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Clinical Efficacy of Majing Zhike Granules for Postoperative Cough in Lung Cancer Patients

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Abstract

Objective: To evaluate the efficacy of Majing Zhike Granules in relieving postoperative cough in lung cancer patients using multidimensional assessment tools. **Methods:** Sixty patients who developed cough after radical lung cancer surgery were randomly assigned to a control group or an intervention group (n = 30 each). The control group received routine postoperative and antitussive care, whereas the intervention group additionally received Majing Zhike Granules for 2 weeks. Changes in the Cough Symptom Score (CSS), Visual Analogue Scale (VAS), and the Leicester Cough Questionnaire (LCQ) were compared between groups, and adverse events were recorded. **Results:** After 2 weeks of treatment, the intervention group exhibited significantly lower CSS and VAS scores than the control group ($P < 0.01$). Scores across all LCQ domains and the total LCQ score were significantly higher in the intervention group ($P < 0.01$). **Conclusion:** Majing Zhike Granules markedly alleviate postoperative cough and improve cough-related quality of life in lung cancer patients, demonstrating good tolerability and potential clinical utility.

Keywords

Lung Cancer, Postoperative Cough, Majing Zhike Granules, Leicester Cough Questionnaire, Visual Analogue Scale, Cough Symptom Score

1. Introduction

Lung cancer remains one of the leading causes of morbidity and mortality worldwide, and surgical resection continues to be the mainstay of treatment for early-stage and selected locally advanced disease [1]. Postoperative cough is a common

but often underrecognized complication, with reported incidences ranging from 30% to 55% [2]-[4]. It typically presents as an irritative cough that worsens at night and may be accompanied by chest pain or dyspnea, substantially impairing sleep, emotional well-being, and recovery quality [5] [6]. Its pathogenesis is multifactorial, involving intraoperative airway traction, inflammatory responses at the bronchial stump, heightened mucosal sensitivity, and stimulation by retained secretions [2] [7] [8]. Persistent cough may further exacerbate incision pain and impede lung reexpansion, delaying pulmonary rehabilitation [9] [10]. Current management mainly relies on expectorants, antitussive agents, and nebulization therapy, yet clinical outcomes remain suboptimal, and symptom recurrence is common, highlighting the need for more effective and safer therapeutic options [11].

Traditional Chinese medicine (TCM), with its multitarget regulatory effects and ability to modulate inflammation, has shown increasing value in postoperative symptom management [12]. Previous studies suggest that TCM interventions can ameliorate cough after lung cancer surgery, reduce airway inflammation, and promote recovery [13] [14]. Majing Zhike Granules, composed of Ephedra Herba, Schizonepetae Spica, Cicadae Periostracum, Trichosanthis Fructus, Glehniae Radix, and other herbs, possess the functions of dispersing wind, diffusing the lung, resolving phlegm, and relieving airway spasm [15]. Experimental evidence indicates that this formula may attenuate airway hyperresponsiveness by regulating inflammatory pathways such as TLR4 signaling [16]. However, clinical evidence regarding its efficacy specifically in postoperative cough among lung cancer patients remains insufficient, and its multidimensional effects on symptom severity and cough-related quality of life require further validation. Therefore, this study employed multiple assessment tools—including the Cough Symptom Score (CSS), Visual Analogue Scale (VAS), and the Leicester Cough Questionnaire (LCQ)—to comprehensively evaluate the therapeutic effects of Majing Zhike Granules in this population, aiming to provide updated evidence for integrating TCM into postoperative cough management.

2. Materials and Methods

2.1. Diagnostic Criteria

Patients met the Western medicine diagnostic criteria for postoperative cough following radical lung cancer surgery [17]: pathologically confirmed lung cancer; having undergone radical surgical resection; and experiencing a postoperative cough lasting ≥3 days.

2.2. Inclusion Criteria

Patients were eligible for inclusion if they met the following conditions: 1) stable vital signs after surgery and sufficient cardiopulmonary function to tolerate subsequent treatment and observation; 2) no recent use of other traditional Chinese medicines for treating cough; and 3) provision of written informed consent after

fully understanding the study protocol.

