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Original Article

Clinical curative effects of Xiaoqinglong Granules combined with budesonideaerosol inhalationon acute infantile asthma

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Abstract: Objective: To observe the clinical curative effects of Xiaoqinglong Granules orally combined with budesonide aerosol inhalation for acute infantile asthma caused by wind-cold evil tightening the lung. Methods: The 82 eligible cases of children with acute asthma caused by wind-cold evil tightening the lung were selected as the observed subject. They were divided into the control group and the research group by random number table, 41 cases for each group. The control group adopted conventional Western medicine treatment combined with budesonide aerosol inhalation while the research group was treated with Xiaoqinglong Granules orally based on the treatment of the control group. Two groups were treated with continuous medication for 14 d. The symptoms of the 2 groups were evaluated and the results of treatment and adverse reactions were compared. Results: The disappeared time of main symptoms such as cough, wheeze and indexes of the research group were significantly lower than those of the control group, while clinical curative effects were significantly higher than those of the control group, and the total effective rate was more superior to that of the control group (P=0.038). Conclusion: It is significantly effective to adopt Xiaoqinglong Granules orally combined with budesonide aerosol inhalation for children with acute asthma, which can improve the pediatric patients' main asthma symptoms such as cough, wheeze, etc. Briefly, the combined treatment is worthy of promotion and application in clinical practice.

Keywords: Children, Xiaoqinglong Granules, budesonide aerosol inhalation, acute asthma

Introduction

Bronchial asthma is called asthma for short, and as a global chronic disease, there are about 300 million people suffering from it in the world [1-3]. Children are easy to be attacked, who under 3 years old get the incidence of 0.5-3.33% [4, 5], presenting an upward trend year by year. Asthma is anallergic airway inflammation involved in multi cells (mast cells, eosinophil, macrophages, lymphocytes and neutrophils) and cellular components. Its pathogeneses are infiltration of the epithelial layer in the airway, increasing under tissue edema and microvascular permeability in the submucosa of airway, caducous ciliated epithelial cells, as well as increasing proliferation of the goblet cells and gland secretion; underchronic inflammation of airway leads to increasing airway responsiveness and the clinical manifestations are: cough, chest tightness, difficult breathing and recurrent episodes of wheeze, all of which will cause serious damage to the pediatric patients' physical and mental health, even endanger their lives.

Previous clinical treatment showed that when children suffered from acute asthma, budesonide aerosol inhalation could effectively improve children's wheeze, cough and other symptoms [6-12]. However, as for the long-term therapeutic effects, Western medicine is not satisfactory. Therefore, in this research, Chinese patent drug, Xiaoqinglong Granules, were add [13-15] as the adjuvant therapy. Xiaoqinglong Granules are one type of Chinese patent drugs, whoseprincipal components include Chinese ephedra, Guizhi, Paeonia lactiflora,

Liquorice, Asarum, etc. With their functions of promoting expectoration, dispelling the superficial evil and relieving cough and asthma, the combination of Xiaoqinglong Granules and budesonide aerosol inhalation can complement each other, take respective advantages of themselves, address both the symptoms and root causes and eventually, get better clinical curative effects.

We observe Xiaoqinglong Granules combined with budesonide aerosol inhalation for 82 pediatric patients with acute asthma, hoping to provide new ideas for clinical treatment for acute infantile asthma.

Materials and methods

General materials

Eighty-two children with acute asthma were selected. According to the random number table method, they were divided into the control group and the research group, including 41 cases in each group. These children met the relevant diagnostic criteria of Guidelines for Diagnosis and Treatment of Bronchial Asthma in Children. The children were asked to take medicine on time and their family signed informed consent. Besides, the study excluded the children with drug allergy and dysfunction of important organs, such as liver, kidney, brain, etc. There were 23 males and 15 females who suffered from asthma mildly or moderately in the control group with an age from 5 to 12 years, and the average age was (8.3±2.3) years old. There were 26 males and 15 females who suffered from asthma mildly or moderately as well in the research group, with an age from 4.8 to 12.1 years, and the average age was (6.5±2.2) years old. The difference in general data of the two groups (P=0.213) had no statistical significance, so it was comparable.

