

# Clinical Analysis of Terbutaline and Budesonide Co-Treatment for Chronic Obstructive Pulmonary Disease

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**Abstract:** *Objective:* To analyze the clinical effect of terbutaline combined with budesonide in the treatment of chronic obstructive pulmonary disease. *Methods:* 500 cases of patients with chronic obstructive pulmonary disease admitted to the hospital from January 2022 to December 2023 were selected and divided into 250 cases in the control group and 250 cases in the observation group by randomization method, both groups received conventional symptomatic treatment, with budesonide added to the control group and terbutaline and budesonide to the observation group, and the lung function indexes, therapeutic effects and adverse drug reactions before and after treatment were compared. *Results:* After treatment, the level of all lung function indexes of patients in the observation group was higher than that of the control group, and the level of total effective rate of treatment was 96.40%, which was higher than that of the control group ( $P < 0.05$ ), and the difference in the incidence rate of adverse reactions between the two groups was not strong ( $P > 0.05$ ). *Conclusion:* In the clinical treatment of chronic obstructive pulmonary disease, the combined use of terbutaline and budesonide can positively improve lung function, with precise effects and few adverse reactions.

**Keywords:** Chronic obstructive pulmonary disease; Terbutaline; Budesonide

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## 1. Introduction

Chronic obstructive pulmonary disease (COPD) is a very highly prevalent respiratory disease, with dyspnea as the main manifestation, accompanied by symptoms such as coughing, suffocating, and wheezing, respiratory secretions can be seen to increase significantly, and the symptoms are aggravated in the course of the disease development and can induce complications such as pulmonary heart disease and emphysema<sup>[1]</sup>, which continue to damage various tissues and organs, and even jeopardize the safety of life. Clinical treatment of chronic obstructive pulmonary mainly uses glucocorticosteroids, which can inhibit airway inflammation, such as budesonide, and can actively improve airway ventilation function, but the prolonged use of drug resistance can be produced<sup>[2]</sup>, the overall effect is poor. Terbutaline is a  $\beta_2$  agonist that promotes bronchial smooth muscle relaxation and reduces inflammatory transmitter release<sup>[3]</sup>. This study analyzes the clinical effect of

the combination of terbutaline and budesonide in the treatment of COPD, and a total of 500 COPD patients admitted to the hospital in the past two years will be included in the study, see below for details.

## 2. Materials and methods

### 2.1. General information

A total of 500 patients with a clear diagnosis of chronic obstructive pulmonary disease were screened as the study subjects (admitted to the hospital from January 2022 to December 2023), and were divided into two groups by the randomized grouping method, with 250 patients in each group.

There were 131 males and 119 females in the control, aged between 50 and 73 years, with a mean age of  $59.54 \pm 7.14$  years. Their disease duration was 2–5 years, with an average of  $3.24 \pm 0.64$  years. There were 135 males and 115 females in the observation group, aged between 52 and 75 years, with a mean age of  $59.69 \pm 7.31$  years. Their disease duration was 2–6 years, with an average of  $3.11 \pm 0.53$  years. The data of the two groups were comparable ( $P > 0.05$ ).

### 2.2. Inclusion and exclusion criteria

Inclusion criteria: (1) Clear clinical diagnosis of chronic obstructive pulmonary disease and acute exacerbation at the time of enrollment; (2) Compliance with the medication criteria and active cooperation in completing the entire course of treatment; (3) Normal cognitive function; (4) Complete general information.

Exclusion criteria: (1) Comorbidity of other important organ diseases; (2) Combination of respiratory system diseases other than chronic obstructive pulmonary disease; (3) Combination of immune system diseases; (4) The existence of communication disorders or the combination of mental diseases.

### 2.3. Methods

After 500 patients were admitted to the hospital, all of them received routine symptomatic treatment such as resolving phlegm, relieving cough, and calming asthma, based on which, the control group was treated with budesonide: budesonide suspension for inhalation was taken and administered by nebulized inhalation through the compressed inhaler twice a day, each time at 0.25–0.5 mg. The observation group was treated with terbutaline on the basis of the control group: terbutaline sulfate for nebulized inhalation was taken and administered twice a day, each time at 0.25–0.5 mg, by nebulized inhalation. Inhalation of the drug was given twice a day, 1 mL each time given for 15–20 min.

