

# Clinical Efficacy of Psychotherapy Combined with Acupoint Herbal Application on Elderly Patients with Pulmonary Tuberculosis: An Exploratory Study

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**Background:** To evaluate the clinical efficacy of psychotherapy combined with acupoint herbal application on elderly patients with pulmonary tuberculosis.

**Methods:** From January 2019 to January 2021, sixty elderly patients with pulmonary tuberculosis treated in our hospital were assessed for eligibility and recruited. They were concurrently assigned (1:1) via the random envelope method to receive either psychotherapy plus acupoint herbal application (observation group) or conventional treatment (conventional group) acupoint herbal application.

**Results:** Psychotherapy plus acupoint herbal application was associated with significantly higher levels of pulmonary functions indices and immune function indices versus conventional treatment. Psychotherapy plus acupoint herbal application resulted in lower SAS and SDS scores versus conventional treatment. The combined treatment showed a better clinical efficacy and sputum negative rate versus conventional treatment.

**Conclusion:** Psychotherapy plus acupoint herbal application improves the lung function and immune function of patients with pulmonary tuberculosis and relieves their negative emotions, which contributes to better treatment efficacy and merits clinical promotion.

**Keywords:** psychotherapy, acupoint herbal application, elderly pulmonary tuberculosis, lung function, immune function, negative sputum test

## Introduction

Tuberculosis is a respiratory disease caused by *Mycobacterium tuberculosis* (MTB) infection and is mainly transmitted by droplets, to which the elderly population is most susceptible. Its manifestations include cough, hemoptysis, and chest pain, which involves important organs as the disease progresses and may trigger respiratory distress and cardiac arrhythmia.<sup>1,2</sup> Western treatment of pulmonary tuberculosis features the combination of various anti-tuberculosis drugs such as isoniazid, rifampin, pyrazinamide, and a complete course of chemotherapy. However, it is associated with multiple adverse events and resistance to chemotherapeutic agents in many cases. Chinese medicine considers tuberculosis as a “consumptive disease”. Recent studies have found that the combination of Chinese and Western medicine in the treatment of multidrug-resistant tuberculosis can significantly reduce the drug resistance and toxic side effects of chemotherapy and improve the quality of life and survival of patients. The combination of traditional Chinese medicine and western medicine for pulmonary tuberculosis can enhance the immunity of the body, promote the absorption of lesions, eliminate symptoms and reduce toxic side effects. Acupoint herbal application involves the application of herbs to acupoints to relieve clinical symptoms and treat diseases, with massage to facilitate the penetration of drug ingredients

and enhance the efficacy of drugs. Moreover, acupoint herbal application excludes irritation of the gastrointestinal tract and avoids diminished efficacy by the first-pass effect. Currently, prospective randomized controlled studies related to the use of acupoint herbal application in pulmonary tuberculosis are scarce. Moreover, the high recurrence of the disease compromises the clinical efficacy and quality of life of patients.<sup>3,4</sup>

Accordingly, 60 elderly patients with pulmonary tuberculosis treated in our hospital between January 2019 and January 2021 were recruited to investigate the clinical efficacy of acupoint herbal application plus psychotherapy in elderly pulmonary tuberculosis. The results are as follows.

## Materials and Methods

### General Data

In this single-blind, exploratory, prospective, randomized, controlled study sixty elderly patients with pulmonary tuberculosis treated in our hospital from January 2019 to January 2021 were assessed for eligibility and recruited. All eligible patients were randomized at a ratio of 1:1 via the random envelope method to either an observation group or a control group. The patients and their families were informed about the purpose and significance of the study before the study and signed the informed consent form. This study was reviewed and approved by the medical ethics committee of our hospital.

### Inclusion and Exclusion Criteria

Inclusion criteria: (1) Patients who were diagnosed with pulmonary tuberculosis by X-ray examination and CT; (2) without communication impairment and can cooperate with the study; (3) with complete clinical data, aged  $\geq 60$  years. Exclusion criteria: (1) Patients with severe organs damage; (2) with other types of psychiatric disorders; (3) with cancer; (4) with systemic infectious diseases; (5) with poor cooperation; (6) with intolerance to the treatment regimen or with allergic reactions; (7) with immune system diseases or coagulation disorders; (8) with other types of pulmonary diseases such as chronic obstructive pulmonary disease and pneumonia; (9) with a history of drug abuse or dependence.