Treatment methods

The control group was treated by conventional therapy (inhalation of oxygen in time, intravenous drips of glucocorticoid, bronchial-dilating agents, anti-infection and sedation) combined with 500 μg of budesonide aerosolinhalation, twice/day. The pediatric patients in the research group took additional 13 g of Xiaoqinglong Granules orally, 3 times/day.

Outcome measures

Observe the duration time of symptoms as well as physical signs (cough, wheeze,) and the lung function of the two groups, make detailed records of adverse reactions in pediatric patients and detect the level of inflammatory factors.

Clinical efficacy

After 7-day treatment, if these signs (cough, wheeze) in pediatric patients showed no improvement or exacerbation, it was regarded as invalid; if signs showed improved effectively, it was regarded as valid; if signs showed disappeared, it was regarded as cured. The total effective rate = (cure case number +effective case number)/(total case number) *100%.

Lung function

All pediatric patients took routine lung function test before the treatment and 14 days after the treatment, and their lung function was detected by Master Semen PFT. The forced expiratory volume in one second (FEV1) and peak expiratory flow rate (PEFR) were used as the main indexes [16, 17].

Inflammatory factors

Enzyme-linked immunosorbent assay was used to detect the level of IL-6 from 5 ml of elbow vein blood of pediatric patient in the morning before and after the treatment [18-20].

Statistical treatment

SPSS 19.0 was used for data analysis, the measurement data were expressed by mean ± standard deviation ($\bar{x}$ ± SD) and T-test was adopted for the comparison between groups. Count data were represented with rate (%), ($P<0.05$), indicating that the difference was statistically significant. The data before and after the treatment, such as lung function, was analyzed by repeated measures.

Results

Clinical efficacy of two groups

The total effective rate of the research group was 97.5%, and that of the control group was 80.4%. The total effective rate of the research

Table 1. Comparison of curative effects in the two groups

	The number of cases	Cure	Effective	Ineffective	Total effective rate
The control group	41	17	16	8	80.4*
The research group	41	31	9	1	97.5

Note: Compared with the control group, *P=0.038.

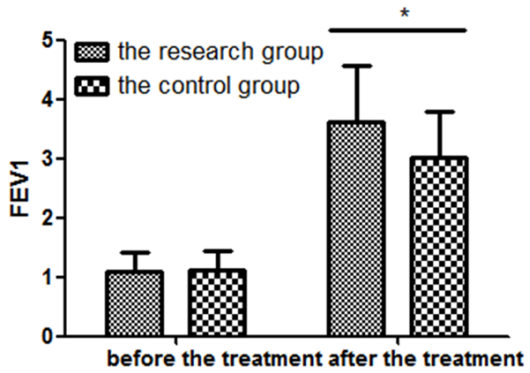

Figure 1. Comparison of forced expiratory volume in one second (FEV1) (L) of the two groups before and after the treatment. Compared with the control group, *P<0.05.

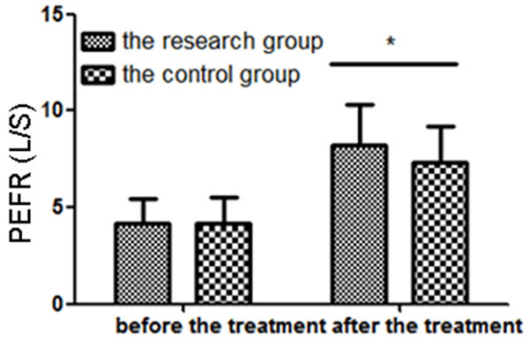

Figure 2. Comparison of and peak expiratory flow rate (PEFR) (L/S) of the two groups before and after the treatment Compared with the control group, *P<0.05.

group increased significantly compared with that of the control group, and the difference was statistically significant (P=0.038<0.05), see **Table 1**.