2.3. Exclusion Criteria

Exclusion criteria were as follows: 1) presence of other primary malignant tumors; 2) severe dysfunction of the heart, liver, or kidneys, or poor general condition; 3) known allergy to components of the study medication; 4) expected survival of less than 3 months; 5) comorbid severe psychiatric illness or cognitive impairment; 6) significant thoracic deformity affecting lung function; and 7) cough caused by other conditions such as infection, asthma, or chronic bronchitis.

2.4. Patient Characteristics

A total of 60 patients with postoperative cough following radical lung cancer surgery were enrolled at Fujian Second People's Hospital between November 2024 and November 2025. Participants were randomly allocated to either the treatment group or the control group (n = 30 each). During the study, two patients in the control group and one in the treatment group withdrew, resulting in 57 patients who completed the trial. Baseline characteristics of the two groups are summarized in Table 1. No significant differences were observed between groups ($P > 0.05$), indicating good comparability.

Table 1. Comparison of baseline characteristics between the two groups.

Variable	Control Group (n = 28)	Treatment Group (n = 29)	Test Statistic	*P* Value
Sex (male/female)	21/7	15/14	$\chi^2 = 2.392$	0.122
Age (years)	56.79 ± 5.77	57.65 ± 6.18	$t = 0.707$	0.483
TNM Stage (I/II)	25/3	27/2	$\chi^2 = 0.002$	0.966

2.5. Treatment Protocol

2.5.1. Control Group

Patients in the control group received routine Western medical treatment. Antitussive and expectorant therapy consisted of ambroxol hydrochloride capsules (30 mg; Shanghai Xinyi Tianping Pharmaceutical Co., Ltd., China; National Drug Approval No. H20000282), administered orally at a dose of 30 mg three times daily.

2.5.2. Treatment Group

In addition to the standard regimen administered to the control group, patients in the treatment group were given Majing Zhike Granules (Approval No.: Min2012S0003; specification: 10 g/sachet), taken orally at a dose of one sachet per administration, three times daily for a total of 2 weeks. The formulation comprises Ephedrae Herba (Mahuang), Schizonepetae Herba (Jingjie), Cicadae Periostracum (Chantui), Cynanchi Paniculati Radix (Xuchangqing), Inulae Flos (Xuanfuhua), Trichosanthis Fructus (Gualou), Arctii Fructus (Niubangzi), Tussilaginis Flos cum Melle (Mikuandonghua), Glehniae Radix (Beishashen), Paeoniae Radix Rubra

(Chishao), Scrophulariae Radix (Xuanshen), and Glycyrrhizae Radix et Rhizoma (Gancao).

2.6. Outcome Measures

2.6.1. Assessment of Cough Symptoms (CSS)

Cough symptoms were evaluated using the scoring system recommended in the 2015 *Guidelines for the Diagnosis and Treatment of Cough* [18]. Daytime and nighttime symptoms were rated separately on a 4-point scale (0 - 3): 0 = no cough; 1 = occasional cough that does not interfere with daily activities/sleep; 2 = frequent cough that mildly interferes with daily activities/sleep; and 3 = severe cough that markedly interferes with daily activities/sleep. Higher scores indicate more severe symptoms. Scores were recorded at baseline and after 2 weeks of treatment.

2.6.2. VAS Assessment of Cough Intensity (VAS)

Cough severity was assessed using a 10-cm visual analogue scale (VAS), as also recommended in the 2015 cough guidelines [18]. A score of 0 indicated no cough, whereas 10 represented the most severe cough. Patients rated their symptom intensity before and after treatment.

2.6.3. Assessment of Health-Related Quality of Life (LCQ)

Cough-related quality of life was measured using the LCQ, in accordance with the 2015 guideline recommendations [18]. The questionnaire includes 19 items across three domains—physical (8 items), psychological (7 items), and social (4 items)—each scored on a 7-point scale. Higher scores indicate better quality of life. Domain scores were averaged, and the total LCQ score was calculated as the sum of the three domain scores.

2.7. Adverse Events

Incidences of pulmonary atelectasis, pulmonary infection, pain, and dyspnea were recorded during the treatment period. The total incidence rate of adverse events was calculated for each group.

2.8. Statistical Analysis

Statistical analyses were performed using SPSS version 25.0. Categorical variables were presented as frequencies and percentages, with between-group differences assessed using the chi-square test. Continuous variables were expressed as mean ± standard deviation ($\overline{x} \pm s$). Between-group comparisons were conducted using independent-sample t-tests, while within-group changes before and after treatment were evaluated using paired t-tests. All statistical tests were two-sided, and a P-value < 0.05 was considered statistically significant.