### Methods

Control group: Patients were given conventional 2HRZE/4HR treatment protocol:<sup>5</sup> Isoniazid (H) 0.3 g/d, once daily; rifampicin (R) 0.6 g/d, once daily, on an empty stomach; pyrazinamide (Z) 0.75 g/d, twice/d; ethambutol (E) 1.0 g/d, once daily. The treatment protocol was given for 2 months, followed by HR consolidation for 4 months.

Observation group: Patients were treated with psychotherapy combined with acupoint herbal application. (1) Psychotherapy. All patients were given health education, including the risk factors, preventive measures, and possible adverse effects of tuberculosis. Patients were given psychological guidance and relaxation training to reduce their psychological burden and discomfort. A warm and cheerful ward environment with soft music was provided to help patients maintain a positive psychological state. (2) Acupoint herbal application. Fructus Evodiae, Herba Epimedii, Fructus Psoraleae, Prepared Daughter Root of Common Monkshood, And Radix Morindae Officinalis were mixed and ground to powder, and added with an appropriate amount of fresh ginger juice to prepare into round medicinal cakes. The medicine was applied to the Feiyu, Dazhui, Shenyu, Tanzhong acupoints and secured with adhesive tape. The duration of each application was 2h, and the treatment was carried out 5 times a week, with 1 month for 1 course. All patients were treated for 3 months.

### Outcome Measures

(1) Pulmonary function indexes were determined using the HI-801 CHEST-pulmonary function instrument (Nanjing Aobang Medical Technology Co., Ltd.). Pulmonary function indices included FVC (L), FEV1 (L), and FEV1/FVC (%), and the operation was performed in strict accordance with the operating specifications.

(2) Immune function testing. Patients' CD4+ and CD8+ levels were determined using a BD FACS Calibur flow cytometer, and CD4+/CD8+ levels were calculated in strict accordance with the operating instructions.

(3) The self-rating anxiety scale (SAS) was used for anxiety assessment, which included 20 items and was scored on a scale of 1 to 4 points. Higher scores indicate more severe anxiety. The self-rating depression scale was used for depression assessment, which included 20 items and was scored on a scale of 1 to 4 points. The higher the score, the more severe the depression.<sup>6</sup>

(4) Efficacy criteria: Markedly effective: The symptoms disappeared, the lesions were completely absorbed, and the indexes returned to normal levels. Effective: After treatment, the symptoms were relieved, the indexes were improved but did not return to the normal levels, and partial lesion absorption was observed. Ineffective: No significant improvement or even aggravation in symptoms after treatment was found.<sup>7</sup> Total efficacy = (markedly effective cases + effective cases) / total cases × 100%.

## Statistical Methods

Statistical analysis of data was performed on the SPSS22.0 software. Count data were expressed as (%) and resolved by chi-square test, and measurement data were expressed as ( $\bar{x} \pm s$ ) and processed by the *t*-test. Paired samples *t*-test was used for comparison within groups at different time points, and two independent samples *t*-test was used for comparison between different groups. A difference was considered statistically significant when  $P < 0.05$ .

## Results

### Baseline Data

There were 17 males and 13 females in the observation group, with a mean age of ( $68.59 \pm 6.32$ ) years (61–82 years) and a mean disease duration of ( $4.64 \pm 1.23$ ) years (1–8 years). There were 18 males and 12 females in the control group, with a mean age of ( $68.56 \pm 6.57$ ) years (62–84 years) and a mean disease duration of ( $4.59 \pm 1.21$ ) years (1–8 years). The general data of the two groups were comparable ( $P > 0.05$ ). See [Table 1](#).

### Pulmonary Function Indexes and Immune Function Indexes

Before treatment, the two groups showed no significant difference in the pulmonary function indexes ( $P > 0.05$ ). After treatment, the pulmonary function indexes were significantly increased in both groups, with higher results obtained in the observation group ( $P < 0.05$ ). It indicated that the observation group yield better recovery of pulmonary function than the control group. See [Table 2](#).

