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Analysis on Chemical Composition of Anti-Rhinitis Drugs and Study on Immunopharmacology

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Based on the perspective of traditional Chinese medicine, this paper analyzed the pathogenesis of rhinitis caused by the deficiency of lung, spleen and kidney, and the invasion of cold, proposed the combined medicinal components of Ephedra Asarum Fuzi soup and Yupingfeng San and conducted research on the prevention and treatment of rhinitis combined with the relevant achievements in immunopharmacology, providing a theoretical reference for clinical drug development and rhinitis treatment. The conclusion of the study indicated that high dose of Biminkang could significantly inhibit the anaphylactic contraction of organism, retard the hemangiectasis caused by histamine and reduce the value of OD_{610}. The medicinal mechanism of high-dose Biminkang is roughly the same as loratadine. Biminkang can effectively protect the nasal mucosa, reduce harmful nasal secreta, and reduce the immunopharmacology effect of MC number, EOS, SP and IgE. The treatment effect of Biminkang on IgE is superior to that of loratadine and is also superior to Xinqin granule in the reduction of EOS and MC number.

1. Introduction

Rhinitis refers to the hypersensitivity of nasal mucosa mainly caused by external environment and pathogen irritation and almost 100 million people worldwide have allergic rhinitis. The main symptoms of rhinitis are blockage of the nose, running nose and sneezing, even cause severe sinusitis, asthma and dermatitis (Ciprandi, 2008; Aziza et al., 2017; Spector et al., 2011; Passalacqua and Durham, 2007; Ofworkshops, 2004; Hansen et al., 2004).

At present, clinical treatment can only be aimed at some specific symptoms. However, due to the large number of pathogens in the external environment and cold air, bacteria in the air and chemical pollution cannot be avoided, which leads to the fact that current rhinitis treatment of traditional Chinese medicine and Western medicine is far from reaching satisfactory results. Traditional rhinitis treatment methods include the combination of antihistamine reagents, anticholinergic agents and stabilizers, but clinical treatment statistics show that the above drugs cure only the symptoms but not the disease and the symptoms may repeat (Marple, 2008; Gelfand, 2004; Nabe et al., 2014; Brozmanová et al., 2006; Scadding, 2008; Naclerio, 2010; Liu et al., 2014; Miyahara et al., 2006). Based on the perspective of traditional Chinese medicine, this paper analyzed the pathogenesis of rhinitis caused by the deficiency of lung, spleen and kidney, and the invasion of cold, proposed the combined medicinal components of Ephedra Asarum Fuzi soup and Yupingfeng San and conducted research on the prevention and treatment of rhinitis combined with the relevant achievements in immunopharmacology, providing a theoretical reference for clinical drug development and rhinitis treatment (Canonica et al., 2010; Mandhane et al., 2011).

2. Pharmacological Effect of Anti-Rhinitis Medicine on the Contraction and Inhibition of Individual Allergy

2.1 Test Materials and Methods

Allergic contraction test on rats: adult male rats fed a laboratory diet are selected, weighing 140-180 g; Vascular permeability test on rats: adult male rats fed a laboratory diet are selected, weighing 140-180 g. The test temperature is 25°C; the relative humidity is 60%, two types of rats were fed 10d before the relevant tests.

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Test drugs: Biminkang, loratadine, histamine phosphate, Qulibenlan; experimental equipment: constant temperature water bath, photometer, biological machine test system. The SPSS is used to carry out the post data processing.

Test procedure: The rats for allergic contraction and vascular permeability test are divided into low dose (2.5mg / ml), middle dose (5.0mg / ml) and high dose group (10.0 mg / ml) and no-dose control group. Before the experiment, rats are injected with normal saline into the hind leg and abdominal cavity. Rats are sacrificed after 5 weeks of feeding and the ileum is quickly taken and placed in the nutrient solution. The antigen, as well as the medicine, is injected into the nutrient solution every 2 hours, the contraction inhibition rate of the ileum is recorded. The vascular permeability test is as the above.

2.2 Test Results and Analysis

Figure 1 shows the treatment inhibition effect of different doses of Biminkang on the allergic contraction of rats. As can be seen from the figure, the effects of Biminkang in low-dose group, medium-dose group and high-dose group are significantly higher than those in blank control group, and the higher the dose of Biminkang, the more obvious the inhibitory effect. The pharmacological effect of 10.0mg/ml of high-dose group is basically the same as the inhibition effect of loratadine.

