in-depth exploration was conducted. In the

future, longitudinal follow-up studies with large samples should be carried out to elucidate the occurrence, development, and recovery of PTSD in patients with lung cancer.

Conclusion

Emotional state, sleep quality, and clinical symptoms in the SG were significantly improved after the implementation of intensive cognitive management, and these measures showed greater improvement compared with the RG. Intensive cognitive management effectively improves the mood state, daily behavior, and quality of life of patients with PTSD due to lung cancer and thus has a clear clinical application value.

Availability of Data and Materials

Data to support the findings of this study are available on reasonable request from the corresponding author.

Author Contributions

KZ designed the research study. RZZ performed the research. KZ and RZZ analyzed the data. KZ and RZZ drafted the manuscript. Both authors contributed to important editorial changes in the manuscript. Both authors read and approved the final manuscript. Both authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

This study conforming to the principles of Declaration of Helsinki (2013) has been approved by the ethical committee of Zibo First Hospital (approval No.: YXLL2022072752). Patients who were aware of the purpose and significance signed an informed consent.

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Conflict of Interest

The authors declare no conflict of interest.

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