Comparison of the lung function of the two groups before and after the treatment

Before the treatment, the difference of lung function index had no statistically significance between the two groups (P=0.127), and after the treatment, FEV1 (P=0.0233<0.05) and PEF (P=0.0118<0.05) of the two groups were both improved; the research group is superior to the control group. See **Figures 1** and **2**.

Comparison of IL-6 level of before and after the treatment between the research group and the control group

Before the therapy, the difference of IL-6 level in the two groups had no statistical significance (P=0.154). IL-6 level showed a sharp reduction in both groups after the therapy and the difference had statistical significance (P=0.0217), and the research group is superior to the control group. See **Figure 3**.

Comparison of the duration time of cough and lung wheeze of two groups

After the therapy, cough (P=0.011) and lung wheeze (P=0.023) were obviously palliative in two groups, and the duration time of these symptoms of research group were previously shorter than these of the control group (all P<0.05), see **Figure 4**.

Discussion

Asthma is a chronic disease of increasing airway responsiveness and reversible obstruction caused by respiratory infection and immune disorders. Inflammatory factors can aggravate airway disease. The increased inflammatory infiltration will produce some symptoms of asthma. Asthma mostly occurs in puberty and high occurs in children less than 3 years old, as well as always attacks and aggravates in the morning or night. Once acute infantile cold asthma attacks, patients suddenly present symptoms such as cough, difficult breathing, chest tightness, wheeze, gasping, or aggravated original symptoms, which severely does harm to children's physical and mental health, even threatens their lives. At this very moment, it is required to quickly relieve airway spasm, improve respiratory function, control inflammatory response and recover pediatric patients' normal respiratory function. The conventional therapy offers oxygen inhalation, relieving cough and eliminating phlegm. Though it achieves remarkable curative effects to acute infantile asthma, due to its great side effects,

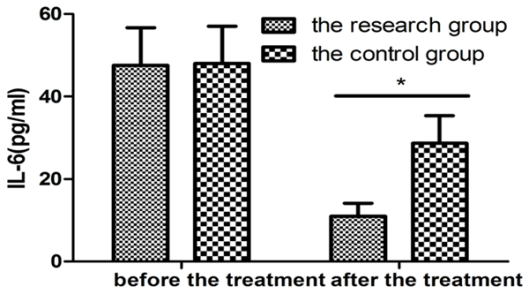

Figure 3. Comparison of IL-6 level of before and after the treatment between two groups. Compared with control group, *P<0.05.

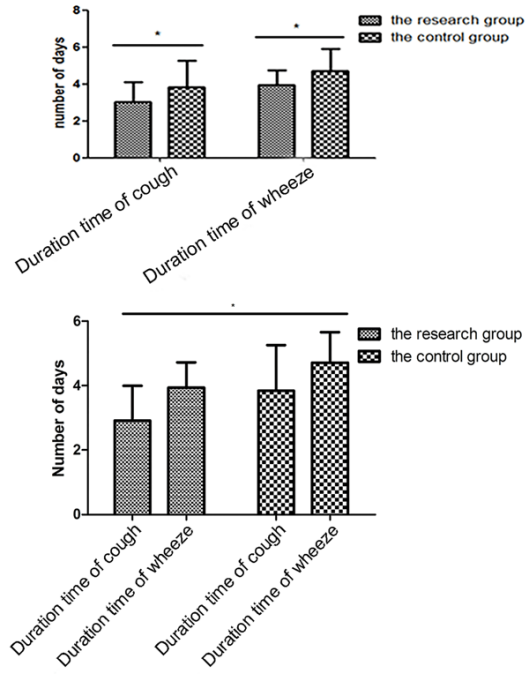

Figure 4. Comparison of the duration time of cough and wheeze before and after the treatment between two groups. Compared with control group, all *P<0.05.

low safety, and short-time usage, serious patients suffer from repeated attacks of it. In the year of 2003, the inhalation therapy was regarded as the first choice to prevent asthma in *Prevention Routines of Bronchial Asthma in Children and Guidelines for Diagnosis and Treatment of Bronchial Asthma in Children*.