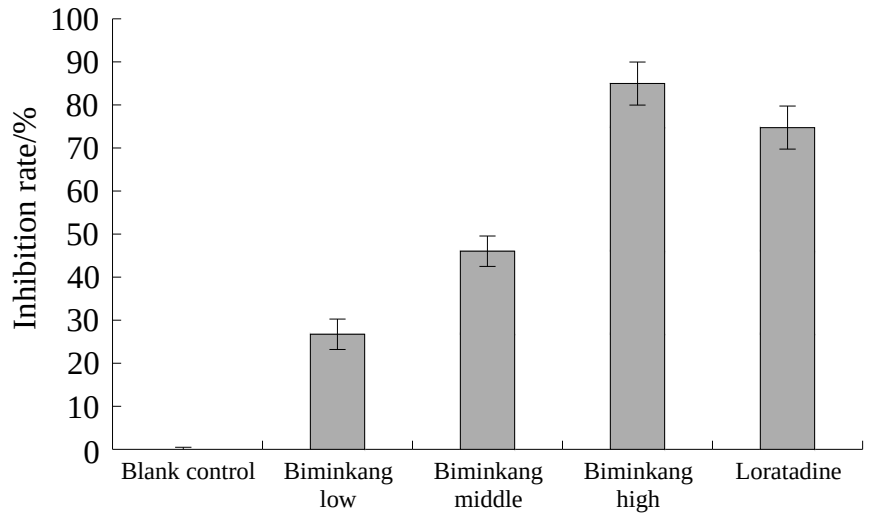

Figure 1: Treatment Inhibition Effect Comparison of Different Doses of Biminkang on the Allergic Contraction of Rats

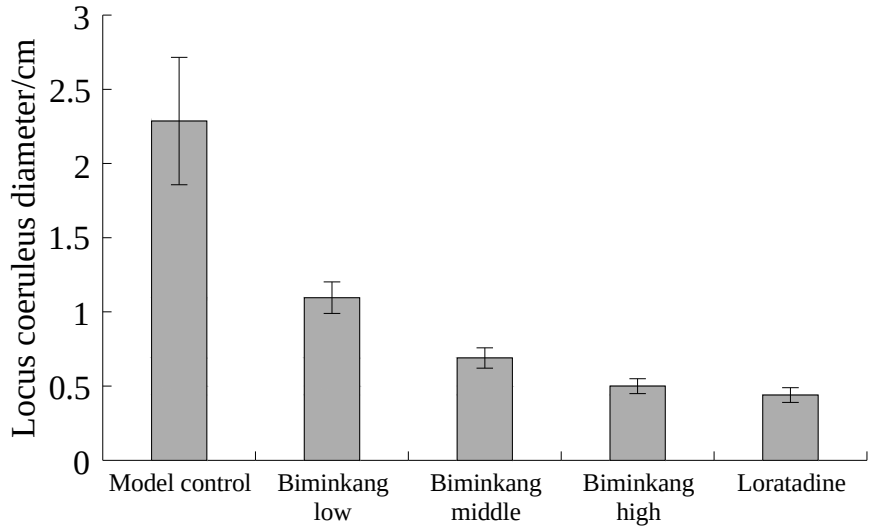

Figure 2: Comparison of Different Doses of Biminkang on the Skin Locus Coeruleus Diameter of Rats

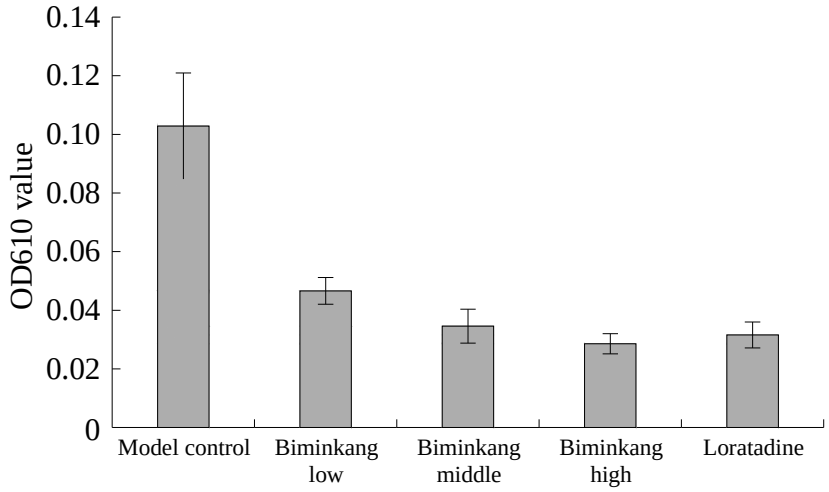

Figure 3: Impact of Different Doses of Biminkang on the OD_{610} Value of Rats

Figure 2 shows the different doses of Biminkang on the skin locus coeruleus diameter and OD_{610} value. As can be seen from the figure, the higher the dose of Biminkang, the smaller the skin locus coeruleus diameter of rats and the smaller the value of OD_{610}. The pharmacological effect of 10.0mg/ml of high-dose group is basically the same as the effect of loratadine.