3. Results

3.1. Cough Symptom Score

After two weeks of treatment, daytime, nighttime, and total cough symptom

scores in the treatment group were significantly lower than those in the control group ($P < 0.05$ or $P < 0.01$). Within the treatment group, all three indices demonstrated significant reductions from baseline ($P < 0.01$). Detailed results are presented in Tables 2-4.

Table 2. Comparison of daytime CSS scores between the two groups (mean ± SD, points).

Group	n	Before treatment	After treatment	*t* value	*P* value
Control group	28	1.82 ± 0.61	1.61 ± 0.69	−0.257	0.798
Treatment group	29	1.86 ± 0.58	1.10 ± 0.72	2.696	0.009
t value (within-group)	—	1.441	3.863	—	—
P value (within group)	—	0.161	0.001	—	—

Table 3. Comparison of nighttime CSS scores between the two groups (mean ± SD, points).

Group	n	Before treatment	After treatment	*t* value	*P* value
Control group	28	1.61 ± 0.69	1.39 ± 0.57	0.332	0.741
Treatment group	29	1.55 ± 0.57	0.83 ± 0.71	3.326	0.002
t value (within-group)	—	1.236	4.638	—	—
P value (within-group)	—	0.227	0.000	—	—

Table 4. Comparison of total CSS scores between the two groups (mean ± SD, points).

Group	n	Before treatment	After treatment	*t* value	*P* value
Control group	28	3.43 ± 0.84	3.00 ± 0.98	0.065	0.948
Treatment group	29	3.41 ± 0.87	1.93 ± 1.00	4.078	0.000
t value (within-group)	—	1.759	6.147	—	—
P value (within-group)	—	0.090	0.000	—	—

3.2. VAS Score

After two weeks, VAS scores in the treatment group were markedly lower than those in the control group ($P < 0.01$). Compared with baseline, the treatment group also showed a significant decrease in VAS scores ($P < 0.01$). The corresponding data are provided in Table 5.

Table 5. Comparison of VAS scores between the two groups (mean ± SD, points)

Group	n	Before treatment	After treatment	*t* value	*P* value
Control group	28	5.53 ± 0.62	5.27 ± 0.61	1.532	0.137
Treatment group	29	5.37 ± 0.69	3.17 ± 0.67	14.870	0.000
t value (within-group)	—	0.934	12.377	—	—
P value (within-group)	—	0.354	0.000	—	—

3.3. LCQ Score

Following the two-week intervention, the treatment group exhibited significantly

higher LCQ scores across the physical, psychological, and social domains, as well as in total LCQ score, compared with the control group ($P < 0.01$). Within the treatment group, all LCQ domain scores and the total score improved significantly from baseline ($P < 0.01$). Detailed outcomes are summarized in Table 6.

Table 6. Comparison of LCQ scores between the two groups (mean ± SD, points).

Domain	Timepoint	Control group (n = 28)	Treatment group (n = 29)	*t* value	*P* value
Physical	Before treatment	4.64 ± 0.78	4.83 ± 0.93	−0.812	0.420
	After treatment	4.78 ± 0.79	6.03 ± 0.87	−5.691	0.000
	t value (within group)	−21.169	−4.925	—	—
	P value (within group)	0.000	0.000	—	—
Psychological	Before treatment	4.96 ± 0.79	4.90 ± 0.94	0.294	0.770
	After treatment	5.09 ± 0.79	6.24 ± 0.74	−5.663	0.000
	t value (within group)	−19.695	−6.172	—	—
	P value (within group)	0.000	0.000	—	—
Social	Before treatment	4.86 ± 0.76	4.83 ± 1.00	0.125	0.901
	After treatment	5.00 ± 0.77	6.03 ± 0.73	−5.219	0.000
	t value (within group)	−18.445	−6.648	—	—
	P value (within group)	0.000	0.000	—	—
Total score	Before treatment	14.46 ± 0.79	14.55 ± 1.12	−0.339	0.736
	After treatment	14.87 ± 0.79	18.31 ± 0.97	−14.653	0.000
	t value (within group)	−37.283	−14.148	—	—
	P value (within group)	0.000	0.000	—	—

3.4. Safety Analysis

During treatment, one patient in the treatment group experienced mild diarrhea, which resolved after medication withdrawal; the patient subsequently discontinued participation. No other notable adverse reactions were observed. Routine blood and urine tests, liver and kidney function assessments, and electrocardiogram findings remained within normal ranges before and after treatment. No serious adverse events occurred, indicating favorable overall safety.