Before treatment, there were no significant differences in the serum levels of CD4+ T cells, CD8+ T cells, and CD4+/CD8 (%) ( $P > 0.05$ ). After treatment, the two groups obtained improvement in the above indexes, with better results obtained in the observation group ( $P < 0.05$ ). Serum levels CD4+ T cells, CD8+ T cells, and CD4+/CD8 (%) could reflect airframe immune function to improve the situation. The results indicated that the immune function in better in the observation group. See [Table 3](#).

### Psychologic Status

After treatment, the SAS and SDS scores of the two groups were remarkably reduced, in which the observation group had lower outcomes than the control group ( $P < 0.05$ ). The lower scores of SAS and SDS in the observation group indicated a better state of mind. See [Table 4](#).

**Table 1** Baseline Demographic Data

	Observation Group	Control Group	<i>t</i> / $\chi^2$	P
Gender			0.069	0.397
Male	17	18		
Female	13	12		
Age (years)	$68.59 \pm 6.32$	$68.56 \pm 6.57$	0.018	0.986
Disease duration (years)	$4.64 \pm 1.23$	$4.59 \pm 1.21$	0.159	0.874

**Table 2** Comparison of Pulmonary Function Indexes Between the Two Groups ( $\bar{X}\pm s$ )

	Groups	FVC (L)	FEV1 (L)	FEV1/FVC (%)
Before treatment	Observation group	1.85±0.23	1.38±0.42	52.32±4.22
	Control group	1.83±0.18	1.33±0.49	52.31±4.24
	t	0.375	0.424	0.009
	P	0.709	0.673	0.993
After treatment	Observation group	3.04±0.52*	1.97±0.34*	75.59±4.14*
	Control group	2.35±0.52*	1.66±0.36*	63.94±4.22*
	t	5.139	3.429	10.794
	p	0.000	0.001	0.000

Note: \*Indicates P<0.05 in comparison with the same group before treatment.

**Table 3** Comparison of Immune Function Indexes Between the Two Groups ( $\bar{X}\pm s$ )

	Groups	CD <sub>4</sub> <sup>+</sup> (%)	CD <sub>8</sub> <sup>+</sup> (%)	CD <sub>4</sub> <sup>+</sup> /CD <sub>8</sub> <sup>+</sup>
Before treatment	Observation group	25.46±2.12	35.36±3.55	0.85±0.16
	Control group	25.45±2.21	35.32±3.62	0.84±0.12
	t	0.492	0.753	1.102
	P	0.113	0.102	0.483
After treatment	Observation group	35.26±3.24*	24.17±3.52*	1.14±0.26*
	Control group	28.38±1.26*	31.87±3.37*	0.96±0.14*
	t	7.492	8.395	3.294
	p	0.000	0.000	0.032

Note: \*Indicates P<0.05 in comparison with the same group before treatment.

**Table 4** Comparison of SAS and SDS Scores Between the Two Groups (Points,  $\bar{X}\pm s$ )

Groups	n	SAS Scores		t	P	SDS Scores		t	P
		Before Treatment	After Treatment			Before Treatment	After Treatment		
Observation group	30	63.14±5.73	36.12±2.94	22.980	0.000	64.26±5.64	39.75±3.15	20.781	0.000
Control group	30	63.24±5.59	43.16±2.46	18.008	0.000	64.37±6.58	50.14±4.36	9.874	0.000
t	/	0.068	10.059			0.070	10.580		
P	/	0.946	0.000			0.945	0.000		

