



Clinical Observation on the Efficacy of Auricular Point Pressing Therapy in Intervening Sleep Disorders in Stable-stage Chronic Obstructive Pulmonary Disease Patients

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Abstract: *Objective:* To observe the clinical efficacy of auricular point pressing therapy in intervening sleep disorders in patients with stable-stage chronic obstructive pulmonary disease (COPD). *Methods:* A total of 60 outpatients from the Department of Respiratory Medicine with regular follow-up and no acute exacerbations in the past 3 months were selected and divided into the control group and the experimental group using the random number table method. The control group received sleep education once a week, while the experimental group was additionally treated with auricular point pressing therapy on this basis. Both groups were treated for 4 weeks. Changes in Pittsburgh Sleep Quality Index (PSQI), sleep efficiency, COPD Assessment Test (CAT) score and modified Medical Research Council (mMRC) dyspnea scale score were compared between the two groups. *Results:* After treatment, the PSQI and CAT scores in the experimental group were significantly lower than those in the control group ($p < 0.05$). The improvement in sleep efficiency was statistically significant in the experimental group before and after treatment ($p < 0.05$), whereas no significant difference was found in the control group ($p > 0.05$). There was no statistically significant difference in mMRC scores in either group before and after treatment ($p > 0.05$). *Conclusion:* On the basis of routine sleep education, adjuvant auricular point pressing therapy can not only improve sleep quality and sleep efficiency in stable-stage COPD patients complicated with sleep disorders, but also relieve dyspnea symptoms to a certain extent.

Keywords: Chronic obstructive pulmonary disease; Sleep disorders; Auricular point pressing therapy; Sleep efficiency

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1. Introduction

Chronic obstructive pulmonary disease (COPD) is a highly prevalent chronic respiratory disorder, with persistently high morbidity, mortality, and economic burden. Due to its incurability, improving patients' quality of life has become a current research priority. Previous studies have shown that approximately 30% of

COPD patients experience sleep problems ^[1]. Sleep disturbances in COPD patients manifest as longer sleep latency, more frequent awakenings, and/or general insomnia, which can lead to daytime fatigue, increased risk of exacerbations, and even elevated mortality, severely affecting patients' physiological, psychological, and social functioning ^[2,3]. However, in clinical practice, healthcare providers tend to focus on monitoring and managing respiratory symptoms in COPD patients, while often neglecting the assessment and management of sleep-related issues. Western medicine lacks targeted treatments without side effects, presenting a significant clinical challenge. Through preliminary clinical observation, we found that auricular point sticking therapy has a definite clinical effect in intervening in sleep disorders in stable COPD patients. Therefore, based on traditional Chinese medicine meridian-viscera theory and the principle of internal diseases treated with external therapy, this study explores the clinical efficacy of auricular point sticking therapy in treating sleep disorders in stable COPD patients, aiming to provide clinical insights for COPD management and sleep quality improvement. The report is as follows:

2. Materials and methods

2.1. Inclusion and exclusion criteria

2.1.1. Inclusion criteria

- (1) Meeting the diagnostic criteria for COPD and having been definitively diagnosed with COPD at our hospital or at other secondary or higher-level medical institutions;
- (2) Providing consent to participate in this trial;
- (3) Aged between 50 and 79 years;
- (4) Able to cooperate with mattress-based sleep monitoring examinations.

2.1.2. Exclusion criteria

- (1) Severe systemic diseases such as severe cardiovascular and cerebrovascular conditions, malignancies, hepatic or renal insufficiency, or hyperthyroidism;
- (2) Other severe respiratory diseases (e.g., lung cancer, pulmonary fibrosis, pulmonary embolism, bronchial asthma, pleural effusion or pneumothorax, active tuberculosis, etc.);
- (3) Acute exacerbation of COPD requiring intensive medical treatment or mechanical ventilation support;
- (4) Need for continuous use of sedative-hypnotic medications (e.g., barbiturates, benzodiazepines, etc.) in the near future;
- (5) Severe cognitive or communication impairment (e.g., Alzheimer's disease, etc.);
- (6) Diseases limiting thoracic and abdominal movement (e.g., thoracic or spinal deformity, massive pleural effusion, myasthenia gravis, etc.);
- (7) Patients with chronic pain.

