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Development Of Moderate Composition Of Complex Phytopards Based On Medicinal Plant Raw Materials

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Abstract. This article presents the results of research on the development of hemostat liquid extract and chlorhexidine bigluconate preservative, complex, anti-inflammatory and hemostatic properties of herbal extracts based on local plant raw materials. In particular, the necessary polymer auxiliary substance for the formation of phytoscreens was selected based on experiments, and its moderate concentration of plasticizer glycerin in the polymer mass was justified. Experiments were performed using one of the mathematical planning methods (Latin 3x3 square).

Key words: medicinal plants, hemostat liquid extract, chlorhexidine bigluconate, sodium carboxymethylcellulose, plasticizer glycerin.

Introduction. The use of medicinal herbs as medicine is one of the most ancient directions, the history of which begins with the formation of man. The peoples of ancient Greece, China, Arabia, Central Asia and Western Europe used medicinal plants instead of medicine. Development of medicinal products using medicinal plants, study of their pharmacological properties, and application of effective, harmless drug forms to medical practice is one of the important tasks, and a number of studies are being conducted in this direction [1-4].

Nowadays, the demand for modern medicines based on medicinal plant raw materials is increasing. Application of convenient forms of drugs, especially in the field of dentistry, is one of the urgent issues of today. One of the promising directions for the development of modern therapy for the treatment and prevention of early caries is the search for drugs that ensure the uniform release of bioactive substances and provide the necessary therapeutic concentration of drugs with gradual absorption. Depending on the method of use of the drug form - as a drug form, the field of application has been expanded, they are intended for use in dermatology, eye and oral cavity. Currently, the creation of active substances in the form of medicinal veils is one of the urgent issues of modern pharmaceutical technology. The effectiveness of the use of medicinal substances in the form of polymer curtains is confirmed by the results of a number of studies [5-6].

Synthetic antibacterial drugs are mainly used for the treatment of oral cavity diseases. However, in recent years, the interest of dentists in their use has decreased sharply, for example, this is a significant decrease in immunity, digestive function disorders both local and general, the development of dysbacteriosis, allergic reactions and other diseases. In this regard, herbal preparations are preferred in the treatment of dental diseases. Phytopreparations contain complex biologically active substances and have a number of advantages: good tolerance, safety, high efficiency, and are explained by the fact that they show a wide range of therapeutic effects. In recent years, a lot of attention has been paid to the technology of phytopreparations, a modern drug form based on phytopreparations [7,10,11, 12].

Based on this, it can be concluded that the development of the technology of polymer curtains, i.e. phytocurtains, based on extractive preparations from plants is one of the urgent issues.

It has been confirmed that the liquid extract of "Hemostat" obtained on the basis of local raw materials has a hemostatic, anti-inflammatory, capillary strengthening effect [4]. Chlorhexidine bigluconate can be mentioned among medicinal substances with various antiseptic and antimicrobial effects that are widely used

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in dental practice. Taking into account the multifaceted pharmacological properties of "Hemostat" liquid extract, the urgency of developing the technology of complex dental phytoplankton together with chlorhexidine bigluconate was justified.

The purpose of the research is to develop a moderate composition of herbal preparations containing "Hemostat" liquid extract and chlorhexidine bigluconate based on local medicinal plant raw materials.

Materials and methods: in the experiments "Hemostat" liquid extract (FS 42-Uz-1249-2016) and meeting the requirements of the European Pharmacopoeia (European Pharmacopoeia 8thEdition): methylcellulose (MTs) [01/2014:0345], polyvinylpyrrolidone (PVP) [07 /2011:0685).] sodium-carboxymethylcellulose (Na-KMTs)-European Pharmacopoeia 3rd Edition – 1997:0472.- P.547-548, film-forming polymers such as gelatin [SPh X., 331], and glycerin as a plasticizer - FSP 42 Uz-29399767-2020 was used.

In the assessment of the quality of phytopards obtained during the study, the RF State Pharmacopoeia [8]. (14th edition of 2018 PPA 1.4.1.0035.18), State Pharmacopoeia of the Republic of Uzbekistan [9]. and the methods presented in the literature were used: appearance, pH index (using the potentiometric method), melting time [13-16].

The first step in the development of the technology of phytoscreens is to justify the concentration of active components in the polymer mass. Therefore, in order to justify the amount of "Hemostat" liquid extract and chlorhexidine bigluconate contained in phytoscreens, model polymer masses were prepared.

In the researches, the amount of "Hemostat" liquid extract is in the range of 5-7.5%, the concentration of chlorhexidine bigluconate is in the range of 0.02-0.04%, and the parameters of the formed phytoplankton were studied.

Based on the results of determining the physical and mechanical parameters of phytopards made from studied model polymer masses and the recommendations of pharmacologists, the amount of "Hemostat" liquid extract and 0.02% of chlorhexidine in the polymer mass was set as moderate for obtaining phytopards. One of the important issues in the creation of phytoscreen technology is the choice of an auxiliary polymer that forms a moderate screen.

