The Effectiveness of Therapy for Contact Allergic Dermatitis Using a New Domestic 6% Ointment from Plant Extracts

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Abstract

In a comparative study of the treatment of skin allergies, a combined 6% ointment of thick succession of Bidens tripartitae and dry extract of licorice root, and ointment celestoderm B in experiment on Guinea pigs, it was found that the use of combined 6% ointment of thick succession of Bidens tripartitae and dry extract of licorice root at the local hydrophobic basis, more effective in the treatment of allergic contact dermatitis than glucocorticosteroid ointment celestoderm B. Thus, in a comparative study of the treatment of skin allergies, a combined 6% ointment of a thick extract of a series of tripartite and dry extract of licorice root and ointment of celestoderm B, it was found that the use of a combined 6% ointment of a thick extract of a series of tripartite and dry extract of licorice root on a local hydrophobic basis, is more effective in the treatment of contact allergic dermatitis than the glucocorticosteroid ointment celestoderm B.

Keywords: Experimental skin allergy, Combined 6% ointment of thick extract of Bidens tripartitae dry extract of licorice root, Celestoderm B, Guinea pigs

Abbreviations: AD: Atopic Dermatitis; ACD: Allergic Contact Dermatitis; DNCB: Dinitrochlorobenzene; GCS: Glucocorticosteroid

Introduction

Atopic dermatitis (AD) is found in all countries of the world, in both sexes and different age groups. The prevalence of blood pressure has more than doubled over the past two decades. According to various authors, atopic dermatitis occupies from 20 to 40% in the structure of skin diseases. The incidence rates of blood pressure among children in the world fluctuate up to 10-20%, among adults - up to 3% [1]. Currently, there is no doubt about the genetic predisposition to allergic diseases, revealed in different countries [2,3].

In recent decades, in the treatment of allergic dermatoses, much attention has been focused to glucocorticosteroid (GCS) preparations in the form of ointments. The antiproliferative effect of GCS is expressed in the inhibition of the synthesis of collagen, mucopolysaccharides, a decrease in the migration activity of cells, which can be the cause of skin atrophy [4].

In this case, ointments containing herbal biologically active substances help. they are natural, cheaper and harmless than synthetic drugs [5]. Our country is rich in...
reserves of a series of tripartite and licorice root. Their tinctures and syrups have been used in folk medicine for many years in the treatment of diathesis and colds. Therefore, if ointment preparations from these medicinal plants were created, a step forward would be made in the treatment of allergic dermatoses.

Purpose of the study: comparative study of the effectiveness of treatment of contact allergic dermatitis using a new domestic combined 6% ointment of a thick extract of a series of tripartite and dry extract of licorice root on a hydrophobic basis obtained from local raw materials with celestoderm B ointment on the skin of guinea pigs.

Materials and Methods

The ointment was prepared on a hydrophobic basis, obtained by the enzymatic transesterification of sunflower oil and internal film beef fat in a mass ratio of 1: 1.5 with the addition of a thick extract of a series of tripartite and dry extract of licorice root, in a mass ratio of 1: 1, dissolved in 6 ml 70% - ethyl alcohol, which is mixed with an ointment base in a mass ratio of 1: 22.5.

Allergic contact dermatitis (ACD) was caused by double application of 5% alcohol-acetone 2,4-dinitrochlorobenzene (DNCB) on guinea pigs according to the method of E.Ya. Ivleva. and Zalkan P.M. (1965). The sensitization focus was created on the back area with an area of 3×3 cm² from which the hair was previously removed. DNCB was applied to the skin area in a dose of 0.1 ml of 5% alcohol-acetone solution (2: 1).

In group 1 (control group; Group 1 - control group; Group 2 - 6% combined ointment from a thick extract of a series of tripartite and dry extract of licorice root) on the 1st day there were: limited red spots, and this was estimated at 0.6 ± 0.1 point. On the 3rd day, some animals were found to have acute erythema, edema, and in some animals' hemorrhagic crusts and ulcers, the state averaged 4.8 ± 0.22 points. By the 5th day of the experiment, the condition of the skin of the animals improved, some showed hyperemia and edema, some showed severe redness and swelling, the condition was assessed on average at 3.8 ± 0.13 points. By the 7th day, allergic inflammation on the skin of the animals had a significant improvement in comparison with the control, with some hyperemia, edema, and some had severe redness, the condition was assessed on average at 2.8 ± 0.13 points. By the 9th day, the healing process of the skin of animals of this group improved, there was a slight and obvious hyperemia, slight edema, which averaged 1.8 ± 0.13 points. On the 11th day of observation, in 4 animals, the skin was completely restored - there were no reactions, the rest had limited red spots, the state was on average estimated at 0.45 ± 0.1 points. The overall score was 14.8. And the index of reducing the severity of cutaneous manifestations (Ind) was 30.8%.