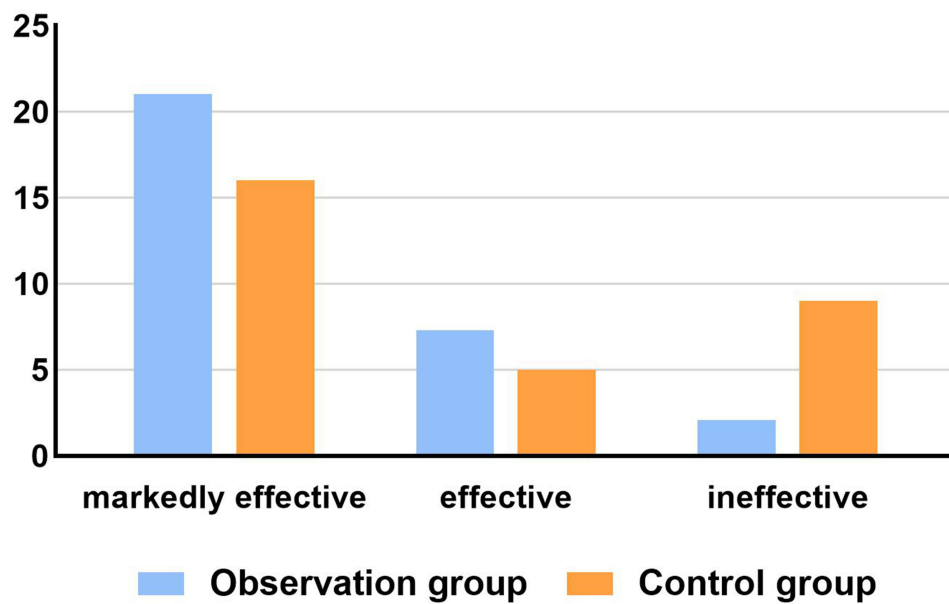
## Clinical Efficacy and Sputum Negative Rates

After treatment, the observation group had 21 cases of markedly effective, 7 cases of effective, and 2 cases of ineffective, with a total efficacy of 93.3%. The control group had 16 cases of markedly effective, 5 cases of effective, and 9 cases of ineffective, with a total efficacy of 70.0%. The observation group outperformed the control group in terms of clinical efficacy (P<0.05). See [Figure 1](#).

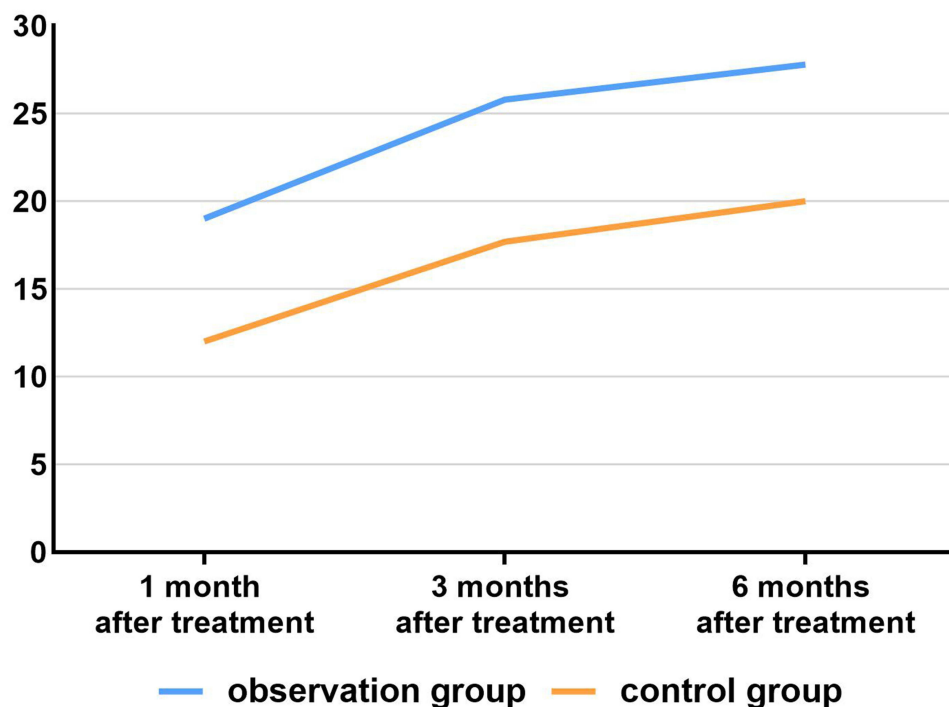
The sputum negative rates of the observation group were 63.3%, 86.7%, and 93.3% at 1, 3, and 6 months after treatment, which outperformed the control group (P<0.05). It indicated the observation group had better safety. See [Figure 2](#).