The control group and the observation group were treated continuously for one week, and after each treatment, their face was cleaned and their mouth was rinsed with plain water.

### 2.4. Observation indexes

- (1) Compare the lung function indexes of the two groups of patients before and after treatment. Indexes included forced vital capacity (FVC), forced expiratory volume in 1 second (FEV1), peak expiratory flow (PEF), and maximum mid-expiratory flow (MMEF).
- (2) Compare the treatment effects of the two groups<sup>[4]</sup>. After treatment, the symptoms of cough and wheezing disappeared, and the lung function indexes improved significantly, which was regarded as “very effective”; the symptoms improved, and the lung function improved, which was regarded as “effective”; and the failure to meet the above criteria, which was regarded as “ineffective”. The total effective rate is the sum of “very effective” and “effective” rates.
- (3) Adverse drug reactions, including skin rash, throat discomfort, and dizziness.

## 2.5. Statistical methods

The data were analyzed by SPSS 25.0 statistical software, and the measurement data conformed to normal distribution was processed with *t*-tests and indicated by mean  $\pm$  standard deviation (SD), while count data was processed with  $\chi^2$  tests and indicated by [*n* (%)]. A *P* value of less than 0.05 indicated that the data were statistically significant.

## 3. Results

### 3.1. Lung function indexes

As shown in **Table 1**, compared with the various lung function indexes of the two groups of patients with COPD before treatment, the difference was not obvious (*P* > 0.05), but after treatment, the level of all lung function indexes of the observation group was significantly higher than that of the control group (*P* < 0.05).

**Table 1.** Lung function indexes before and after treatment (mean  $\pm$  SD)

Group	FVC (L)		FEV1 (L)		PEF (L/s)		MMEF (L/s)	
	Before	After	Before	After	Before	After	Before	After
Control group ( <i>n</i> = 250)	2.45 $\pm$ 0.47	2.71 $\pm$ 0.36	1.69 $\pm$ 0.51	2.10 $\pm$ 0.32	3.25 $\pm$ 0.36	5.38 $\pm$ 0.57	1.20 $\pm$ 0.18	2.23 $\pm$ 0.25
Observation group ( <i>n</i> = 250)	2.49 $\pm$ 0.41	3.09 $\pm$ 0.46	1.71 $\pm$ 0.48	2.80 $\pm$ 0.26	3.28 $\pm$ 0.30	6.41 $\pm$ 0.42	1.23 $\pm$ 0.17	3.01 $\pm$ 0.40
<i>t</i>	1.014	10.286	0.452	26.844	1.012	23.002	1.916	26.146
<i>P</i>	0.311	0.000	0.652	0.000	0.312	0.000	0.056	0.000

### 3.2. Treatment effect

As shown in **Table 2**, the level of total effective rate of treatment of patients in the observation group was significantly higher than that of the control group (*P* < 0.05).

**Table 2.** Treatment effect [*n* (%)]

Group	Ineffective	Effective	Very effective	Total effectiveness rate
Control group ( <i>n</i> = 250)	37 (14.80)	136 (54.40)	77 (30.80)	213 (85.20)
Observation group ( <i>n</i> = 250)	9 (3.60)	121 (48.40)	120 (48.00)	241 (96.40)
$\chi^2$	-	-	-	18.770
<i>P</i>	-	-	-	0.000

### 3.3. Adverse drug reactions

As shown in **Table 3**, compared with the incidence of adverse reactions in the two groups, the difference was not significant (*P* > 0.05).