The ileum, under the action of different antigens, will releases the source medium that causes allergy of rats, resulting in the contraction of smooth muscle of the ileum. After dosing, inhibition effect on the contraction of the ileum proves that the medicine has an anti-hypersensitivity effect. The results from Figure 1 show that Biminkang has a good inhibitory effect on the allergic contraction of rats. At a certain dose, the higher the Bimikang content, the better the inhibitory effect on allergic contraction.

Histamine is the main cause of allergic rhinitis, and the presence of histamine will lead to the smooth muscle spasm and increase in vascular permeability. The results of the test in Figure 2 and 3 indicate that Biminkang can inhibit the hemangiectasis caused by histamine and reduce the OD_{610} value.

3. Immunopharmacological Effects Analysis of Anti-Rhinitis Medicine

MC number, EOS, SP and IgE are four important parameters of allergic rhinitis characterization and these four parameters will be analyzed in the following part.

Table 1 shows the biological emergent symptom of different groups of rats after antigen invasion (because of no antigen in the blank control group, no emergent symptom of rhinitis). The model control group is the group without dosing and the dosing in the remaining three groups is Biminkang, Xinqin granules and loratadine respectively. It can be seen from the table that after dosing of Biminkang, the symptom score is significantly lower than that of model control group and Xinqin granule group, but the symptom score is higher than that of loratadine group.

Table 1: Impact of Different Anti-Rhinitis Medicine on Running Nose and Scratching Nose

Group	Reciprocal	Dose	Symptom score
Blank control	8	Normal saline	0
Model control	8	Normal saline	6.98±0.57
Biminkang	8	4.9	2.31±0.29
Xinqin granule	8	4.9	3.20±0.56
Loratadine	8	0.002	1.85±0.33

Figure 4 shows the impact of different groups of anti-rhinitis medicine on the nasal secreta and mucosal EOC of rats. As can be seen from the figure, the EOS number of the nasal secreta and nasal mucosal of the model control group is the largest. The number of EOS of the infected rats decreases slightly after the dosing of Xinqin granules; The decrease of EOS after the dosing of Biminkang and loratadine is significant, and there was no significant difference between these two.

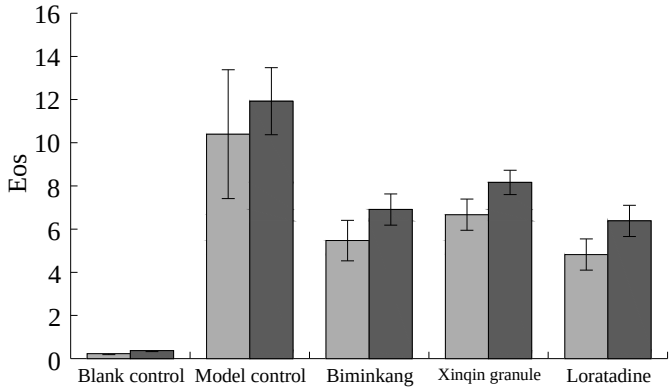

Figure 4: Impact of Different Groups of Anti-Rhinitis Medicine on the Nasal Secreta and Mucosal EOC of rats

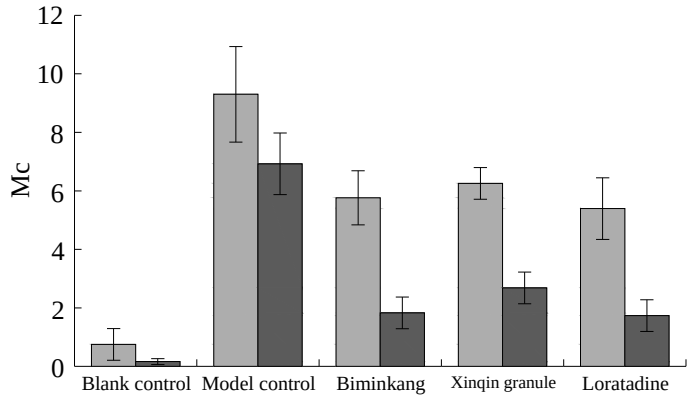

Figure 5: Impact of Different Groups of Anti-Rhinitis Medicine on the Nasal Excitation MC Number of Rats

