

Staged CBI for Reducing Anxiety and Depression in Lung Cancer Patients Undergoing Chemotherapy: A Retrospective Cohort Analysis

Lei Chen¹, Yongxia Sun², Huanhuan Yu², Min Sun²

¹Nursing department, Fuyang Tumor Hospital, Fuyang, Anhui, 236000, People's Republic of China; ²Oncology Department, Fuyang Tumor Hospital, Fuyang, Anhui, 236000, People's Republic of China

Correspondence: Min Sun, Email sun18055836138@hotmail.com

Background: The success rate of Staged cognitive behavioral intervention (CBI) in reducing emotional discomfort and enhancing the life-quality of patients undergoing chemotherapy for lung cancer was assessed retrospectively in this study.

Objective: The records of 55 affected role received/receiving chemotherapy for lung cancer were examined for Staged CBI.

Methods: In this study, patients' life related information's were obtained through demographic questionnaires. The 36-Item Short Form Survey (SF-36) was included as a single question that indicates subjective shifts in well-being. The Functional Assessment of Cancer Therapy-General (FACT-G) and the Lung Cancer Symptom Scale (LCSS) were designed as measuring scales for quality of life (QoL). Cohen's d indexes were measured to analyze the group's effectual size. The follow-up data were collected 6–8 weeks after the Staged CBI sessions.

Results: The SF-36 showed that effect size was large for most of the domains (Cohen's $d > 1.2$) and post CBI intervention was not significant except physical function. The FACT-G survey revealed that improvements were significant for observation group vs control for physical well-being ($p = 0.004$), social well-being ($p = 0.007$), emotional well-being ($p = 0.008$), and functional well-being ($p = 0.045$). The LCSS survey showed clinically marked changes for activity level, daily routine and social activities from 43.86 ± 20.16 to 71.29 ± 25.42 , 45.36 ± 32.65 to 72.36 ± 26.78 , and 35.36 ± 31.07 to 77.77 ± 28.58 , respectively ($P > 0.001$). The resulting outcomes were significant in getting better the overall Global QoL of the patients. Besides these, the symptoms burden was also promisingly reduced.

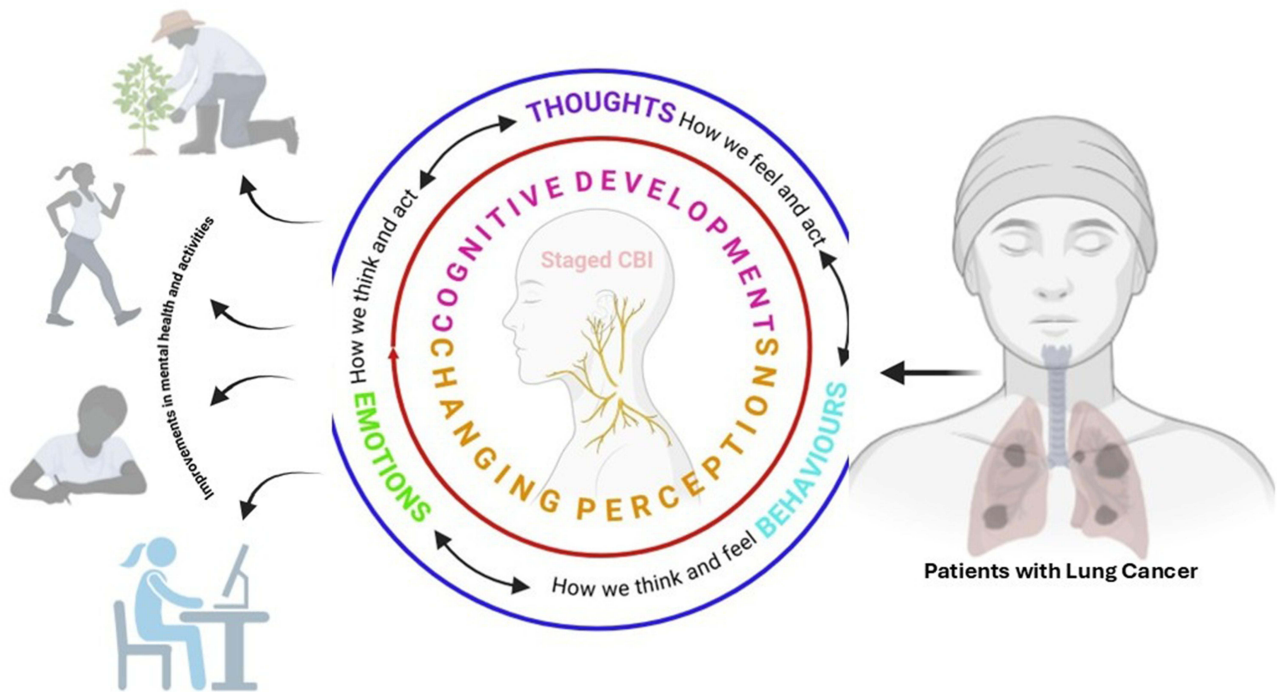
Conclusion: The function of CBI in lung cancer chemotherapy patients has not yet been examined retrospectively. This study investigated how CBI affects the treatment of mental health issues and enhances patients' treatment compliance and quality of life.