2.1.3. Withdrawal criteria

- (1) Withdrawal or loss to follow-up during the study;
- (2) Poor treatment compliance, failure to adhere to the protocol;
- (3) Receipt of other treatments during the study that could affect the evaluation of therapeutic outcomes.

2.2. General data

All study subjects were recruited from stable COPD cases treated at the Respiratory Medicine outpatient clinic of our hospital from April 2022 to March 2024, with no acute exacerbations in the preceding 3 months. Randomization was performed using a random number table, with 30 patients allocated to each of the control and experimental groups. In the experimental group, there were 13 males and 17 females, with a mean age of 63.47 ± 6.91 years and a COPD duration ranging from 4 to 26 years (mean 10.73 ± 5.67 years). In the control group, there were 14 males and 16 females, with a mean age of 63.20 ± 7.81 years and a COPD duration ranging from 3 to 26 years (mean 10.57 ± 6.11 years). Statistical analysis showed no significant differences in gender, age, or other general data between the two groups ($p > 0.05$), indicating comparability.

2.3. Treatment protocol

Patients in both groups received salmeterol and fluticasone propionate powder for inhalation (50 µg/500 µg per blister), 1 inhalation twice daily, and maintained home oxygen therapy for 6–10 hours per day.

2.3.1. Control group

Received sleep education once weekly, including psychological counseling, encouragement of active emotional regulation, creating a quiet and comfortable sleep environment, establishing regular routines, and practicing warm foot baths and listening to light music before bedtime to improve sleep.

2.3.2. Experimental group

Received auricular point sticking therapy in addition to the control group treatment. Selected auricular points: Lung, Kidney, Sympathetic, Endocrine, and Shenmen. After disinfecting with 75% alcohol, the auricular seeds were applied to the above points on both ears according to standard techniques. The points were stimulated by pressing, kneading, and pinching with the thumb and index finger, with the intensity adjusted to produce local sensations of soreness, numbness, heaviness, distension, or warmth. The treatment was administered three times per week, and patients were instructed to press the points themselves for 15 minutes, one hour before bedtime each day. The total treatment course lasted 4 weeks.

2.4. Observation indicators

2.4.1. Sleep quality

Assessed using the Pittsburgh Sleep Quality Index (PSQI), which comprises 7 dimensions covering subjective sleep quality, sleep duration, sleep efficiency, daytime dysfunction, etc. Each item is scored from 0 to 3, with a total score ranging from 0 to 21. A higher total score indicates worse sleep quality and more severe insomnia.

2.4.2. Sleep efficiency

Calculated from relevant data extracted from the PSQI: sleep efficiency = (sleep time/time in bed) $\times$ 100% (time in bed = wakeup time - bedtime). Scores range from 0 to 3: 0 points for sleep efficiency $> 85\%$, 1 point for 75–84%, 2 points for 65–74%, and 3 points for $< 65\%$.

2.4.3. Severity of dyspnea

Assessed using the COPD Assessment Test (CAT), which includes 8 items covering cough, sputum

production, chest tightness, activity limitation, etc., each scored from 1 to 5, with a total maximum score of 40. A higher total score indicates more severe dyspnea.

2.4.4. Dyspnea grade

Evaluated using the modified Medical Research Council (mMRC) dyspnea scale, which classifies dyspnea into grades 04, with higher grades indicating greater severity.

2.5. Statistical methods

Data were organized and analyzed using SPSS 23.0 statistical software. Continuous data that met normality and homogeneity of variance assumptions were expressed as mean $\pm$ standard deviation ($\bar{x} \pm s$); between-group comparisons were performed using independent-samples *t* tests, and within-group pre and post-treatment comparisons were performed using paired *t* tests. Ordinal data were expressed as percentages (%), and between-group comparisons were performed using rank-sum tests. A *p* value < 0.05 was considered statistically significant.