In group 3 (celestoderm B ointment) on the 1st day of the experiment, the animals showed limited red spots and slight hyperemia, which was estimated on average 0.6 ± 0.07 points. On the 3rd day, the process was acute, with hyperemia; 2 points - clear hyperemia and edema; 3 points - sharp redness and significant swelling; 4 points - the formation of hemorrhagic crusts; 5 points - the formation of extensive ulcers.

Results

On the 1st day of our observation, the skin of animals in group 1 was characterized by limited red spots, some had diffuse hyperemia and, on average, the state was estimated at 0.6 ± 0.1 points. On the 3rd day of the experiment, acute hyperemia, edema and hemorrhagic crusts with large ulcers were found on the skin, which averaged 4.6 ± 0.2 points. On the 5th day, acute redness, edema, small ulcers were revealed, which averaged 4.3 ± 0.3 points. On days 7 and 9, the above changes persisted, the condition was estimated at 4.3 ± 0.3 and 4.3 ± 0.2 points, respectively. On the 11th day of our experiment, the inflammation was slightly less, with hyperemia, edema and some hemorrhagic crusts on the skin, with a value of 3.5 ± 0.2 points (Table 1).

In the animals of the 2nd group in our experiment (a combined 6% ointment based on the sum of flavonoids of a thick extract of a series of tripartite and dry extract of licorice root) on the 1st day there were limited red spots, and this was estimated at 0.6 ± 0.1 point. On the 3rd day, some animals were found to have acute erythema, edema, and in some animals' hemorrhagic crusts and ulcers, the state averaged 4.8 ± 0.22 points. By the 5th day of the experiment, the condition of the skin of the animals improved, some showed hyperemia and edema, some showed severe redness and swelling, the condition was on average 3.8 ± 0.13 points. By the 7th day, allergic inflammation on the skin of the animals had a significant improvement in comparison with the control, with some hyperemia, edema, and some had severe redness, the condition was assessed on average at 2.8 ± 0.13 points. By the 9th day, the healing process of the skin of animals of this group improved, there was a slight and obvious hyperemia, slight edema, which averaged 1.8 ± 0.13 points. On the 11th day of observation, in 4 animals, the skin was completely restored - there were no reactions, the rest had limited red spots, the state was on average estimated at 0.45 ± 0.1 points. The overall score was 14.8. And the index of reducing the severity of cutaneous manifestations (Ind) was 30.8%.
severe redness, edema and hemorrhagic crusts, ulcers and an average score of 4.9 ± 0.1 points. On the 5th day, the state practically did not change and was estimated at 4.7 ± 0.15 points. By the 7th day of the experiment, the inflammatory process of the skin improved, with obvious hyperemia, edema and severe redness, with hemorrhagic crusts, the average condition was estimated at 4.2 ± 0.25 points. By the 9th day, diffuse hyperemia, severe hyperemia, edema and severe redness were observed, which were estimated at 3.2 ± 0.33 points, and the results of this day were reliable in comparison with the control. Despite the fact that by the 11th day red spots, slight hyperemia, obvious hyperemia and edema remained on the skin of the animals, and the condition was assessed on average 2.8 ± 0.25 points, the indicators were unreliable. The overall score was 20.7 and the cutaneous severity index (Ind) was 3.3%.

Summing up the results of our experiment, the skin of animals in the 1st group (control group) on day 1 showed mild symptoms of CAD, which progressed on the 3rd day, although they partially decreased on the 5th day, but the condition remained almost unchanged until the end experiment. The total score was 21.4. Also, in animals of the 2nd group, mild symptoms of CAD were observed on the 1st day, with a sharp progression on the 3rd day and a slight decrease in symptoms on the 5th day, and a significant decrease in symptoms was observed from the 7th day. The mean score was 14.8, and the index for reducing the severity of skin manifestations (Ind) was 30.8%. The animals of the 3rd group also showed symptoms of mild CAD on the 1st day, acute exacerbations on the 3rd and 5th days, a slight decrease on the 7th day, and began a significant decrease from the 9th day. The average score was 20.7 points, and the index of reducing the severity of skin manifestations (Ind) was 3.3%.