Keywords: lung cancer, staged CBI, chemotherapy, retrospective analysis

Introduction

Lung cancer chemotherapy patients (LCCP) experience significant psychological distress, impacting treatment adherence and quality of life. Around the globe, developed and developing areas, all are facing the intense fatality of the cancer that endorse fear of life and hopelessness.¹ The fatalities have been found to increase from ~8 to ~20 million since 2008 worldwide. According to the report from WHO in 2012, more than 60% deaths occurred due to cancers in America, Africa, and Asia.^{2,3} Among these, half the population died due to ignorance of their health and improper examinations that led to severity of the diseases. The most common psychiatric issues with cancer patients are fear, anxiety, fatigue, appetite issues, bad mood, sleep issues, and worries. These emotional and psychiatric issues can be resolved with best psychological treatments to improve the quality of life in the survival period.^{3–5} Physiological and psychological complications are still terrible for cancer patients, despite the availability of modern therapeutic alternatives. Emotional distress including the pending clue of death, helplessness, low confidence, reliance on others, and doubtful future. Lung cancer is one of the leading cancers leading to death.^{6–9} The kind of cancer a patient has a direct impact on their mental and emotional health. Patients afflicted with lung cancer, for instance, may endure terrible psychological and

Graphical Abstract



emotional wounds as a result of the disease's high mortality rate. This can lead to idle daily life performance and functions after finishing the treatment.^{10,11} Moreover, the patients who received or receiving chemotherapy often face fear of cancer progression and recurrence of the disease which can cause emotional and psychological damage.^{12–14} That's why proper psychological treatment is rigorously needed at the time of diagnosis, during treatment course, and after the treatment to provide support for navigating psychological issues and improving the quality of life.

Staged cognitive behavioral intervention (CBI) is a personalized treatment according to the severity of the disease and is considered an effective intervention for treating psychiatric and emotional issues with LCCP.^{15–17} To cope with the emotional and depressive symptoms in lung cancer patients undergoing chemotherapy CBI is promising intervention that starts with psychiatric education and continues until recovery. In addition, CBI helps LCCP to gain understanding, overcomes behavioral and cognitive issues, and trains them in new abilities.^{18–20} The wider community frequently uses CBI as an approach for addressing psychosocial problems including anxiety and depression as well as to measure and enhance quality of life. This is supported by the literature's strong evidence of CBI's efficacy on mental health measures, and it should be considered when considering CBI in society. Although there has always been some variance in efficacy among age groups, CBI is being demonstrated to be useful for mental health issues such as depression and anxiety in LCCP.^{21–23} Recent investigations showed no difference in effect size between young and middle-aged adults and older individuals. Furthermore, research has shown that patients would prefer to engage in CBI rather than take medicine to alleviate mental health issues. The combination of positive mindsets towards seeking professional assistance and the effectiveness of CBI for cancer chemotherapy patients renders CBI a feasible choice for the oncology community. Cancer patients' thoughts can be eased, and the strain of diagnosis and treatment can be lessened using CBI. Findings reveal that patients have less anxiety and sadness, better quality of life, reduced insomnia symptoms, and eventually a lower morbidity related to their cancer diagnosis when CBI is used appropriately. When it comes to the treatment and survival phase of cancer diagnosis, addressing the psychological problems of patients with CBI can offer a comprehensive and successful strategy.^{7,24–26}

Therefore, CBI might be a promising approach for addressing mental health issues and enhancing global QoL in lung cancer chemotherapy patients. While the function of CBI in managing lung cancer chemotherapy patients remains unexplored, a retrospective analysis offers a pragmatic first step to evaluate its real-world utilization, safety, and potential associations with outcomes. Given the logistical and ethical challenges of conducting an RCT without preliminary data—such as patient selection, dosing, or expected effect sizes—this study leverages existing clinical records to identify trends, generate hypotheses, and inform the design of future prospective trials. Additionally, the availability of a large, well-documented cohort of patients who received CBI as part of routine care provides a unique opportunity to assess its impact in a diverse, unselected population (Figure 1). The primary goals of this research were to find out how CBI affects the treatment of mental health issues and to enhance patients' treatment compliance and quality of life.

Methods

The purpose of the analysis was to evaluate and analyze the effects of staged cognitive behavioral interventions (CBIs) on the quality of life (QoL) of the patients who are undergoing chemotherapy for lung cancer. The study was carried out post-approval from the institutional review board and ethics committee of Fuyang Tumor Hospital, Anhui (No. KY2024072).

Participating in Patients and Design of the Study

According to the aim of the study, the patient receiving chemotherapy for any type of lung cancer was capable of this retrospective study. All the participants involved in the study were allowed after being informed of written consent. Prior ethical approval was obtained before the study and Helsinki guidelines were thoroughly followed.² Sample size was determined by the availability of patients who were receiving chemotherapy from January 2022 to December 2022 were entered in the study design. The participants were included for staged CBI analysis as detailed in the flow chart (Figure 2). The details of the patients included are given in Supporting Tables 1 and 2.

