

**RESEARCH ARTICLE**

## Pharmacological Studies of Dental Gel “Dentavir-phyto”

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### ABSTRACT:

In the article are represented results of pharmacological studies of dental gel under conditional name “Dentavir-phyto” on the model of experimental stomatitis caused by a 10 % solution of sodium hydroxide. The finding data suggest that the investigational medicine has a strong therapeutic effect on the severity of which is not inferior to comparator medicine dental gel “Kamident-Zdorovje”. Gel “Dentavir-phyto” is perspective for future use as a medicine for treating inflammatory diseases of the oral cavity and may be the medicine of choice in the local treatment of stomatitis in children and optionally prolonged treatment.

**KEYWORDS:** Liquorice, Dental Gel, Pharmacology.

### INTRODUCTION:

Stomatitis (from the Greek “stoma” - a mouth) – is the most common lesions of the oral mucosa. When stomatitis ulcers are formed on the inside of the lips and cheeks, the floor of the mouth, under the tongue, the soft palate and tonsils<sup>[8]</sup>.

The cause of stomatitis may be different factors - those that impact directly on the mucous membrane of the mouth (injury, chemical, thermal, radiation effects, when on the mucosa occur redness, erosions, ulcers), and systemic diseases of the body - gastrointestinal tract diseases, cardiovascular system diseases, weakening of the immune system, allergies, metabolic diseases, etc.<sup>[6]</sup>.

There are the following types of stomatitis: fungal, herpetic, aphthous, vesicular, bacterial (traumatic), allergic, erosive, ulcerative, catarrhal and catarrhal-hemorrhagic.

The disease usually takes place in a period of 4 to 14 days. Stomatitis treatment should be directed at ensuring therapeutic effects on different groups of microorganisms in the mouth, regardless of etiological factors. The structure of drugs for the treatment of stomatitis should include components that affect different symptoms and have antibacterial, antifungal, antiviral and reparative effects<sup>[1]</sup>.

To date, most often for the treatment of inflammatory diseases of the oral cavity and its mucous membranes used drugs of synthetic origin which, unlike herbal medicines, can cause the development of different local and systemic allergic reactions<sup>[1]</sup>.

It should be noted that herbal medicines have complex chemical composition and, consequently, the diversity of biological activity. Mode of action of herbal drugs manifested not immediate effect but long-term one, which determines their specificity and value. The therapeutic effect of the use of natural ingredients is more stable and durable.

We as active ingredients of dental gel codenamed “Dentavir-phyto” have chosen: dry extract of licorice root and essential oils of peppermint and sage. According to the literature data<sup>[2, 10]</sup> and our previously conducted experimental studies, these active components ensure antibacterial, antifungal, antiviral and reparative properties of the drug, which are necessary for the treatment of stomatitis.

The aim of the work – is to study the pharmacological activity of the dental gel “Dentavir-phyto”, namely its reparative action.

### MATERIALS AND METHODS:

Specific pharmacological activity of the investigated gel was studied by reparative effect in traumatic damage of the oral cavity in rats weighing 230-290 g.

As a comparison drug was used dental gel “Kamident-Zdorovje”, which consists of lidocaine hydrochloride, infusion of chamomile flowers and thymol. This drug enhances nonspecific resistance, has antibacterial, anti-inflammatory, reparative and local anesthetic activity<sup>[1]</sup>.

All animals were divided into 4 groups (6 in each):

Group 1 – intact animals,

Group 2 – control pathology (animals with experimental stomatitis),

Group 3 – experimental animals for which applied investigated dental gel “Dentavir-phyto”,

Group 4 – experimental animals for which applied dental gel “Kamident-Zdorovje”.

Stomatitis caused by single application of 10 % sodium hydroxide solution for 10 seconds. A solution with a cotton swab was applied to the oral mucosa of rats between the lower lip and mandibular incisors<sup>[5]</sup>.

Treatment of animals was carried out for 14 days, treating the surface of the damaged part of the oral mucosa of experimental animals by investigated dental gel and comparison drug, coated with gauze. After research animals were taken out of the experiment using method of euthanasia.

The extent of the pathological process and activity of investigative gel “Dentavir-phyto” and comparison drug gel “Kamident-Zdorovje” evaluated by changing in the peripheral blood. Blood was taken and analyzed on the 1-st, 3-rd and 7-th day of the experiment. In dynamics examined the total number of leukocytes and leukocyte formula using conventional methods<sup>[9]</sup>.

As an integral performance status was used animals body weight. The data were treated by methods of variation statistics<sup>[3,4,7]</sup>.

All tests were performed according to the requirements of the Commission on Bioethics of the National University of Pharmacy and “General ethical principles of animal experimentation” (Kiev, 2001), consistent with the provisions of the “European Convention for the protection of vertebrate animals used for experimental and scientific purposes”<sup>[9]</sup>.

## RESULTS AND DISCUSSIONS:

After the application for experimental animals application of 10 % sodium hydroxide solution on the second day of the experiment in its place were developed a large swelling, redness, abundant plaque on the lower incisors of rats.

System response of the body was accompanied by significant increase in the total number of leukocytes,

neutrophils, eosinophils and monocytes in the background to reduce the number of lymphocytes in comparison with the original data. These changes confirm the development of inflammation in the oral mucosa of experimental animals.