3. Results

3.1. Comparison of PSQI scores before and after treatment between the two groups

Table 1. Comparison of PSQI scores before and after treatment between the two groups ($\bar{x} \pm s$)

Group	Number of cases (n)	Before treatment	After treatment
Experimental group	30	15.40 $\pm$ 2.33	11.13 $\pm$ 1.76a
Control group	30	15.30 $\pm$ 2.47	15.20 $\pm$ 2.68b

Note: a indicates *p* < 0.05 compared with the experimental group before treatment, showing a statistically significant difference; b indicates *p* > 0.05 compared with the control group before treatment, showing no statistically significant difference.

3.2. Comparison of sleep efficiency before and after treatment between the two groups

Table 2. Comparison of sleep efficiency before and after treatment between the two groups

Group	Number of cases (n)	Sleep efficiency				
		0 points	1 point	2 points	3 points	
Experimental group	30	Before treatment	6 (20%)	13 (43%)	7 (23%)	4 (14%)
		After treatment	16 (53%)	11 (37%)	2 (6.7%)	1a (3.3%)
Control group	30	Before treatment	5 (16.7%)	15 (49.9%)	5 (16.7%)	5 (16.7%)
		After treatment	5 (16.7%)	16 (53.3%)	5 (16.7%)	4b (13.3%)

Note: a indicates *p* < 0.05 compared with the experimental group before treatment, denoting a statistically significant difference.

b indicates *p* > 0.05 compared with the control group before treatment, denoting no statistically significant difference.

3.3. Comparison of CAT scores before and after treatment between the two groups

Table 3. Comparison of CAT scores before and after treatment between the two groups ($\bar{x} \pm s$)

Group	Number of cases (n)	Before treatment	After treatment
Experimental group	30	23.73 $\pm$ 6.23	16.53 $\pm$ 4.13a
Control group	30	24.00 $\pm$ 5.82	23.87 $\pm$ 5.72b

Note: a indicates $p < 0.05$ compared with the experimental group before treatment, which is statistically significant.
b indicates $p > 0.05$ compared with the control group before treatment, which is not statistically significant.

3.4. Comparison of mMRC scores before and after treatment between the two groups

Table 4. Comparison of mMRC scores before and after treatment between the two groups

Group	Number of cases (n)		mMRC				
			0 (score)	1 (score)	2 (score)	3 (score)	4 (score)
Experimental group	30	Before treatment	3 (10%)	8 (26.7%)	10 (33.3%)	7 (23.3%)	2 (6.7%)
		After treatment	5 (16.7%)	15 (50%)	7 (23.3%)	2 (6.7%)	1 (3.3%) ^a
Control group	30	Before treatment	3 (10%)	9 (30%)	10 (33.3%)	3 (10%)	5 (16.7%)
		After treatment	2 (6.7%)	10 (33.3%)	10 (33.3%)	3 (10%)	5 (16.7%) ^b

Note: a indicates $p < 0.05$ compared with before treatment in the experimental group, which is statistically significant.

b indicates $p > 0.05$ compared with before treatment in the control group, which is not statistically significant.