Inclusion and Exclusion Criteria

The inclusion criteria entailed the following points: (a) exact diagnosis of lung cancers, (b) giving their informed agreement to take part in the research, (c) not getting counseling or psychotherapy during the CBI sessions, (d) not having previously taken part in comparable research, (e) being at least elementary school educated, and (f) not abusing

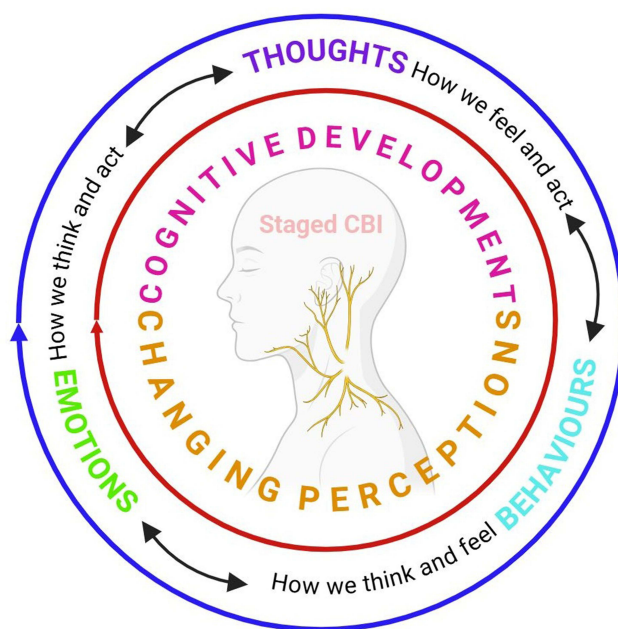


Figure 1 Schematic illustration of the staged CBI effects on life quality.

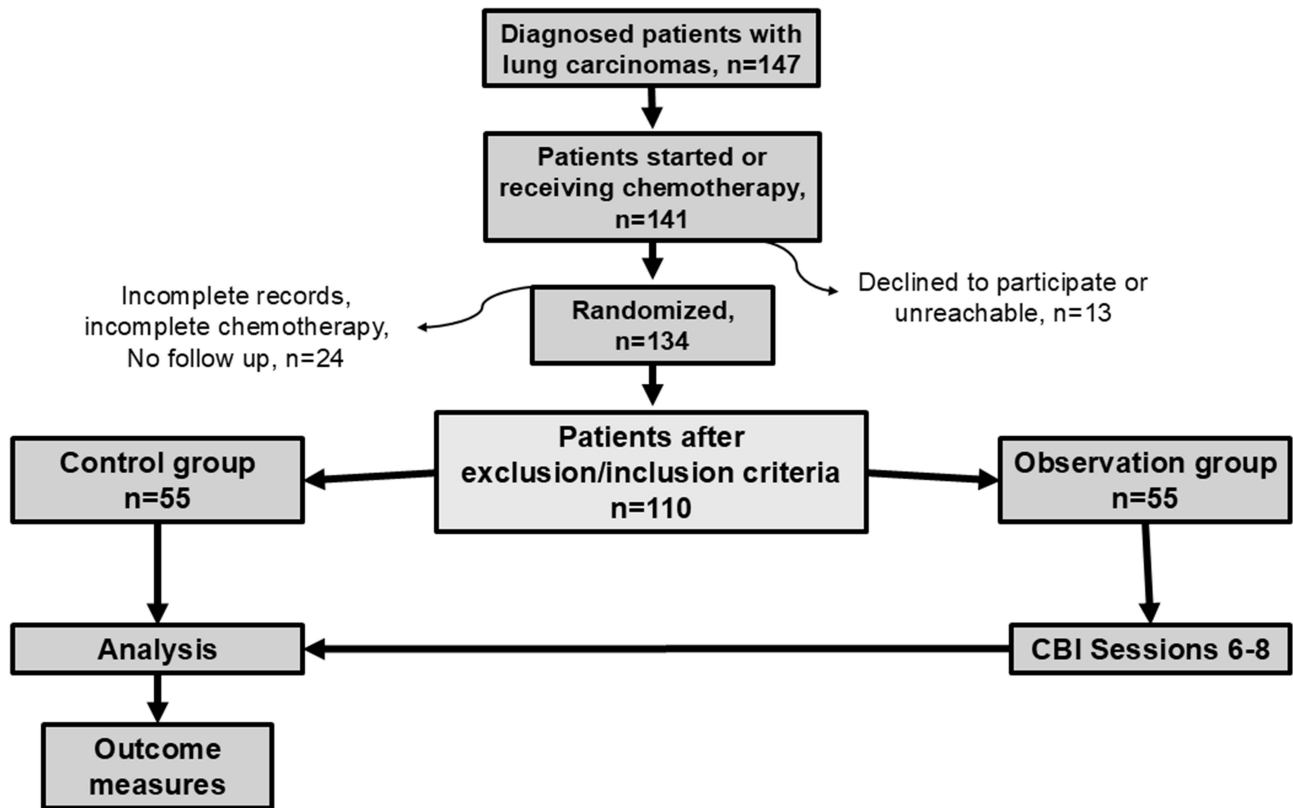


Figure 2 Flow chart of including or excluding the participants into the staged CBI analysis study design.

drugs. However, the following were exclusion criteria: (a) missing more than two sessions; (b) not finishing chemotherapy; and (c) abusing drugs during the intervention. The above criteria was followed for including eligible participants.

Staged CBI

In staged CBI intervention 6–8 sessions (30–60 minutes each) were performed. These sessions are detailed in the following protocol.