On the background of the dental gel “Dentavir-phyto” and comparison drug dental gel “Kamident-Zdorovje”, starting from the 3-rd day, there was a decrease of intensity of inflammation of the oral mucosa of rats, which was characterized by a decrease in edema and hyperemia.

Since the 4-th day in the control group of pathology animals observed a gradual decrease in the inflammatory process, but complete recovery of animals by the end of observation was not occurred.

Throughout the experimental period, significant changes in the body weight of all experimental animals were not detected (Table 1).

Hematological changes under the influence of the investigated dental gel were accompanied by a significant decrease in the total number of leukocytes, neutrophils, eosinophils and monocytes and by a significant increase in the level of lymphocytes that characterizes the expressive properties of reparative dental gel “Dentavir-phyto” (Table 2).

Comparator dental gel “Kamident-Zdorovje” also showed a marked therapeutic effect in experimental models of stomatitis, which was characterized by a significant decrease in the number of leukocytes, neutrophils, eosinophils, and monocytes and by a significant increase in the level of lymphocytes.

Comparative analysis of the pharmacological activity of the investigated dental gel and comparison drug showed that exposure of dental gel “Dentavir-phyto” complete healing of the oral mucosa of experimental animals on the 9-th day of the experiment, and in the group of animals treated with dental gel “Kamident-Zdorovje” – on the 7-th day of the experiment.

These data suggest that in experimental model of stomatitis caused by 10 % sodium hydroxide solution, dental gel “Dentavir-phyto” is pronounced therapeutic effect with expression almost equal comparison drug dental gel “Kamident-Zdorovje”.

Thus, the investigated dental gel is promising for use as a medicine for the treatment of inflammatory diseases of the oral cavity. And because of its natural plant origin, it can also be a drug of choice for the local treatment of stomatitis in children and at the need for long-term treatment.

**Table 1: Evolution of the body weight of rats under the influence of dental gel “Dentavir-phyto”, (n = 6)**

Index	Research term	Intact control	Control pathology	Gel “Dentavir-phyto”	Gel “Kamident-Zdorovje”
Body weight, g	Baseline data	271±3,10	253±6,7	270±3,70	238±4,8
	14-th day	302±3,10	288±7,5	306±2,50	275±4,1

**Table 2: Dynamics of hematological parameters in rats on the model of experimental stomatitis caused by 10 % sodium hydroxide solution, (n = 6)**

Index	Research term	Intact control	Control pathology	Gel "Dentavir-phyto"	Gel "Kamident-Zdorovje"
<b>Leucocytes, 10<sup>9</sup>/l</b>	Baseline data	5,7±0,5**	5,6±0,1	5,8±0,1	5,4±0,1
	3-rd day	5,6±0,1	8,7±0,2**/#	7,7±0,2**/**/#	7,3±0,2**/**/#
	7-th day	5,8±0,1	7,3±0,1**/#	6,7±0,2**/**/#	6,5±0,2**/**/#
<b>Dynamics of leukocyte formula</b>					
<b>Neutrophils, %</b>	Baseline data	18,33±0,35	18,0±0,26	17,33±0,34	17,83±0,31
	3-rd day	18,84±0,40	32,16±0,31**/#	27,5±0,42**/**/#	27,0±0,36**/**/#
	7-th day	17,33±0,34	23,0±0,37**/#	20,16±0,31**/**/#	19,83±0,43**/**/#
<b>Eosinophils, %</b>	Baseline data	3,33±0,21	3,67±0,21	3,5±0,22	3,5±0,22
	3-rd day	3,32±0,21	3,66±0,21*	2,5±0,34*/#	2,7±0,33*/#
	7-th day	2,67±0,21	3,5±0,22**/**	2,0±0,25**/**/#	2,3±0,31*/#
<b>Basophils, %</b>	Baseline data	1,0±0,0	0,0±0	1,0±0,0	1,0±0,0
	3-rd day	0±0	2,66±0,21**/#	0,0±0,0*	1,2±0,16**/**
	7-th day	0±0	1,0±0	0,0±0,0	1,0±0,0
<b>Lymphocytes, %</b>	Baseline data	74,3±0,33	73,83±0,40	75,4±0,34	73,5±0,50
	3-rd day	75,0±0,36	57,66±0,42**/#	66,6±0,66**/**/#	65,8±0,47**/**/#
	7-th day	75,5±0,34	69,0±0,36**/#	75,0±0,25*	73,83±0,90*
<b>Monocytes, %</b>	Baseline data	3,66±0,21	4,5±0,22	3,67±0,21	4,16±0,30
	3-rd day	3,67±0,21	3,8±0,30	3,2±0,31	3,33±0,21#
	7-th day	4,5±0,22	3,5±0,22**/**	2,8±0,30**/**	3,00±0,25**/**

Note: \* - the index is significantly relative to the control group pathology, p≤0.05;

\*\* - the index is significantly relative to intact control group, p≤0.05;

# - rejection rate is significantly with respect to the initial data, p≤0.05.

## CONCLUSION:

1. The study of the pharmacological activity of the dental gel codenamed "Dentavir-phyto" for reparative effect in oral wound damage in rats was conducted.
2. It is established that the investigative drug has a strong reparative action with an expression almost equal comparator drug.
3. It is shown that the gel "Dentavir-phyto" may be the drug of choice in the local treatment of stomatitis in children and at the need for long-term treatment.

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