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Research Article

SELECTION OF THE COMPOSITION AND DEVELOPMENT OF TECHNOLOGY OF MEDICAL-COSMETIC LOTION BASED ON PLANT EXTRACT

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ABSTRACT

The article presents the results of research on the selection of the composition and development of technology for a therapeutic and cosmetic lotion based on the plant polyextract "Phytoinflam", intended for the prevention and treatment of acne. Lotion samples have been developed that differ in the type and concentration of the preservative, moisturizer and dispersion medium. The obtained samples were analyzed in accordance with the requirements of GOST 31679-2012 "Liquid cosmetic products. General technical conditions". Based on the results of the analysis, the optimal composition of the therapeutic and cosmetic lotion was selected for further research. In order to improve consumer properties, it is proposed to introduce fragrances - essential oil of cloves into the composition of the lotion. The choice of this oil is made on the basis of studies confirming its antibacterial, anti-inflammatory and antioxidant properties. A technology for obtaining a therapeutic and cosmetic product based on the proposed composition is proposed.

KEYWORDS

Medical cosmetics, lotion, dry extract, technology, composition, preservatives.

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INTRODUCTION

One of the fundamental modern directions in the technology of production of medical and cosmetic products is the introduction of biologically active substances or their complexes into their composition, which have various therapeutic properties: anti-inflammatory, antioxidant, wound healing, regenerating, photoprotective, etc. These complexes in most cases are represented by water, alcohol-water extracts from medicinal plant materials in the form of extracts in various aggregate states, juices, infusions and decoctions [1-4].

According to the results of comprehensive studies, complexes of biologically active substances of plant origin are practically non-toxic, and their physiological activity is close to that of natural substances of internal metabolism [5].

Considering the foregoing, the purpose of this research was to select the composition and develop a technology for a medical and cosmetic lotion based on a plant polyextract.

Materials and methods

As a substance in the selection of the composition and development of the technology of the lotion, the dry polyextract "Phytoinflam" was chosen, obtained by the staff of the Department of Technology of Dosage Forms of the Tashkent Pharmaceutical Institute from the bark of the common oak (Quercus robur L.) flowers of chamomile (Chamomilla recutita L.) and grass of a series of tripartite (Bidens tripartita L.). The results of preclinical studies confirmed the pronounced anti-inflammatory and wound healing activity of the selected polyextract. The extract was obtained by circulation extraction with the successive use of two extractants: purified water and ethyl alcohol. Purification of the obtained extract from ballast substances was carried out by adding activated carbon, followed by filtration [6,7].

As is known, in addition to the main complex of biologically active substances, when selecting the composition of a cosmeceutical agent, it is necessary to introduce auxiliary substances, such as acidity regulators, preservatives, flavoring agents, etc. For this purpose, we used the following excipients: glycerin, urea, salicylic acid, boric acid, sodium tetraborate, citric acid, aluminum alum, essential oils of clove, lavender and rose, ethyl alcohol of various concentrations, etc.

Taking into account the literature data, as well as the proposal of pharmacologists, the plant polyextract "Phytoinflam" was included in the composition of the lotion at a concentration of 10%.

The lotion test samples were analyzed according to [8]: the appearance and color were determined visually, the smell was determined from the surface of the medical and cosmetic product, the volume fraction of ethanol was determined by gas chromatography, and the pH value of the samples was determined potentiometrically.

Results and discussion

At the initial stage of research, the compatibility of the components of the lotion was tested. It was found that aluminum alum caused the precipitation of tannins present in the composition of the dry polyextract: as a result, this substance was not used in the selection of the composition of the medical and cosmetic lotion. The remaining excipients were compatible with the active substance and with each other.

We have prepared lotions with more than 10 compositions, differing in compositions of excipients. Table 1 shows the compositions of 7 prototypes, which in appearance met the requirements of regulatory documentation [8].

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Table 1

Compositions of prototypes of cosmeceutical lotion based on dry polyextract "Phytoinflam"

Name of ingredients	KL-1	KL -2	KL -3	KL -4	KL -5	KL -6	KL -7
Dry polyextract "Phytoinflam"	10,0	10,0	10,0	10,0	10,0	10,0	10,0
Glycerol	5,0	5,0		6,0	6,0		8,0
Urea			2,0			1,5	
Salicylic acid				0,5	1,0		
Lemon acid	0,1					0,1	
Benzoic acid		0,3	0,5				0,3
Boric acid	0,5	0,2				0,2	
Sodium tetraborate					1,0		0,5
Ethyl alcohol 96%	20,0	40,0	35,0	25,0	30,0	30,0	25,0
Purified water	before 100,0	before 100,0	before 100,0	before 100,0	before 100,0	before 100,0	before 100,0

Lotions obtained according to the sample data were analyzed according to GOST 31679-2012 "Liquid cosmetic products. General technical conditions" according to the following indicators: appearance, color, smell, volume fraction of ethyl alcohol, pH value. The data obtained are shown in table 2.