In our study, another indicator of allergic dermatitis was studied - the thickness of the skin folds of animals (Table 2). In guinea pigs of group 1 (control group), the average index of skin folds before the experiment was (0.26 ± 0.016 cm), one day after applying DNCB, it began to increase to 7 days (3 days, 0.46 ± 0.017 cm, Day 3 2.28 ± 0.09 cm, Day 5 2.97 ± 0.14 cm, Day 7 3.14 ± 0.17 cm). Only from the 9th day did it begin to decrease (9th day 2.25 ± 0.05 cm, 11th day 1.7 ± 0.07 cm).

The thickness of the skin fold in the animals of the 2nd group before the experiment averaged 0.24 ± 0.016 cm, from the 1st day (0.46 ± 0.016 cm) after applying DNCB to the 5th day, an increase in the thickness of the skin fold was observed (3rd day 1.42 ± 0.06 cm, 5th day 2.65 ± 0.05 cm), and from the 7th day, the thickness of the skin fold began to decrease (7-day 1.71 ± 0.05 cm, 9-day 1.25 ± 0.04 cm, 11-day 0.55 ± 0.07 cm). And from day 3, there was a significant decrease in indicators compared to control.

In animals of the 3rd group, the average index of skinfold thickness before treatment was 0.22 ± 0.13 cm, 1 day after applying DNCB (0.41 ± 0.01 cm), an increase in skinfold thickness was observed up to 5 days (3-day 1.42 ± 0.06; 5-day 2.72 ± 0.18 cm) and from the 7th day there was a significant decrease in comparison with the control indicators (on the 7th day 1.72 ± 0.06 cm, on 9th day 1.53 ± 0.01 cm, on day 11 1.37 ± 0.14 cm).

Table 1: Changes in the severity of skin processes in points during treatment contact allergic dermatitis in experiment.

<table>
<thead>
<tr>
<th>Groups (M ± m; n=10)</th>
<th>The severity of skin processes in points. days of the study</th>
<th>Points total</th>
<th>Ind %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-day</td>
<td>3-day</td>
<td>5-day</td>
</tr>
<tr>
<td>1-group (control)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.6 ± 0.07</td>
<td>4.6 ± 0.16</td>
<td>4.1 ± 0.1</td>
</tr>
<tr>
<td>2-group (6% ointment)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>0.6 ± 0.07</td>
<td>4.8 ± 0.22</td>
<td>3.8 ± 0.13</td>
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<tr>
<td>3-group (celestoderm B)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.6 ± 0.07</td>
<td>4.9 ± 0.1</td>
<td>4.7 ± 0.15</td>
</tr>
</tbody>
</table>

* P≤0.05; ** P≤0.01; *** P≤0.001 in comparison to control
**Discussion**

Summing up the results of our experiment, the skin of animals in the 1st group (control group) on day 1 showed mild symptoms of CAD, which progressed on the 3rd day, although they partially decreased on the 5th day, but the condition remained almost unchanged until the end experiment. The total score was 21.4. Also, the animals of the 2nd group showed mild symptoms of CAD on the 1st day, with a sharp progression on the 3rd day and a slight decrease in symptoms on the 5th day and significant.

Summarizing the obtained indices of the skinfold thickness in experimental animals from the 1st to the 7th day of the study, an increase was noted, and from the 9th day, a decrease in the skinfold thickness. In animals of groups 2 and 3, an increase was observed up to the 5th day, and from the 7th day the onset decreased. But until the end of the experiment, the indicators of group 2 were closer to the initial position than group 3.

**Conclusion**

Thus, in a comparative study of the treatment of skin allergies, a combined 6% ointment of a thick extract of a series of tripartite and dry extract of licorice root and ointment of celestoderm B, it was found that the use of a combined 6% ointment of a thick extract of a series of tripartite and dry extract of licorice root on a local hydrophobic basis, is more effective in the treatment of contact allergic dermatitis than the glucocorticosteroid ointment celestoderm B.

**Declarations**

I affirm that no conflicts of interest to declare. All co-authors have seen and agree with the contents of the manuscript and there is no financial interest to report. We certify that the submission is original work and is not under review at any other publication.

**References**