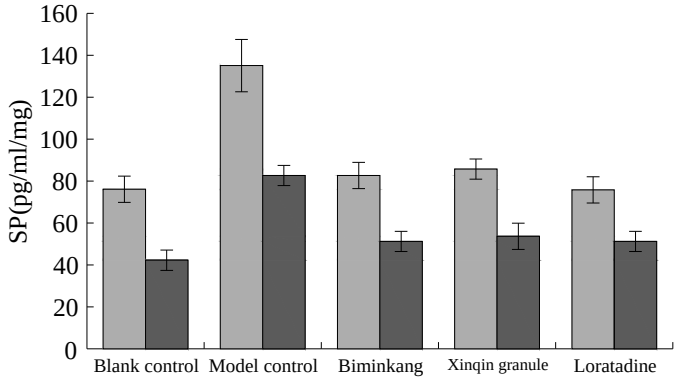

Figure 6: Impact of Different Groups of Anti-Rhinitis Medicine on the Nasal Mucosal SP of Rats

Figure 5 and Figure 6 show the different groups of anti-rhinitis medicine on the number of nasal excitation MC and nasal mucosa SP. As can be seen from the figure, the number of excitation MC in the model control group is much higher than that in the blank control group and different dosing groups, and there is no significant difference in the number of excitation MC between the three dosing groups of Bimincome, Xinqin granules and loratadine.

Figure 7 shows the impact of different groups of anti-rhinitis medicine on the IgE (U / ml) of rats. As can be seen from the figure, the IgE (U / ml) content of rats after the dosing of Biminkang is significantly lower than that of the model control group, Xinqin granules and loratadine dosing group.

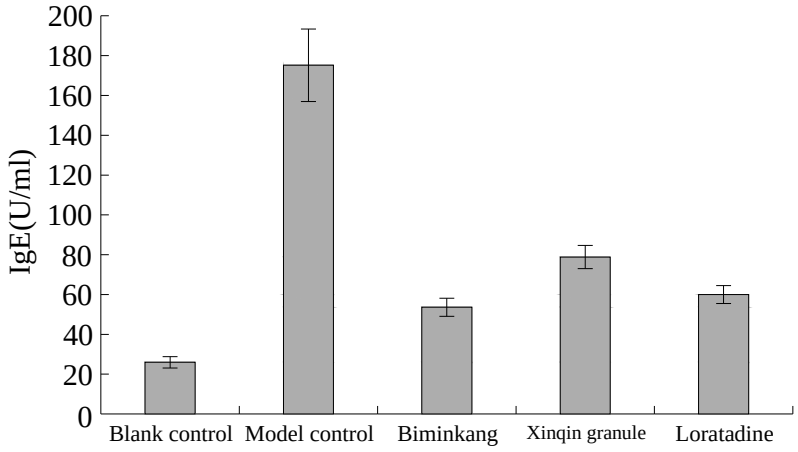

Figure 7: Impact of Different Groups of Anti-Rhinitis Medicine on the IgE(U/ml) of Rats

After invasion of various kinds of antigens, running nose, scratching nose and other rhinitis symptoms emerge in rats, and after the dosing of Biminkang, the experimental results show that rhinitis symptoms have been significantly improved. Microscopic results of the organization structure of nasal mucosa in the rats suffering from rhinitis show that the disorder, shedding, edema and other symptoms emerge in the mucosal tissue. However, mucosal tissues show obvious improvement with no obvious structural damage and small amount of infiltration of MC and EOS after the dosing of Biminkang, indicating that the Biminkang has immunopharmacological effect of protecting the nasal mucosa. In normal organisms, the IgE level is low but it will increase significantly when the organism is suffering from rhinitis. Influenced by MC and EOS, when organisms have rhinitis, the binding of antigen and IgE cells release pathogenic medium like histamine. The results show that the content of IgE in rats is significantly inhibited after the dosing of Biminkang, and the treatment effect of Biminkang is better than that of Xinqin granules and loratadine, indicating that Biminkang had the immunopharmacological effect of reducing the IgE.

4. Conclusion

Based on the perspective of traditional Chinese medicine, this paper analyzed the pathogenesis of rhinitis caused by the deficiency of lung, spleen and kidney, and the invasion of cold, proposed the combined medicinal components of Ephedra Asarum Fuzi soup and Yupingfeng San and conducted research on the prevention and treatment of rhinitis combined with the relevant achievements in immunopharmacology, providing a theoretical reference for clinical drug development and rhinitis treatment. The conclusions are as follow:

(1) High dose of Binkankang can significantly inhibit the allergic contraction of organisms and delay the hemangiectasis caused by histamine and decrease the OD_{610} value. The medicinal mechanism of high dose of Binkankang is roughly the same as loratadine.

(2) Binkankang can effectively protect the nasal mucosa, reduce harmful nasal secreta, and reduce the immunopharmacological effect of MC number, EOS, SP and IgE. The treatment of Biminkang is superior to that of loratadine, and is also superior to Xinqin granule in the reduction of EOS and MC number.

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