All analyzed samples of the lotion were homogeneous single-phase liquids without foreign impurities, from light brown to brown with a reddish tint. Despite the fact that the urea substance itself is odorless, the lotion samples according to the compositions KL-3 and KL-4, containing this moisturizer in their composition, had a slight smell of ammonia. This fact served as the basis for excluding these compounds from further studies. Lotions for the rest of the compositions had a woody smell, characteristic of the smell of the plant polyextract "Phytoinflam".

Table 2

The results of the analysis of prototypes of medical and cosmetic lotion

Lotion samples	Определяемые показатели				
	appearance	Colour	smell	volume. share of ethanol, %	pH
KL-1	homogeneous single-phase liquid without foreign impurities	brown with a reddish tint characteristic of the color of the plant polyextract, which is part of the lotion	woody smell characteristic of the smell of vegetable polyextract	25,16	4,52

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KL-2	homogeneous single-phase liquid without foreign impurities	Brown with a brownish tint, characteristic of the color of the vegetable polyextract, which is part of the lotion	woody smell characteristic of the smell of vegetable polyextract	52,90	4,10
KL -3	homogeneous single-phase liquid without foreign impurities	light brown color, characteristic of the color of the vegetable polyextract, which is part of the lotion	woody smell characteristic of the smell of vegetable polyextract and a slight smell of ammonia	46,34	6,91
KL -4	homogeneous single-phase liquid without foreign impurities	brown color characteristic of the color of the vegetable polyextract, which is part of the lotion	woody smell characteristic of the smell of vegetable polyextract	33,61	3,88
KL -5	homogeneous single-phase liquid without foreign impurities	brown with a reddish tint, characteristic of the color of the plant polyextract, which is part of the lotion	woody smell characteristic of the smell of vegetable polyextract	41,28	5,03
KL -6	homogeneous single-phase liquid without foreign impurities	light brown color, characteristic of the color of the vegetable polyextract, which is part of the lotion	woody smell characteristic of the smell of vegetable polyextract and a slight smell of ammonia	40,09	7,11
KL -7	homogeneous single-phase liquid without foreign impurities	brown color with a reddish tint, characteristic of the color of the vegetable polyextract, which is part of the lotion	woody smell characteristic of the smell of vegetable polyextract	32,40	6,82

One of the main indicators of the quality of medical and cosmetic products is the volume fraction of ethyl alcohol. Despite the fact that for all prototypes this indicator was within the regulated limits, it was decided to exclude the compositions KL-1 and KL-2. Since it is highly likely that a low proportion of ethanol will cause an insufficient therapeutic effect (composition KL-1; 25.16%), and an increased content will cause excessive drying of the skin, as a result, its peeling and loss of elasticity (composition KL-2; 52, 90%).

Since the developed medical and cosmetic product is intended for the treatment of acne, and this disease is more often manifested in oily skin types, it is necessary that the pH of the lotion be slightly acidic. This explains the choice of organic acids as preservatives. According to [8], the pH value for lotions is regulated in the range of 1.2-8.5. All analyzed prototypes of medical and cosmetic products meet the requirements for this indicator. However, the lotion being developed is intended for the treatment of acne and will be used for oily skin, therefore, for the manifestation of the maximum therapeutic effect, its pH should be slightly

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acidic. Those. compositions KL-3, KL-6 and KL-7, having a practically neutral and slightly alkaline reaction, are not suitable for this type of lotion. According to the composition of KL-4, the prototype had an acidic pH value: as a result, it was also excluded from further studies.

Based on the results of the analysis, we decided to select the composition of KL-5 for further research. In addition to the main BAS complex in the form of the Phytoinflam polyextract, this composition includes ethyl alcohol, glycerin, salicylic acid and sodium tetraborate.

Ethyl alcohol is a necessary component in the composition of lotions, since it has an astringent, antiseptic effect. Also, due to its presence, moderate degreasing of the skin occurs, which is necessary in the treatment of acne [2].

Glycerin, having increased hygroscopicity, acts as a moisturizer and emollient. It prevents the loss of moisture and excessive drying of the skin as a result of the use of medical and cosmetic products, and also promotes its regeneration [2].

Sodium tetraborate has a moderate preservative and rather pronounced antiseptic property. In addition, researchers note its ability to cleanse the skin, and thanks to these properties, this component is widely used in medical and cosmetic products for the treatment of acne.

In the composition we offer, salicylic acid at a concentration of 1.0% is used as the main preservative. This content was used on the basis of a study of literature data, which shows the allowable rate from 0.5 to 1%. It was decided to consider the possibility of reducing the concentration of the preservative. For this purpose, lotions were prepared according to the composition of KL-5 with salicylic acid content of 0.5%, 0.7% and 1%.

However, an analysis of the microbiological purity of the prepared lotion showed that when the content of salicylic acid at a concentration of 0.5% - after 1 month, and at a content of 0.7% - after 2 months, an excess of the content of microorganisms relative to the norms given in the regulatory documentation was observed. Thus, it was found that 1% salicylic acid content is optimal for this lotion.