4. Discussion

Chronic obstructive pulmonary disease (COPD) is a silent killer, characterized by persistent respiratory symptoms and airflow limitation, with a progressive course. In recent years, due to the intensification of various COPD-related risk factors such as population aging, air pollution, and longterm smoking habits, its prevalence has been increasing year by year, and it has also led to an increased prevalence of comorbidities including cardiovascular disease and osteoporosis^[4]. Although patients in the stable phase do not experience acute exacerbations, chronic airway inflammation persists, and pathological changes such as longterm hypoxia, carbon dioxide retention, systemic inflammation, and autonomic dysfunction are difficult to reverse; these are important triggers for sleep disturbances^[5]. However, in clinical practice, healthcare providers tend to focus on monitoring and managing respiratory symptoms in COPD patients, while often neglecting the assessment and management of sleep-related issues. Many COPD patients in clinical settings commonly present with sleep disorders such as refractory insomnia and frequent nocturnal awakenings. To alleviate these sleep disturbances, patients often self-medicate or take benzodiazepine or nonbenzodiazepine sedative-hypnotic drugs under medical guidance. Currently, studies on the effects of benzodiazepine and nonbenzodiazepine sedative-hypnotics in COPD patients remain controversial, and no consensus has been reached. Some studies suggest that benzodiazepine hypnotics reduce minute ventilation while increasing respiratory rate, thereby increasing the burden on respiratory muscles and reducing the responsiveness to blood carbon dioxide concentration, which may more readily lead to hypercapnia^[6,7]. Other studies have found that benzodiazepines have no effect on minute ventilation or blood carbon dioxide levels^[8,9]. Some research considers nonbenzodiazepine drugs as the first choice for COPD patients in clinical practice, mainly because of their low toxicity and significant efficacy in improving sleep quality^[10,11]. Other studies have indicated that nonbenzodiazepines may still reduce nocturnal alveolar ventilation^[12]. Respiratory symptoms and sleep-related problems form a vicious cycle of “pulmonary function decline – sleep disturbance – immune dysfunction – recurrent exacerbations”, significantly reducing patients’ quality of life and increasing the risk of acute exacerbations and mortality^[13]. Therefore, safe and effective intervention drugs and regimens are particularly critical for COPD patients with sleep disturbances complicated by pathological changes such as

alveolar hypoventilation, respiratory muscle fatigue, and carbon dioxide retention. In recent years, COPD combined with sleep disorders has gradually attracted clinical attention, but at present, there is still a lack of targeted, effective, and low adverse effect interventions to safely improve sleep quality in these patients.

Sleep disorders fall under the categories of *bumei* (insomnia), *yebu ming* (sleeplessness at night), and *budewo* (inability to lie down) in traditional Chinese medicine. The five viscera are the residences of the five spirits—*hun*, *shen*, *yi*, *po*, and *zhi*. The loss of proper storage of the five spirits is the core pathogenesis of insomnia. If the Qi, blood, and body fluids of the five viscera are abundant, and YinYang Qi is harmonious, then the five spirits fulfill their respective functions, the heart spirit is internally restrained, and the sleepwake rhythm follows its natural order. If the five viscera are deficient, with depletion of essence, Qi, blood, and fluids, the spirit loses nourishment, emotions are disturbed, YinYang is imbalanced, and the spirit becomes restless, ultimately leading to difficulty in falling asleep and the onset of insomnia. The Treatise on the Causes and Symptoms of Diseases records: “Lung distension is characterized by deficiency fullness with wheezing and coughing”. This disease is located in the lung, and over time it involves the spleen, kidney, and heart^[14]. The lung governs Qi and respiration; with prolonged disease, lung Qi becomes deficient, failing to disperse and descend, leading to Qi stagnation. The kidney governs Qi reception; chronic illness affects the kidney, and if kidney Qi is insufficient, it fails to grasp Qi, resulting in shallow and rapid breathing and restless sleep at night. The root of the disease is deficiency of the lung and kidney, while phlegm turbidity and blood stasis are the superficial manifestations. Phlegm and stasis mutually bind, disturbing the heart spirit, which then loses nourishment, causing nocturnal sleeplessness^[15,16]. Moreover, prolonged illness consumes Qi and blood, leading to YinYang imbalance, with yang failing to enter Yin at night and Yin failing to contain Yang. Additionally, longterm illness often results in emotional distress and liver Qi stagnation, further aggravating insomnia^[14]. Therefore, treatment during the stable phase focuses on supplementing the lung and kidney, calming the heart and spirit, and harmonizing YinYang. As an external therapy of TCM, auricular point sticking can regulate the Qi and blood of the viscera through meridians, aligning with the pathogenic characteristics of this disease^[15,17].