**Table 3.** Adverse drug reactions [*n* (%)]

Group	Skin rash	Throat discomfort	Dizziness	Adverse drug reaction rate
Control group ( <i>n</i> = 250)	3 (1.20)	5 (2.00)	2 (0.80)	10 (4.00)
Observation group ( <i>n</i> = 250)	3 (1.20)	5 (2.00)	3 (1.20)	11 (4.40)
$\chi^2$	-	-	-	0.050
<i>P</i>	-	-	-	0.824

## 4. Discussion

COPD is highly prevalent among middle-aged and elderly individuals. In recent years, with the trend of population aging, the incidence of chronic obstructive pulmonary disease has continued to rise. During the progression of the disease, a significant inflammatory reaction is observed in the airways and lungs. Repeated infections lead to the stimulation of inflammatory cells, resulting in the release of numerous inflammatory mediators, which cause greater damage to lung tissue and structure <sup>[5]</sup>. Additionally, influenced by various other factors, chronic obstructive pulmonary disease may experience acute exacerbation. The conventional clinical treatment for chronic obstructive pulmonary disease typically involves the use of anti-infective drugs and corresponding therapies for cough and asthma. These interventions can reduce the release of inflammatory factors and improve airway edema, but their overall effectiveness is limited, often requiring combination therapy with glucocorticoids. Budesonide, a glucocorticoid, can inhibit the immune response and promote the reduction of histamine release <sup>[6]</sup>. Moreover, it can decrease the respiratory response to methacholine and facilitate the secretion of bronchoconstrictor substances. However, prolonged use of the drug may lead to drug resistance <sup>[7]</sup>, resulting in diminished overall effectiveness.

Terbutaline is a  $\beta_2$  agonist, which can reduce the symptoms of edema caused by endogenous transmitters, promote bronchial smooth muscle diastole, and relieve airway spasms. Terbutaline is highly hydrophilic, which can have a rapid onset of action, and the effect of combining with budesonide is even more upgraded. In this study, a total of 500 patients were selected and divided into two groups, the observation group adopted the combination of terbutaline and budesonide, and the results showed that all the lung function indexes of the patients in the observation group were better than those of the control group, which showed that the combination of drugs could actively improve the lung function of patients with chronic obstructive pulmonary disease, the reason is that budesonide can reduce the degree of airway mucosal edema, improve bronchial spasm, and release the hyperresponsiveness of the airway, and then improve the ventilation and ventilation function. With this, the ventilation function is improved, and terbutaline can diastole the airway smooth muscle and dilate the bronchial tubes, which has a rapid onset of action and a long-lasting efficacy <sup>[8]</sup>, and the combined effect of budesonide is even better.

In comparing the total effective treatment rate between the two groups, the observation group achieved a rate of 96.40%, which was higher than the control group's rate of 85.20%. However, the difference in adverse reactions was not significant. This suggests that combination drug therapy can enhance drug efficacy without a notable increase in side effects. This outcome may be attributed to the nebulized inhalation method of drug delivery. Through nebulization, drugs are compressed into tiny particles and delivered directly to the lesions, resulting in increased local drug concentration and activity, thereby achieving the desired therapeutic effect while minimizing adverse effects associated with oral or intravenous administration.

Nebulized inhalation therapy offers broader applicability in treating respiratory diseases. Compared to intravenous or oral administration, it delivers drugs directly to the lesion with each breath, thereby improving the speed of drug onset <sup>[9]</sup>. Additionally, it is convenient and highly accepted by patients. Following each nebulized inhalation treatment, it is essential to promptly clean the oral cavity and face to reduce residual drug side effects caused by residue buildup. In addition to pharmacological interventions, non-pharmacological approaches are also crucial. Respiratory training, for instance, can significantly improve lung function, increase lung capacity, and mitigate the adverse effects of the disease on respiratory function. Furthermore, it aids in enhancing lung oxygen uptake, thereby restoring oxygen supply to tissues and organs and minimizing the impact of chronic obstructive pulmonary disease on overall health <sup>[10]</sup>.

In conclusion, COPD is highly prevalent among middle-aged and elderly individuals, often characterized



by recurrent episodes and proving difficult to cure. Clinical treatment of chronic obstructive pulmonary disease typically involves symptomatic medication, along with the addition of terbutaline and budesonide, which can effectively improve the patient's lung function. The overall effectiveness of this treatment approach is satisfactory, with minimal side effects associated with the drugs. Therefore, it is worth promoting this treatment regimen.

## Disclosure statement

The author declares no conflict of interest.

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