Table 1 Demographic Study of the Included Patients

Characteristics	Control	Observation	p-value
Age	64.96±9.75	64.31±9.76	0.726
Gender			0.191
Male	65.45%	67.27%	
Female	24.55%	22.73%	
Education Level			0.428
Elementary	10.9%	14.5%	
High School	16.3%	20.0%	
Bachelor's or higher	72.72%	65.45%	
Employment Status			0.471
Employed	32.72%	32.72%	
Unemployed	30.9%	21.81%	
Retired	36.36%	45.45%	
Income level annually (U.S.D)			0.501
<10,000	9.0%	7.27%	
10,000–20,000	21.8%	40.0%	
>20,000	69.09%	52.72%	

Table 2 The 36-Item Short form Survey (SF-36) Report

S-36 domains		Control	Observation	p-value	Coh d
PF	Base line	22.32±4.15	23.54±5.14	0.113	1.404
	Post CBI	25.51±4.32	28.52±6.28	0.035*	
	6–8 weeks Post CBI	31.25±5.23	41.62±4.11	0.035*	
RP	Base line	30.32±3.44	29.54±4.64	0.453	0.993
	Post CBI	31.21±4.98	33.12±5.31	0.359	
	6–8 weeks Post CBI	34.21±5.83	40.22±6.34	0.012*	
BP	Base line	45.65±7.85	48.55±6.93	0.333	0.215
	Post CBI	42.31±6.13	43.12±5.22	0.222	
	6–8 weeks Post CBI	41.12±5.15	42.33±6.13	0.199	
GH	Base line	36.52±5.61	38.65±5.74	0.247	0.485
	Post CBI	37.64±6.22	39.82±5.63	0.178	
	6–8 weeks Post CBI	41.02±5.85	55.67±5.14	0.048*	
VT	Base line	27.12±5.96	21.92±3.32	0.139	1.646
	Post CBI	30.12±4.33	31.12±4.87	0.424	
	6–8 weeks Post CBI	31.31±4.64	45.17±3.27	0.041*	
SF	Base line	37.16±4.56	34.25±5.93	0.325	1.608
	Post CBI	36.45±5.12	37.12±4.12	0.435	
	6–8 weeks Post CBI	38.12±4.27	47.86±4.08	0.027*	
RE	Base line	21.12±3.46	24.75±3.95	0.211	0.924
	Post CBI	25.23±4.31	29.12±4.17	0.118	
	6–8 weeks Post CBI	26.54±5.17	35.12±5.34	0.037*	
MH	Base line	24.23±4.01	23.98±3.78	0.364	1.951
	Post CBI	26.45±3.55	27.54±3.54	0.311	
	6–8 weeks Post CBI	25.34±4.24	34.45±5.12	0.029*	

Notes: (Cohen's d values: 0.0–0.2= trivial effect, 0.2–0.5= small effect, 0.5–0.8= medium effect, 0.8–1.2= large effect, >1.2= very large effect).

Abbreviations: PF, physical functioning; RP, role physical; BP, bodily pain; GH, general health; VT, vitality; SF, Social functioning; RE, role emotional; MH, mental health.

Psychoeducation and Goal Setting (Sessions 1-2)

- i. Commencing the CBT counselor, becoming patients familiar with each other, and starting a trust-based connection. The patients are introduced to CBI therapists, and relationships are established among patients and therapists, and each other patients.
- ii. The purpose and importance of CBI information's (specification of time, place, length, and number of the sessions). Rules and procedures for conducting the sessions, for example, session's timing, respect each other (patients) during discussions, and to leave the CBI sessions when absent for two consecutive sessions.
- iii. Cheering patients to openly express their attitudes, beliefs, and incidents of depression.
- iv. Summary of the whole session and give assignments to the patients (record of patient's depression symptoms).

Cognitive Restructuring and Relaxation Techniques (Sessions 3-4)

- i. Review the previous assignments and share the ideas to have meaningful, rational, healthy, purposed, and flexible life experiences with strong thoughts and beliefs.
- ii. Establishing the relationship of thoughts and beliefs with emotional reactions and behavioral changes.
- iii. Providing patients with projects that involve identifying and overcoming obstacles to their confidence, as well as summarizing the session's content. Record of patients' negative and positive beliefs and thoughts.

- iv. Discussions between group members about self-esteem, its importance, and peoples' characters possessing high-level self-esteem.
- v. Delivering homework to patients involves identifying and compiling a list of obstacles to self-esteem and offering answers, as well as effectively communicating the session's content.

Problem-Solving and Coping Skills Training (Sessions 5-6)

Examine the assignments from the prior session.

- i. Conversation on the concept of self-acceptance and associated social skills.
- ii. Finding and enhancing one's essential qualities, emotions, and happy vibes.
- iii. Outlining the main points of the session and assigning the patients' homework for the next one (identifying and compiling a list of self-defeating ideas and attitudes, assessing one's own strengths and shortcomings)
- iv. Conversation about optimism and its importance.
- v. The identification of optimists' qualities and those who possess them. Educating patients on the obstacles to optimism caused by cognitive distortions.
- vi. Providing patients with assignments (identifying and compiling a list of the characteristics of optimistic people), summarizing the session's information, and outlining practical strategies for overcoming obstacles to being optimistic.

Consolidation and Relapse Prevention (Session 7-8)

- i. Assignments examination and review.
- ii. Small blessings and their discussions with each other (patient) psychologists and planning to deal with negative emotions.
- iii. Conducting cognitive interventions (dealing with negative thoughts and feelings through identification of skills, positive thoughts, and feelings that improve optimism and self-esteem, getting feedback from patients about the treatment plan).
- iv. Maintaining therapeutic effects (feedback and practices for future).
- v. Ending the staged CBI sessions and conducting post-test and acknowledgment.