Glucocorticoid inhalation is currently the most effective anti-inflammatory drugs for persistent asthma. As one kind of glucocorticoid, thehigh-concentrated glucocorticoid molecules of budesonide (AstraZeneca Pharmaceutical Co. Ltd.) can deeply penetrate into cell membranes, rapidly dissolve in mucus, quickly absorbed by airway tissues, inhibit proinflammatory protein synthesis and promote anti-inflammatory protein synthesis; meanwhile, it can decrease the possibility of discharged drugs with sputum, prolong the stay and action time of drugs in the airway, ensure the long-lasting anti-inflammatory effects, reduce the distribution and accumulation of inflammatory factors in the whole body and tissues by reducing ciliary movement and cough. Budesonide can amend the increase of airway responsiveness, especially significantly relieve the symptoms of cough, edema and gasping, to reduce the recurrence of acute infantile asthma. However, it cannot completely cure the asthma. However, there are some disadvantages of hormone dependence and hormone resistance, and thus, the overall efficacy of topical medication is not satisfactory.

Xiaoqinglong Granules are one type of Chinese patent drugs, and their ingredients include Chinese ephedra, Guizhi, Paeonia lactiflora, Liquorice, Asarum, Schisandra chinensis, Rhizoma zingiberis, and Pinellia. The main functions of the prescription are promoting expectoration, dispelling the superficial evil and relieving cough and asthma. And the prescription was used to relieve the symptoms of thirst, coldness, body heat, but not sweating as well as difficult breathing, polypnea with cough and the water like sputum, which was caused by wind-cold invading the skin surface leaded renal dysfunction. According to traditional Chinese medicine theory, Guizhi can help restore the Yang qi on the damaged skin surface of human; Chinese ephedra can increase the Yang qi on the skin surface, while Paeonia lactiflora can decease it, thus both of them can keep the Yang qi in balance; Liquorice can not only complement the Qi in the the spleen and stomach, but also adjust the characteristics of all the Chinese traditional medicine. Meanwhile, modern pharmacological studies have suggested that Chinese ephedra can relax bronchial smooth muscle and increase lung perfusion, while Schisandra chinensis and Paeonia lactiflora can relieve histamine-induced bronchial smooth muscle spasm. In addition, Asarum have the effect of antipyretic and increasing the lung perfusion to improve lung function and Pinellia has the function of antiemesis, inhibition of glandular.

No toxicity or adverse reactions occurred during our clinical study. This research shows that Xiaoqinglong Granules combined with budesonide aerosol inhalation plays a complementary role in the treatment of acute infantile asthma, which can reduce patients' inflammation reactions and have a better effect than the comprehensive treatment which mainly depends on budesonide aerosol inhalation. Regarding the clinical observation of acute infantile asthma in two groups, the total effective rate of the research group was higher than that of the control group (**Table 1**, P=0.038). The duration time of symptoms was shorter than that of the control group. In addition, the improvements of lung function, regulation of inflammatory factors, etc. were significantly better than those of the control group.

In summary, on the basis of the routine treatment, budesonide aerosol inhalation combined with Xiaoqinglong Granules for infantile asthma caused by wind-cold evil tightening the lung has a significant effect. It is better than the comprehensive treatment which mainly depends on budesonide aerosol inhalation in terms of descent of serum IL-6, pulmonary ventilation function, FEV1 improvement, rapid relief of cough, wheeze and so on. And it is worthy of promotion and application owing to its little adverse reaction and side effect, better efficacy and high safety. But the applicable scope and treatment evaluation of Xiaoqinglong Granules combined with budesonide aerosol inhalation requires more in-depth study.

Disclosure of conflict of interest

None.

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