Effect of Inhalation of Low-Dose Budesonide Powder Combined with Pulmonary Rehabilitation in the Treatment of Bronchial Asthma

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Abstract

The objective of this study was to observe and analyze the effects of inhalation of low-dose budesonide powder combined with pulmonary rehabilitation in the treatment of bronchial asthma, and to explore the mechanism of action. In this study, 180 patients who had been diagnosed and treated for bronchial asthma in our hospital were enrolled as research objects. They were divided into experimental group accepting inhalation of low-dose budesonide powder combined with pulmonary rehabilitation and control group accepting conventional drug therapy. The therapeutic effects of the two groups were compared. Compared with the control group (77.78%), the overall treatment effective rate of was significantly higher in the experimental group (94.44%), p<0.05. The improvement degree of pulmonary function in the experimental group was more significant than that in the control group, p<0.05. Observing asthma symptom scores of the patients in the two groups, it was found that the asthma symptom scores of the experimental group were significantly lower 2 months and 6 months of treatment, than those of the control group, p<0.05. It is conducted that inhalation of low-dose budesonide powder combined with pulmonary rehabilitation therapy in patients with bronchial asthma can significantly improve the therapeutic effect, which is worthy of promotion and application.

Background

Bronchial asthma is a heterogeneous disease characterized by chronic airway inflammation involving multiple cells (eosinophils, mast cells, T lymphocytes, neutrophils, airway epithelial cells, etc.) and cellular components (Ozdemir, 2020). This chronic inflammation is associated with airway hyperreactivity, usually with extensive and variable reversible expiratory airflow restriction, leading to recurrent episodes of wheezing, shortness of breath, chest tightness, and/or cough, with varying intensity over time (Zou, 2017). Most bronchial asthma attacks and exacerbations occur at night and/or in the early morning, and most patients can spontaneously relieve or be relieved by treatment (Park et al., 2016).

At present, there are many effective drug treatments for bronchial asthma. Glucocorticoids have a very significant application effect in terms of anti-immunity and anti-inflammation. Through inhalation therapy, they can act locally on patients without serious adverse reactions (Shimoda et al., 2017). However, long-term inhalation of large amounts of glucocorticoids can easily lead to sinusitis, respiratory tract infection and other conditions (Liu et al., 2017). Inhalation of low-dose budesonide powder combined with pulmonary rehabilitation in the treatment of bronchial asthma (Wang et al., 2018) is evaluated in this study.

Materials and methods

In this study, 180 patients who had been treated for bronchial asthma in our hospital from January 2016 to May 2019 were enrolled as experimental subjects. All patients passed the clinical comprehensive examination and met the diagnostic criteria of bronchial asthma in the guidelines for the prevention and treatment of bronchial asthma (Fu, 2018). The patients were randomly divided into experimental group and control group, each containing 90 cases. There were 50 male patients and 40 female patients in each group. The experimental group was treated with inhalation of low-dose budesonide powder combined with pulmonary rehabilitation, while the control group was treated with conventional drug therapy.

The therapeutic effects of the two groups were compared. The overall treatment effective rate and the improvement degree of pulmonary function were compared between the two groups. The asthma symptom scores of the patients in the two groups were observed and compared 2 months and 6 months after treatment.

Results

Compared with the control group (77.78%), the overall treatment effective rate of was significantly higher in the experimental group (94.44%), p<0.05. The improvement degree of pulmonary function in the experimental group was more significant than that in the control group, p<0.05. Observing asthma symptom scores of the patients in the two groups, it was found that the asthma symptom scores of the experimental group were significantly lower 2 months and 6 months after treatment, than those of the control group, p<0.05.

Discussion

Inhalation of low-dose budesonide powder combined with pulmonary rehabilitation therapy in patients with bronchial asthma can significantly improve the therapeutic effect, which is worthy of promotion and application.
Table I. Comparison of pulmonary function indicators between the two groups (±s).

<table>
<thead>
<tr>
<th>Group</th>
<th>FEV1(L)</th>
<th>FVC(L)</th>
<th>FEV1/FVC</th>
<th>PEF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td></td>
<td>treatment</td>
<td>treatment</td>
<td>treatment</td>
<td>treatment</td>
</tr>
<tr>
<td>Experimental</td>
<td>1.4±0.2</td>
<td>1.9±0.5</td>
<td>2.2±0.3</td>
<td>2.9±0.1</td>
</tr>
<tr>
<td>Control group</td>
<td>1.4±0.7</td>
<td>1.5±0.3</td>
<td>2.3±0.6</td>
<td>2.4±0.8</td>
</tr>
<tr>
<td>t</td>
<td>0.29</td>
<td>4.59</td>
<td>0.11</td>
<td>6.58</td>
</tr>
<tr>
<td>p</td>
<td>&gt;0.05</td>
<td>&lt;0.05</td>
<td>&gt;0.05</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

Table II. Comparison of overall treatment effective rate between the two groups [n (%)].