Data Collection Tools

A demographic survey was used to collect data for this investigation. Physical functioning, physiological discomfort, role constraints resulting from physical health issues, role restrictions resulting from personal or emotional issues, emotional well-being, social functioning, energy/fatigue, and overall health views are the eight health categories that are tapped by the 36-item Short Form Survey (SF-36).²⁰ Additionally, it has a single item that indicates a perceived change in health. Four aspects (functional, social, emotional, and physical well-being) of HRQOL in cancer patients were measured by the 27-item Functional Assessment of Cancer Therapy-General (FACT-G) questionnaire.¹⁵ Specifically intended for use in clinical trials, the Lung Cancer Symptom Scale (LCSS) is a site-specific QoL assessment.¹⁶ It assesses the impact of the six main symptoms linked to lung cancers on total symptomatic discomfort, functional activities, and overall Global QoL.^{19,21} Nine visual analogue scales (100 mm horizontal line) were used for the patient. To indicate how strongly they responded to the questions, patients mark the line (0 being the lowest rating, 100 being the highest rating). Observer scale: 5-point categorical scale (100 = none, 75 = mild, 50 = moderate, 25 = marked, 0 = severe) ([Supplementary Materials](#)). All these tools were used to analyse the effects of staged CBI on the patient's receiving chemotherapy.

Statistical Analysis

The means, standard deviation, frequencies, and percentages were used to characterize the data. Both the Student's *t*-test and the chi-squared test were used to compare sociodemographic and clinical data between groups. Repeated measures ANOVA were used to compare the psychological ratings, and a post-hoc Bonferroni test was used to modify *p* values. A *p*-value of less than .05 was deemed significant. The independent samples *t*-test was used to compare the two groups'

mean ratings for optimism and self-esteem at two different times. By computing the mean difference between the two groups and dividing it by the pooled Standard Deviation (SD), Cohen's *d* index was calculated for this purpose.^{8,9,14,20,21,23} A researcher who was blind to the data conducted all the analyses.

$$\text{Cohen's } d = \frac{M2 - M1}{SD \text{ pooled}}$$

$$SD \text{ pooled} = \sqrt{\left(\frac{SD1^2 + SD2^2}{2}\right)}$$

Results and Discussions

Demographics

People with advanced lung cancer are a heterogeneous group, mostly consisting of those whose life expectancy is only a few days or months due to the disease's most advanced stage. A person with advanced cancer may live for years and have various demands as the disease progresses due to advancements in cancer treatment.⁶ Consequently, it is critical to determine the requirements of patients with advanced cancer and create therapies that will help them along the way. People with advanced cancer frequently have more physical, emotional, and spiritual symptoms than those with early-stage or localized diseases. Living with advanced cancer involves a lot of physical symptoms, including pain, exhaustion, constipation, dyspnea, and irregular sleep patterns. Anxiety, despair, and grieving over past or future losses are examples of emotional symptoms.^{7,15,16} It has also been determined that anxiety and depression are a symptom cluster, meaning that they occur together. Hope, gratitude, receiving love, forgiveness, finding meaning and purpose, connecting with family, friends, a spiritual community, or a deity from their faith tradition, believing in something greater than oneself, and finally spiritual needs have all been identified as being important for people with advanced cancer.¹⁷ Cancer patients are increasingly being provided with cognitive-behavioral interventions (CBIs) to help them with the entire spectrum of symptoms and psychosocial requirements mentioned above. Cognitive behavioral interventions (CBIs) aim to reduce symptoms and promote the idea that one has control over one's thoughts, beliefs, attitudes, and abilities to help with coping both during cancer treatment and during the survival process.²⁴ Psychology, behavioral science, and educational theories such as instrumental or operant conditioning, social learning theory, self-efficacy theory, adult education, and stress and coping theory serve as the foundation for CBIs.²⁵ Cognitive, behavioral, and educational therapies are the three main categories that have been discovered. Specific processes that are thought to enhance coping are addressed by each type of intervention. Cognitive interventions (CI) use the detection and alteration of negative ideas, beliefs, and expectations as its mechanism of change. CIs include guided imagery, problem solving, cognitive restructuring, and meaning-making treatments. In order to get results, behavioral treatments aim to reduce the use of maladaptive behaviors and enhance the use of adaptive behaviors.^{3,5,11} Since learning is dependent on rewards and punishments for behavior, learning habits remain in a person's repertoire of coping mechanisms. The method of change in behavioral therapies is to provide patients with a fresh set of environmental cues that reward good behavior. Activity pacing, social reinforcement, arranging enjoyable activities, and developing plans to ensure medication adherence are examples of behavioral therapies.^{23,26} There are two ways that psycho-educational therapies have been utilized to help cancer patients with their emotional and physical problems. First, studies are evaluating the impact of psycho-educational therapies separately. Second, along with other cognitive and behavioral therapies, psycho-educational interventions are frequently included in CBI protocols. When included into a CBI, educational interventions fill in knowledge gaps about the physiology and anatomy of symptoms, other illness education topics, and the intervention's theoretical foundations.^{4,12,14}

The demographic information provides a comprehensive overview of the study population, allowing for better understanding of the effectiveness of the Staged CBI intervention in lung cancer chemotherapy patients.¹⁹ It plays crucial role in Staged CBI eg older adults may respond better to CBI due to increased motivation and life experience, women may benefit more from emotional expression and social support aspects of CBI, and higher education levels may enhance understanding and engagement with CBI. Besides this, social support from spouses may enhance quality of life.^{9,20,21} While retired patients may report better quality of life due to reduced stress. In our study 65.45% and 67.27%

of patients were males in control and intervention/observation group, respectively. The mean ages were 64.96 ± 9.75 and 64.31 ± 9.76 in control and intervention/observation group, respectively. In both control and observational groups, above 65% of the patients were highly educated and only <10% were considered with poor incomes (Table 1). The demographics represent helpful information's to proceed Staged CBI with/after chemotherapy for lung cancer patients.¹⁰