Traditional Chinese medicine believes that auricular points are closely connected with the viscera and meridians. The *Ling Shu · Oral Questioning* states: “The ear is the convergence of all meridians.” The auricle is intimately linked with the twelve meridians and the five viscera and six bowels. Stimulation of corresponding points can regulate the neuroendocrine-immune network through meridian conduction, achieving the principle of treating internal diseases through external therapy and holistic regulation^[18,19]. Modern studies have shown that auricular stimulation can exert its effects through the vagal pathway and autonomic regulation, and its neurobiological basis has been preliminarily confirmed^[19,20]. In this study, we selected the auricular points of Lung, Kidney, Sympathetic, Endocrine, and Shenmen for sticking therapy. The lung governs dispersion and descent, regulating the ascending, descending, exiting, and entering of Qi; it also connects with all vessels and houses the *po* spirit, closely related to mental activities and sleep rhythms. The Lung point on the ear is the corresponding reaction point of the lung on the auricle; stimulating it can regulate lung Qi, promote dispersion and descent, and simultaneously calm the *po* spirit, relieve cough and asthma, and thereby improve clinical symptoms such as coughing, wheezing, and sleep disturbances in COPD patients by restoring lung function to soothe the spirit. The lung is the master of Qi, while the kidney is the root of Qi; the lung governs exhalation and the kidney governs inhalation. With prolonged disease, kidney Qi is damaged, Qi and blood become deficient, and the heart spirit loses nourishment. Stimulating the Kidney

point can nourish kidney Yin, calm the spirit, strengthen bones, and enrich marrow, thereby replenishing Qi and blood and regulating visceral function. The Shenmen point can calm the spirit, relieve cough and phlegm, reduce inflammation, and alleviate pain, and is commonly used to treat insomnia, dream-disturbed sleep, vertigo, chest pain, palpitations, and restlessness. Stimulating the Endocrine and Sympathetic points can reduce cortical hyperexcitability, exerting sedative, Yin-subduing, and mind-stabilizing effects. The combined use of multiple points can synergistically regulate visceral Qi, calm the mind, and harmonize Yin-Yang, allowing the five spirits to remain within their abodes, thereby improving insomnia. Furthermore, auricular stimulation can unblock meridians, regulate Qi and blood, correct endocrine disorders, restore the lung's dispersing and descending function, promote the discharge of airway secretions, reduce chronic pulmonary inflammation, and consequently alleviate cough, sputum, wheezing, and sleep disturbances in stable COPD patients.

The results of this study showed that conventional sleep health education combined with auricular point sticking significantly reduced patients' PSQI and CAT scores, improved sleep efficiency, and alleviated symptoms related to dyspnea, while the mMRC score showed no significant change. This suggests that auricular point sticking primarily improves respiratory discomfort indirectly by improving sleep quality, regulating neurological function, and reducing systemic inflammation, but its effect on dyspnea at rest is limited. This may be mainly due to the relatively small sample size and minimal baseline differences between the two groups. Future studies with larger sample sizes are warranted to further evaluate the treatment efficacy.

5. Conclusion

In summary, the addition of auricular point sticking therapy to conventional sleep education not only improves sleep quality and sleep efficiency in patients with stable chronic obstructive pulmonary disease (COPD) who suffer from sleep disorders, but also alleviates dyspnea symptoms to a certain extent. Moreover, auricular point sticking therapy is characterized by simple operation, noninvasiveness, safety, and high patient acceptance, making it suitable for widespread clinical application and promotion. However, this study has certain limitations, including a relatively small sample size, a lack of dynamic monitoring of long-term acute exacerbation frequency and objective inflammatory cytokine indicators, and insufficiently in-depth mechanistic research. Future studies may expand the sample size, conduct multicenter randomized controlled trials, and incorporate serum inflammatory cytokines, blood oxygen saturation, and 5-hydroxytryptamine (5HT) levels to further elucidate the mechanisms of action. In addition, auricular point sticking therapy could be integrated with pulmonary rehabilitation, emotional regulation, and dietary management to establish a comprehensive integrated management model for sleep disorders in stable COPD, combining traditional Chinese and Western medicine. This would provide new insights and evidence-based support for clinical nonpharmacological interventions, further improving patients' long-term quality of life and reducing the risk of disease progression.

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Disclosure statement

The authors declare no conflict of interest.

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