4. Discussion

This study showed that Majing Zhike Granules significantly alleviated postoperative cough in lung cancer patients, as demonstrated by reductions in daytime, nighttime, and total CSS scores, along with lower VAS scores. Improvements across all LCQ domains further indicate that the intervention not only reduced symptom severity but also enhanced cough-related quality of life. These multidimensional benefits complement earlier findings that traditional Chinese medicine (TCM) formulations may reduce airway irritation, modulate postoperative dis-

comfort, and promote functional recovery. Collectively, the present results suggest that Majing Zhike Granules may serve as a meaningful adjunctive therapy for postoperative cough, addressing limitations of conventional treatments that often provide incomplete relief.

From the perspective of traditional Chinese medicine (TCM) theory, postoperative cough is primarily attributed to impairment of lung qi and yin caused by surgical trauma, which weakens the lung's capacity to disperse and descend qi, thereby predisposing patients to persistent irritative cough and throat itching [19]-[21]. Based on the therapeutic principle of supporting the upright qi while dispelling pathogenic factors, Majing Zhike Granules were formulated to regulate qi movement, relieve cough, and restore lung function. Ephedrae Herba (Mahuang) and Schizonepetae Herba (Jingjie) disperse wind and diffuse the lung to facilitate the outward release of pathogenic factors [22], while Inulae Flos (Xuanfuhua) and Tussilaginis Flos cum Melle (Mikuandonghua) descend rebellious qi, moisten the lung, and relieve cough. When used in combination, these herbs create a coordinated ascending-descending effect that helps normalize the movement of lung qi.

In addition, Cicadae Periostracum (Chantui), Cynanchi Paniculati Radix (Xuchangqing), and Arctii Fructus (Niubangzi) further dispel wind, soothe the throat, and alleviate cough and throat itching, whereas Glehniae Radix (Beishashen) and Scrophulariae Radix (Xuanshen) nourish yin, moisten the lung, and benefit the throat, addressing the underlying yin deficiency commonly observed after surgery. Glycyrrhizae Radix et Rhizoma (Gancao) harmonizes the actions of the other herbs, moderates urgency, and exerts antitussive effects, thereby enhancing the overall tolerability and coherence of the formulation. Considering that surgical injury may also lead to blood stasis and qi constraint, Paeoniae Radix Rubra (Chishao) and Trichosanthis Fructus (Gualou) were included to activate blood circulation, regulate qi, and relieve chest stagnation, representing a therapeutic refinement of the formula. Modern pharmacological studies [23]-[25] suggest that Majing Zhike Granules may modulate inflammatory mediators such as TNF-α and IL-6 and attenuate airway hypersensitivity, which is consistent with the clinical improvements observed in the present study. However, it should be noted that inflammatory biomarkers, including TNF-α and IL-6, were not directly measured in the present study; therefore, the proposed mechanistic links are inferred from prior experimental evidence. Future clinical studies incorporating biomarker assessments are warranted to further elucidate the underlying mechanisms of Majing Zhike Granules in postoperative cough.

Majing Zhike Granules also exhibited a favorable safety profile. Only one patient experienced mild, self-limiting diarrhea, and no clinically significant abnormalities were detected in routine laboratory or cardiopulmonary evaluations. These findings suggest that the formula is well tolerated and may enhance postoperative comfort while supporting recovery. Nonetheless, this study was a single-center trial with a modest sample size and a relatively short treatment duration;

therefore, the generalizability of the findings should be confirmed through larger, multicenter studies with extended follow-up. Future research should incorporate larger, multicenter cohorts and extended follow-up, along with mechanistic evaluations—such as inflammatory marker profiling, airway mucosal assessment, or imaging—to clarify long-term efficacy and underlying pathways. Such evidence would further strengthen the role of TCM-based interventions in the standardized management of postoperative cough.

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Conflicts of Interest

The authors declare that they have no conflicts of interest related to this work.

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