The 36-Item Short form Survey

The 36-Item Short Form Survey (SF-36) provides valuable insights into patients' health status, facilitating informed clinical decisions, research, and healthcare planning. It is a widely used, multi-purpose, generic measure of health status. It assesses eight health domains, providing a comprehensive picture of physical and mental well-being. SF-36 was carried out to interpret the effectiveness of Staged CBI in lung cancer chemotherapy patients.²¹ Cohen's *d* is a statistical measure of effect size, which helps evaluate the magnitude of differences between two groups. Cohen's *d* values were also calculated based on mean differences and standard deviation to calculate the effect size of the two groups.² A statistical difference was found between the groups while comparing the results after 6–8 weeks of follow-up post CBI all the domains with *p* values lower than 0.5 (Table 2). The effect size was very large or large for most of the domains (Cohen's *d* > 1.2). Post CBI intervention was not significant except physical function in all domains to improve the quality of life. The SF-36 report gives positive outputs for Post CBI intervention with follow-up and revealed that Staged CBI could be able to enhance the quality of life of the patient's receiving chemotherapy.

Functional Assessment of Cancer Therapy-General (FACT-G) Survey

The Functional Assessment of Cancer Therapy-General (FACT-G) survey is a widely used and validated instrument to measure health-related quality of life (HRQOL) in cancer patients. Mean scores are rated as; 80–100: good HRQOL, 60–79: moderate HRQOL, and <60: poor HRQOL. The change in scores ≥ 5 points is considered clinically significant improvement while ≤ -5 points is considered clinically significant decline.^{15,16,20} There were clinically significant improvements post CBI and follow-up for observation group (Table 3). The improvements were statistically significant for observation group compared to the control with *p*-values 0.004, 0.007, 0.008, and 0.045 for physical well-being (PWB), social well-being (SWB), emotional well-being (EWB), and functional well-being (FWB), respectively. The effect size was large between control and observation group. The outcomes proved the benefits of Staged CBI for lung cancer patients receiving or received chemotherapy. In fact, the FACT-G survey provides valuable insights into cancer patients' HRQOL, facilitating informed clinical decisions and improved patient care.

Table 3 FACT-G (Functional Assessment of Cancer Therapy-General) - 4 Domains, Scored 0–108

S-36 domains		Control	Observation	p-value	Coh d
PWB	Base line	31.55±3.41	30.82±4.27	0.465	1.059
	Post CBI	34.22±3.83	38.32±3.91	0.084	
	6–8 weeks Post CBI	48.44±3.86	62.45±3.12	0.004**	
SWB	Base line	33.45±4.78	32.12±5.05	0.499	0.962
	Post CBI	36.12±4.28	40.12±4.03	0.109	
	6–8 weeks Post CBI	57.45±5.33	67.88±6.81	0.007**	
EWB	Base line	30.12±5.03	31.15±4.01	0.424	1.138
	Post CBI	32.65±3.78	38.45±6.13	0.039	
	6–8 weeks Post CBI	46.88±4.56	60.65±10.5	0.008**	
FWB	Base line	29.56±6.07	31.12±7.43	0.345	1.024
	Post CBI	35.12±5.31	36.12±6.07	0.298	
	6–8 weeks Post CBI	49.65±4.87	64.23±4.03	0.045*	

Abbreviations: PWB, physical well-being; SWB, social well-being; EWB, emotional well-being; FWB, functional well-being.

The Lung Cancer Symptom Scale (LCSS) Survey

The Lung Cancer Symptom Scale (LCSS) survey is a validated instrument designed to assess symptoms and quality of life in lung cancer patients. The LCSS is intended primarily for use in clinical trials as a disease- and site-specific quality of life measure. It assesses the main lung cancer symptoms and how they affect overall symptomatic distress, functional activities, and overall quality of life.^{13,22} The LCSS was developed with the goal of offering a useful quality of life metric that would lessen the strain on patients and staff when quality of life was measured repeatedly during the trial. It assesses various aspects worldwide and thoroughly documents those that are most likely to be impacted by therapeutic measures. A patient-completed scale plus an optional one for medical professionals (sometimes known as a “counterpart observer”) to offer context make up this scale. We evaluated symptom burden, functional status, and global quality of life. The mean scores are interpreted as symptom burden (<20 = mild, 20–40 = moderate, >40 = severe), functional status (>70 = good function, 40–69 = moderate, <40 = poor function), and global quality of life (good > 50 > poor). The changes in scores are considered; ≥ 10 points = clinically significant improvement and ≤ -10 points = clinically significant decline. The LCSS survey provides valuable insights into lung cancer patients’ symptoms and quality of life, facilitating informed clinical decisions and improved patient care.¹⁰ There were clinically insignificant improvements in the symptoms burden in both the groups. However, the improvements were comparably better in the observation group compared to the control (Table 4). The clinical improvement in fatigue symptoms and insignificant improvements of other symptoms are basically due to the