For this purpose, various film-forming polymers: methylcellulose (MTs), sodium-carboxymethylcellulose (sodium-KMTs), polyvinylpyrrolidone (PVP), polyvinyl alcohol (PVS), gelatin were studied. The studied compositions are presented in Table 1

Table-1

The studied compositions of hemostat liquid extract and chlorhexidine bigluconate-preserving model polymer masses based on different polymers

Components, g	The amount of components per 100 g of curtain mass, g				
	content 1	content 2	content 3	content 4	content 5
"Hemostat" liquid extract	5,0	5,0	5,0	5,0	5,0
Chlorhexidine bigluconate	0,02	0,02	0,02	0,02	0,02
sodium-KMTs	2,0				
MTs		2,0			
Gelatin			10,0		
PVS				10,0	
PVP					10,0
Glycerin	2,0	2,0	2,0	2,0	2,0
Purified water	up to 100	up to 100	up to 100	up to 100	up to 100

Polymeric membranes were obtained by the melting method known in the literature. For this, when obtaining model polymer masses, a solution of the appropriate polymer is first taken, then chlorhexidine bigluconate dissolved in water, "Hemostat" liquid extract and plasticizer glycerin are added to it. The resulting polymer mass is homogenized for 25-30 minutes using a MM3M magnetic mixer. Ready polymer masses are poured into special molds and dried at 30℃.

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Physico-mechanical parameters of the formed phytoplanks were studied. In this case, the appearance of polymer curtains, melting time, migration from molds, average weight, pH indicator were determined using MH and methods presented in the literature. The obtained results are presented in Table 2.

According to the results of the experiment, it was found that the indicators of the dental curtains obtained from the studied polymers are different. The best results in terms of appearance were observed in phytoscreens obtained from sodium-KMTs and PVS-based polymers. Only PVP and PVS curtains showed negative results regarding mold release properties.

Table 2

The results of determining the physical and mechanical parameters of phytoscreens prepared on the basis of liquid extract of "Hemostat" in different polymers

Learned indicators	Contents				
	1	2	3	4	5
External appearance	Curtains are elastic, smooth, pale yellow	Curtains are elastic, smooth, pale yellow, deformable met	Curtains are fragile, smooth, brown in color	Curtains are elastic, smooth, pale yellow	Veins are very fragile, fragile, pale yellow
The feature of moving out of the mold	The curtains came off the mold easily	The curtains came off the mold easily	The curtains came off the mold easily	Curtains were difficult to move from the mold	It is difficult to remove the curtains from the mold
Average weight, g	0,283	0,390	1,25	1,45	1,05
Melting time, minutes	22	40	14	5	10
pH indicator	6,5	5,75	4,7	6,09	4,82

But positive results in terms of elasticity and uniformity were observed in phytoscreens obtained using sodium-KMTs polymer. Based on the obtained experimental results, sodium-KMTs were selected as a moderate polymer for the formation of phytoscreens.

At the next stage of research, it was based on the moderate concentration of sodium-KMTs and plasticizer glycerin in the polymer mass forming phytoscreens.

To achieve the goal, the experiments were performed according to the mathematical planning method, that is, the 3x3 derivative square plan [16]. The following factors were studied: factor A - Na-KMTs polymer concentration;

Factor V is the concentration of glycerol in the polymer mass.

The levels of the studied factors are presented in Table 3.

During the experiments, polymer masses containing different concentrations of sodium-KMTs and glycerol were prepared by the method described above. The following quality indicators of the formed phytoscreens were studied as moderation parameters: the ability to move from the mold - Y_1; melting time - Y_2; pN indicator Y_3;

The ability of phytopards to move from the mold was evaluated in a 3-point system: 1 point - phytopards that moved from the mold with difficulty or did not move at all; 2 points - curtains moved from the mold; 3. Phytoparadises are very easily transferred from the mold.

Table 3

The investigated concentrations of polymer and plasticizer in the polymer mass forming the dental phytopard containing "Hemostat" liquid extract and chlorhexidine bigluconate.

factor	factor levels

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A – polymer concentration of Na-KMTs	a_1 – 1 %; a_2 - 2,0%; a_3 - 2,5%
B- plasticizer glycerin concentration	b_1-1%; b_2-2% b_3-3%

Table 4 shows the planning matrix of the parallel experiments and the results of determining phytoplankton indicators.