## Discussion

In this study, the observation group showed a more significant reduction in the SAS and SDS scores than the control group, demonstrating the role of psychotherapy in alleviating the negative emotions of the patients. Health education enhances their knowledge of the disease and helps them understand the tuberculosis risk factors and corresponding intervention methods, which facilitates the improvement of self-care ability and thus promotes recovery.<sup>8,9</sup> Psychological



**Figure 1** Comparison of clinical efficacy of the two groups.



**Figure 2** Comparison of sputum negative rates of the two groups.

intervention and guidance help relieve patients' negative emotions and enhance treatment compliance.<sup>10</sup> It was found that elderly patients with tuberculosis lack knowledge and understanding of tuberculosis disease knowledge, which results in excessive anxiety. Some patients may develop low self-esteem, emotional sensitivity, and depression with the realization of the infectiousness of tuberculosis, which compromises patients' quality of life and the sleep quality.<sup>11,12</sup> Therefore, in addition to the treatment of patients with somatic symptoms, patients' mental health and emotional changes such as psychotherapy require more attention to enhance their prognosis.<sup>13</sup>

In the present study, the acupoint herbal application was introduced for treatment, with similar properties to acupuncture, in which multiple herbs are applied directly to the corresponding acupoints to stimulate the local acupoints and achieve clinical symptom alleviation through meridian conduction.<sup>14</sup> In traditional Chinese medicine, pulmonary tuberculosis is classified as “deficiency labor” and “consumptive disease” that is mostly attributed to insufficient qi and yin and deficiency of both spleen and kidney, whereby treatment highlights replenishment of the spleen and nourishment of the kidney.<sup>15</sup> The main effects of *Fructus Evodiae* are to warm the meridians and disperse cold, with antimicrobial and antiviral effects.<sup>16</sup> *Herba Epimedii* benefits the liver and kidney meridians, tonifies the kidney, strengthens yang, and relieves cough and asthma.<sup>17</sup> *Fructus Psoraleae* nourishes qi to mitigate asthma. Prepared Daughter Root of Common Monkshood replenishes heat, boosts yang, disperses cold, and relieves pain. *Radix Morindae Officinalis* reinforces the kidney qi, strengthens the yang, dispels wind, and removes dampness.<sup>18</sup> Multiple Chinese herbs nourish the lung and strengthen the kidney. In the present study, the improvement of pulmonary function indexes in the observation group was superior to that of the control group, indicating the better efficacy of this treatment regimen in enhancing the pulmonary functions of patients. It has been reported that compared with oral administration of traditional Chinese medicine, little effect has been observed on patients’ gastrointestinal function in acupoint herbal application as its components directly penetrate the body through the skin, which features a safety profile.<sup>19</sup> Modern pharmacological research shows that acupoint herbal application flattens the drug concentration curve and avoids the peak and valley phenomenon of time-blood concentration curve, with the advantages of strong efficacy and long duration of action, thereby enhancing the body’s immune functions. In addition, acupoint herbal application stimulates the nerve centers through the skin and vascular receptors and mobilizes the immune system through neurohumoral regulatory mechanisms to achieve disease control.<sup>20</sup> Changes in T lymphocyte subsets were observed in this study, but the exact mechanism is still unclear. Moreover, network pharmacology has confirmed that acupoint herbal application is associated with an enhanced immune capacity.<sup>21</sup> The specific mechanism requires further investigation. Herein, the observation group obtained significantly higher treatment efficacy and sputum negative rates than the control group, which suggests the effectiveness of psychotherapy plus acupoint herbal application.

The limitations of this study lie in the small sample size collected and the insufficient comprehensiveness of the observed indicators. In addition, the repeatability of acupoint herbal application was poor and lacked uniform standards. In future clinical studies, the study sample size will be expanded, and follow-up indicators will be increased to investigate the advantages and mechanisms of psychotherapy plus acupoint herbal application to provide a more reliable basis for clinical practice.

## Conclusion

Psychotherapy plus acupoint herbal application improved the lung function and immune function of patients with pulmonary tuberculosis and relieves negative emotions, which contributes to better treatment efficacy and merits clinical promotion.

## Ethics Approval and Consent to Participate

The patients and their families were informed about the purpose and significance of the study before the study and signed the informed consent form. This study was reviewed and approved by the medical ethics committee of ChangChun University of Chinese Medicine. All the methods were carried out in accordance with the Declaration of Helsinki.

## Data Sharing Statement

All data generated or analysed during this study are included in this published article.

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## Disclosure

The authors declare that they have no competing interests in this work.

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