Table 4 The Lung Cancer Symptom Scale (LCSS) Survey

LCSS		Control	Observation	p-value
Symptoms				
Cough	Base line	40.00±35.5	43.37±34.41	0.321
	Post CBI	46.25±33.65	42.83±33.53	0.171
	6–8 weeks Post CBI	49.54±32.56	44.94±30.34	0.346
Dyspnea	Base line	43.63±35.11	40.13±36.27	0.316
	Post CBI	47.72±34.15	40.02±35.02	0.483
	6–8 weeks Post CBI	53.57±33.33	33.63±32.65	0.068*
Fatigue	Base line	38.67±32.55	34.12±31.41	0.587
	Post CBI	45.45±33.85	29.09±33.85	0.289
	6–8 weeks Post CBI	61.11±34.51	21.35±25.91	0.007*
Pain	Base line	51.25±39.12	48.37±33.87	0.499
	Post CBI	55.65±31.01	50.45±35.77	0.346
	6–8 weeks Post CBI	59.66±30.12	38.66±30.45	0.001
Hemoptysis	Base line	35.25±41.12	38.67±39.97	0.299
	Post CBI	38.32±36.81	35.45±31.87	0.196
	6–8 weeks Post CBI	39.66±33.66	33.66±34.78	0.119
Dysphagia	Base line	34.15±28.53	35.74±28.89	0.426
	Post CBI	39.61±29.47	32.54±26.11	0.278
	6–8 weeks Post CBI	35.45±27.84	24.18±18.66	0.045*
Weight loss	Base line	44.23±27.12	41.33±23.22	0.387
	Post CBI	49.22±22.61	37.44±26.77	0.378
	6–8 weeks Post CBI	45.56±32.55	32.53±23.33	0.011*

(Continued)

Table 4 (Continued).

LCSS		Control	Observation	p-value
Appetite loss	Base line	30.55±29.66	31.23±33.41	0.401
	Post CBI	34.11±31.13	36.87±31.02	0.235
	6–8 weeks Post CBI	35.44±37.44	33.23±28.36	0.379
Hoarseness	Base line	30.78±39.55	31.98±34.65	0.455
	Post CBI	31.55±27.55	35.36±21.33	0.305
	6–8 weeks Post CBI	34.36±36.55	31.32±44.36	0.218
Functional Status				
Activity Level	Base line	45.55±22.41	43.86±20.16	0.349
	Post CBI	49.5±22.86	51.61±23.46	0.316
	6–8 weeks Post CBI	52.27±27.33	71.29±25.42	<0.001***
Daily activities	Base line	41.32±28.44	45.36±32.65	0.366
	Post CBI	48.65±25.35	48.55±31.23	0.447
	6–8 weeks Post CBI	55.69±31.25	72.36±26.78	<0.001***
Social activities	Base line	36.32±33.32	35.36±31.07	0.483
	Post CBI	43.89±39.12	46.58±29.2	0.221
	6–8 weeks Post CBI	53.88±34.44	77.77±28.58	<0.001***
Global quality of Life				
Base line		50.58±11.47	50.08±12.65	0.46
Post CBI		52.83±9.61	54.16±12.11	0.383
6–8 weeks Post CBI		60.21±9.25	71.89±9.13	0.003**

psychological peace and calmness in the observation group. The results are still satisfactory to gain the benefits of Stage CBI.

The Staged CBI endorses the enrollment of patients in their social circle and physical activities which lead to improve their functional status.²⁰ Clinically marked changes were observed for activity level, daily routine and social activities from 43.86 ± 20.16 to 71.29 ± 25.42 , 45.36 ± 32.65 to 72.36 ± 26.78 , and 35.36 ± 31.07 to 77.77 ± 28.58 , respectively (Table 4). The changes were clinically significant, and slight improvement was also found for control group. The statistical analysis showed p-values less than 0.001 for comparison of control versus observation. The data presented the influence of Staged CBI on the betterment of quality of life of these lung cancer patients.

This retrospective analysis demonstrates the effectiveness of staged CBI in reducing psychological distress and improving quality of life in lung cancer chemotherapy patients. The Lung Cancer Symptom Scale (LCSS) and Global Quality of Life (QoL) are closely related concepts in assessing the well-being of lung cancer patients.^{6,16} By understanding the relationship between LCSS and Global QoL, healthcare providers can optimize patient care and improve overall well-being. Symptom burden (LCSS) negatively impacts Global QoL and improved symptom management (LCSS) enhances Global QoL (Figure 3). Investigation of LCSS and Global QoL relationships in diverse populations is useful to assess the impact of Staged CBI.²⁵ We examined the impact of LCSS on Global QoL in lung cancer patients receiving or received chemotherapy. Figure 3 shows that after 6–8 weeks of follow-up after Staged CBI, the Global QoL significantly improved in observation group as compared to control. These data justified the importance of Staged CBI to improve the Global QoL of patients suffering from lung cancer.