<table>
<thead>
<tr>
<th>Group</th>
<th>Significant effective</th>
<th>Effective</th>
<th>Ineffective</th>
<th>Overall treatment effective rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>50</td>
<td>35</td>
<td>5</td>
<td>85(94.44)</td>
</tr>
<tr>
<td>Control group</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>70(77.78)</td>
</tr>
<tr>
<td>X2</td>
<td></td>
<td></td>
<td></td>
<td>10.29</td>
</tr>
<tr>
<td>p</td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

Table III. Comparison of asthma symptom scores between two groups (±s).

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of cases</th>
<th>Before treatment</th>
<th>2 months after treatment</th>
<th>6 months after treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>90</td>
<td>1.958±0.046</td>
<td>0.240±0.011</td>
<td>0.239±0.057</td>
</tr>
<tr>
<td>Control group</td>
<td>90</td>
<td>1.980±0.036</td>
<td>0.456±0.039</td>
<td>0.399±0.063</td>
</tr>
<tr>
<td>X2</td>
<td></td>
<td>0.18</td>
<td>5.70</td>
<td>9.31</td>
</tr>
<tr>
<td>p</td>
<td></td>
<td>&gt;0.05</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

the experimental group, respectively, with an average age of (46.7±2.1) years and an average course of disease of (5.2±0.6) years. In contrast, there were 48 male patients and 42 female patients in the control group, respectively, with an average age of (47.3±2.8) years and an average course of disease of (5.5±0.9) years. There were no significant differences in general data between two groups, p>0.05.

Patients in the control group were given routine medication. During asthma attack, patients were instructed to oral administration of prednisone (5 mg, once a day); theophylline controlled-release tablets (0.2g, twice a day); and inhaled salbutamol aerosol (200μg, three times a day). During the remission phase, no medication was given. Patients in the experimental group were treated with low-dose budesonide inhalation therapy. Patients inhaled budesonide powder fog before sleep. Patients in the asthma attack were inhaled with salbutamol aerosol (200 mg, three times a day). Both groups were treated for one year. Patients in the experimental group were given pulmonary rehabilitation based on the instruction provided on the study of Schultz et al. (2017). After treatment, the pulmonary function indexes of the two groups were observed and compared. Forced expiratory volume (FEV1), forced expiratory volume (FVC), FEV1/FVC and peak expiratory velocity (PEF) were counted. The overall treatment effective rate was observed and the score of asthma symptoms was calculated. Statistical analysis software SPSS21.0 was used to process data. The measurement data were expressed by mean ± average (± s), with t test conducted for intergroup comparison. Enumeration data were expressed by natural (n) and percentage (%), with X2 used for intergroup comparison. The intergroup difference is of statistical value when P<0.05.

Results and discussion

Table I shows the comparison of pulmonary function indicators between two groups. The improvement effect of pulmonary function indicators in the experimental group was more significant, p<0.05.

Table II, The overall treatment effective rate of the
experimental group was higher than that of the control group, *p* < 0.05.

Table III shows symptom scores of the patients in the experimental group after treatment were significantly better than those before treatment, and there was a significant difference with the control group, *p* < 0.05.

Bronchial asthma is a common and frequent occurring disease. Once it cannot be treated timely and effectively, it will endanger the life safety of patients. Practical experience has shown that the single implementation of drug treatment for bronchial asthma patients, the results are not uniform, so it is usually to take comprehensive therapy (Eric et al., 2018; Zou et al., 2018). Remission type drugs (short-acting oral β2 agonists, short-acting theophylline, inhaled anticholinergic agents, etc.) are used to relieve bronchospasm symptoms (Zou et al., 2018).

Budesonide is a highly effective local anti-inflammatory glucocorticoid that enhances the stability of lysosomal membrane, smooth muscle cells and endothelial cells, inhibits immune response and reduces antibody synthesis, and weakens the activity and release of allergenic agents (Practical, 2019). Budesonide can weaken the enzymatic stimulation during the binding of antigens and antibodies, and block the release and synthesis of bronchoconstrictor substances, so as to reduce the contraction response of smooth muscle (Shin et al., 2019; Hakim et al., 2019; Tashkin et al., 2019). It is widely used in the treatment of glucocorticoid-independent bronchial asthma, as well as the treatment of dependent bronchial asthma and asthmatic chronic bronchitis. A small dose of budesonide powder aerosol for inhalation therapy can quickly deliver the drug to the airway surface of patients, promote the absorption of the drug and reduce the rate of adverse reactions, so it has a reliable safety (Janson et al., 2019).

**Conclusion**

In conclusion, inhalation of low-dose budesonide powder combined with pulmonary rehabilitation therapy in patients with bronchial asthma can significantly improve the therapeutic effect and positively improve the pulmonary function.

**Statement of conflict of interest**

The authors have declared no conflict of interest.

**References**