Table-4

Planning matrix and moderation parameters of experiments on the basis of moderate concentration of polymer and plasticizer in phytoplankton

The number of experiments	Factors studied		Indicators and results studied		
	A	B	Y_3- the ability to move from the mold	Y_2– dissolution time, minutes	Y_1–pH indicator
1	a_1	b_1	0	20	5,54
2	a_1	b_2	0	25	5,85
3	a_1	b_3	0	30	5,71
4	a_2	b_1	2	35	6,05
5	a_2	b_2	3	39	6,03
6	a_2	b_3	3	44	6,03
7	a_3	b_1	2	53	6,07
8	a_3	b_2	2	65	6,1
9	a_3	b_3	3	75	6,07

In order to have clear conclusions about the results of the experiment, the moderation indicators (Y_1,Y_2,Y_3) were combined into one general indicator. For this, the generalized propensity function was used, and with the help of this function, the quality indicators of phytoplankton were transferred to the propensity function indicators. A special propensity scale was created according to the obtained indicators.

Figure 1 shows the propensity scale and generalized propensity function of parameters such as mold migration ability (Y_1), dissolution time (Y_2) and pH index (Y_3) of "Hemostat" liquid extract and chlorhexidine bigluconate preserving phytopars.

According to the experimental results, the Y_1, Y_2, Y_3 parameters were transferred to the generalized propensity function - D according to the following equation:

$$D = \sqrt[3]{d_1 \cdot d_2 \cdot d_3}$$

The results of the experiment are presented in Table 5. According to the statistical analysis of the obtained results, a range of moderate compatibility of the studied factors was determined. The order of moderate compatibility with respect to polymer concentration (factor A) was a2 > a3 > a1. The order of compatibility in terms of glycerol concentration (B factor) was as follows: b2>b1>b3.

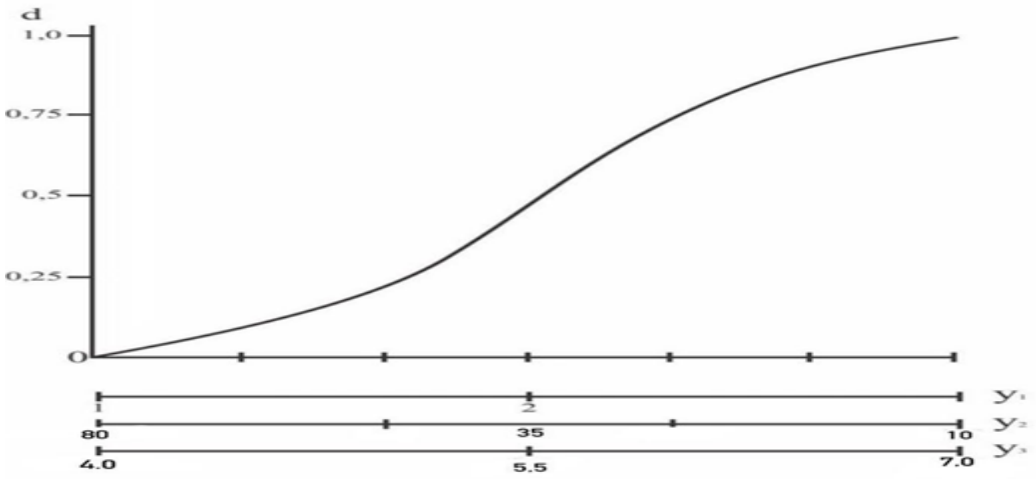

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Figure 1. Propensity function of moderation parameters such as mold migration ability (Y_1), melting time (Y_2) and pH index (Y_3) of "Hemostat" liquid extract and chlorhexidine bigluconate preserving phytofilms

Table 5

Values of phytoscreens prepared on the basis of "Hemostat" liquid extract and chlorhexidine transferred to the propensity function

The number of experience	Indicators of the propensity function			$D = \sqrt[3]{d_1 \cdot d_2 \cdot d_3}$ general indicators of the propensity function
	d_1	d_2	d_3	
1	0	0,808	0,458	0
2	0	0,725	0,299	0
3	0	0,608	0,342	0
4	0,5	0,5	0,767	0,5769
5	1	0,367	0,758	0,6526
6	1	0,258	0,758	0,5799
7	0,5	0,142	0,775	0,3803
8	0,5	0,075	0,799	0,3104
9	1	0,016	0,775	0,2315

Based on the above results, it was determined that the moderate concentration of sodium-KMTs in the polymer mass is 2,0%, and the plasticizer (glycerin) is 2% for the development of the technology of dental phytopards containing the liquid extract of "Hemostat" and chlorhexidine.

Conclusions. According to the experimental results, a suitable polymer "moderate film forming" was selected for obtaining dental phytoscreens containing liquid extract of "Hemostat" and chlorhexidine. Moderate concentration of selected polymer-sodium-KMTs and plasticizer glycerol in the polymer mass was based. In this case, the experiments were performed on the basis of the mathematical planning method - the Latin 3x3 square matrix. The obtained results showed that the concentration of 2.0% sodium-KMTs and 2.0% glycerol was chosen as moderate in the polymer mass.

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