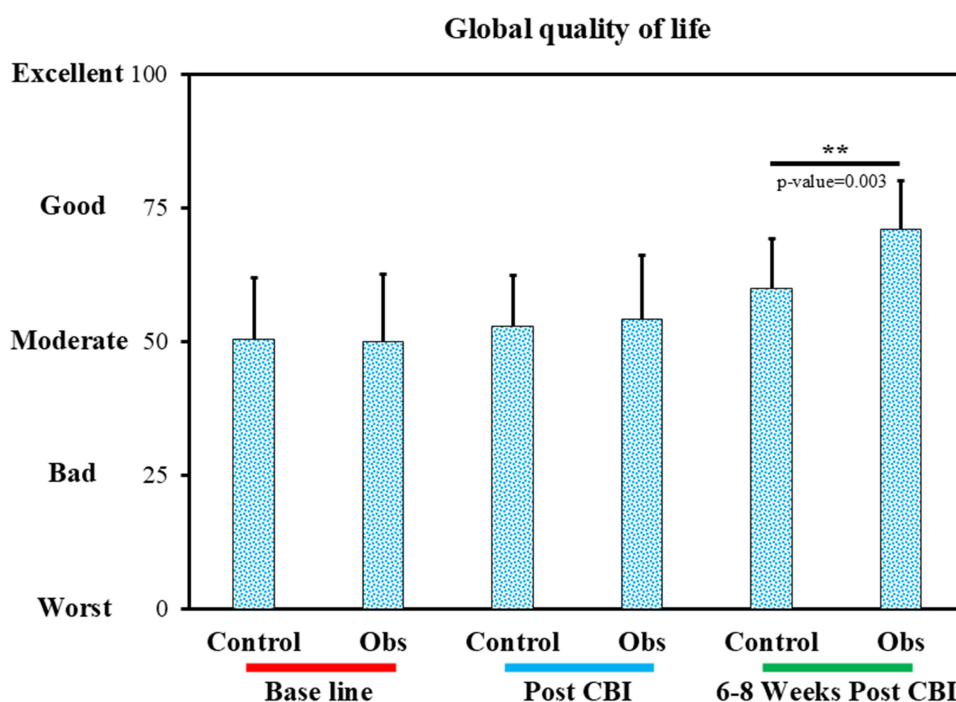


Figure 3 Global quality of life of lung cancer patients with/without undergoing Staged CBI. Data are presented as mean \pm standard deviation. Where, * $P < 0.05$, ** $P < 0.01$.

Limitations and Implications

There were some limitations in retrospective design, including bias due to incomplete or inaccurate records, lack of control over data collection, difficulty establishing cause-and-effect relationships, and potential for selection bias. Limited generalizability is also crucial such as small sample size or specific population, limited geographic or cultural representation, results may not apply to other settings or populations, and difficulty extrapolating findings to broader contexts. The results were interpreted in caution due to the study limitations where the findings may not be representative of the large population. The results may not be directly applicable to the clinical practice without evidence from other studies. Retrospective studies with large and more diverse populations are needed to verify the replication of the findings. By acknowledging and addressing these limitations and implications, researchers and readers can better understand the study's contributions and limitations.

Future Perspectives

To enhance patient results and quality of life, more research is required to include standardized Staged CBI into lung cancer chemotherapy. Examining the efficacy and validity of optimum Staged CBI approaches in a variety of patient groups. When it comes to chemotherapy for lung cancer, we need to delve further into combination treatments (CBI + pharmaceutical interventions). In order to inform patients about the advantages and availability of Staged CBI, it is essential to create individualized ways that use biomarkers or machine learning. Future research may further examine the comparative efficacy of Staged CBI for patients undergoing chemotherapy for lung cancer, as well as the involvement of multicenter randomized controlled trials (RCTs). The Staged CBI trial has the potential to revolutionize lung cancer chemotherapy by improving patient education and support, updating clinical practice recommendations, and directing future research.

Recommendations

The use of Staged CBI in lung cancer chemotherapy regimens is strongly advised for the benefit of patients undergoing this treatment. In order to guarantee accessibility and fairness in CBI service, as well as to carry out Staged CBI, there is an enormous need for qualified healthcare personnel. To find out how intense CBI is, it's important to study the best way

to administer it and how long it should last. This might include looking at several personalized CBI strategies based on biomarkers or patient input. Encouraging patient-centered care, shared decision-making, and the ease of measuring patients' results and quality of life might be achieved via the promotion of collaborative care models for patients' education about CBI advantages and procedures. Healthcare professionals may improve patient outcomes and quality of life by incorporating phased CBI into normal therapy and studying the most effective dosage and duration.

Conclusion

This research sets out to determine whether Staged CBIs are effective in raising lung cancer patients' overall quality of life. Examining the potential long-term moderating influence of symptom load and physical functioning was one of the secondary purposes. Quality of life in relation to health and contentment with care were also investigated as potential benefits of Staged CBIs. For individuals undergoing chemotherapy for lung cancer, staged CBI is an excellent supplementary therapeutic option. Lung cancer chemotherapy patients may benefit greatly from Staged Cognitive Behavioral Intervention (CBI) as an auxiliary treatment that improves their mental and physical health. Staged CBIs improved symptom management (eg, pain, fatigue, anxiety), quality of life, coping abilities, resilience, emotional regulation, sleep quality, social support, connectivity, and cognitive function and clarity. They also reduced distress and increased social support. Healthcare practitioners may provide full support to patients undergoing lung cancer chemotherapy by including tiered CBIs. This approach improves patient outcomes and quality of life.

Abbreviations

CBI, Cognitive behavioral intervention; FACT-G, Functional Assessment of Cancer Therapy – General; QoL, quality of life; SF-36, 36-Item Short Form Survey; LCCP, Lung cancer chemotherapy patients; WHO, world health organization; CI, Cognitive interventions; HRQOL, health-related quality of life; PWB, physical well-being; SWB, social well-being; EWB, emotional well-being; FWB, functional well-being; RCTs, randomized controlled trials.

Ethics Approval and Informed Consent

This study was approved by the Ethics Committee of Fuyang Tumor Hospital, Anhui (No. KY2024072) and conducted after signing written informed consent.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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