In order to improve the consumer properties of the developed medical and cosmetic lotion, clove essential oil was added in the amount of 2 drops per 100 g of finished product. As is known today, various oils can be used as fragrances: rose, jasmine, chamomile, geranium, lavender, mimosa, frankincense, fir, lemon, mint, rosemary, etc. The choice of this particular oil is explained by the fact that 2000 years ago in China, clove oil was used for toothaches as an analgesic and anti-inflammatory agent. It also has antimicrobial and strong antibacterial properties. According to studies, this oil controls the development of many bacteria, incl. Staphyloccocus aureus (Staphylococcus aureus), which provokes the appearance and development of acne. The antioxidant properties of cloves should also be noted: 290,283 units on the ORAC scale, which is 30 times more than that of blueberries [9,10].

The technological scheme for the preparation of a medical and cosmetic lotion based on the dry polyextract "Phytoinflam" is shown in fig. 1.

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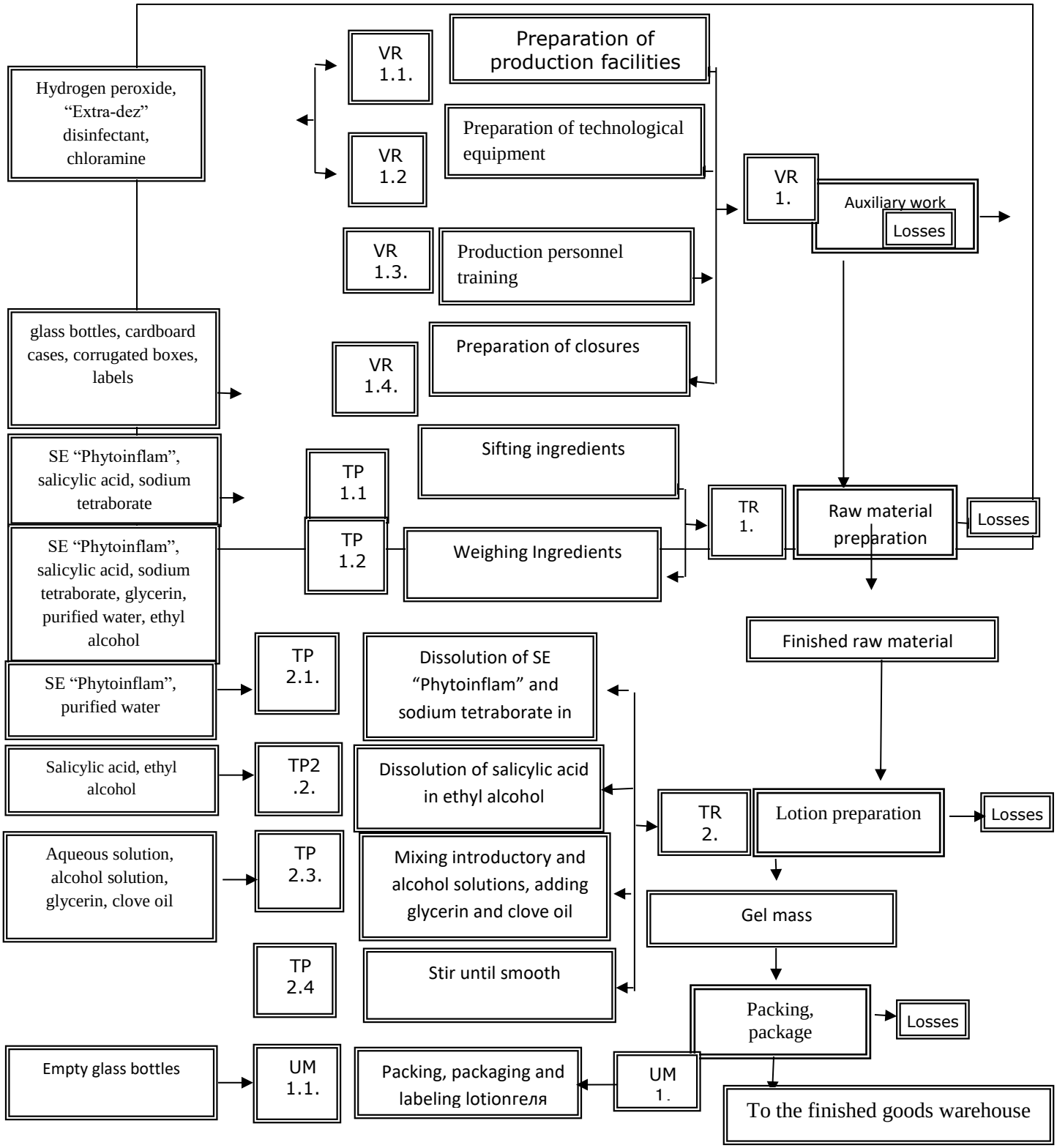

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Fig.1. Technological scheme for the preparation of medical and cosmetic lotion

CONCLUSION

1. The composition was selected and the technology for obtaining a medical and cosmetic lotion based on the dry polyextract "Phytoinflam" was developed. The content of the preservative - salicylic acid and the introduction of clove oil as a fragrance have been scientifically substantiated.
2. The resulting lotion in terms of quality met the requirements of GOST 31679-2012 "Liquid cosmetic products. General technical conditions".

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