ТЕХНОЛОГІЯ ЛІКАРСЬКИХ ПРЕПАРАТІВ

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DEVELOPMENT OF THE COMPOSITION AND TECHNOLOGY OF SUPPOSITORIES WITH BEE-BREAD

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The experimental data concerning development of the composition and technology of a medicine for treating the urinary tract in men are given. The results obtained have shown the significance of directed action of suppositories with bee-bread, and it allows to consider them to be a promising dosage form for medical practice.

The appearance of genital disorders and reproductive function in men depends on the high pace of life, increasing level of the nervous tension, increase of pollution by industrial waste and toxic chemicals, increased background radiation, limited physical movement, abuse on medications, alcohol, tobacco and others [1, 4, 10].

With development of the pharmaceutical industry in Ukraine, the share of medicines from natural products is a small market part although prospects for their application make it possible to create new drugs being original in the chemical structure and pharmacological action. That is why under the supervision of academician of the Ukrainian Academy of Sciences, Doctor of Pharmacy, professor O.I.Tikhonov the work over development of medicines based on bee products is conducted [3, 4, 11].

Bee-bread, which is unique in its biological activity, is a pollen collected by working honeybees, mixed with honey and secretions of insects maxillary glands and fermented in cell honeycomb. Bee-bread plays an important role in the life of bees. It is necessary for development of normal physiological processes and is an indispensable source of aminoacids and vitamins, carbohydrates, minerals, phytohormones, natural antibiotics. Bee-bread shows a significant number of medicinal properties such as antioxidant, antitumor, genitourinary, anti-inflammatory and hepatoprotective actions [5, 13].

In most cases medicinal substances introduced into the form of suppositories enter the bloodstream faster than with subcutaneous injection, and exhibit the therapeutic effect in smaller doses. The perspectiveness of this dosage form becomes more apparent when considering that some medicinal substances taken internally are inactivated by gastric juices and injure the gastrointestinal tract [6, 7].

Therefore, the aim of our work is to develop the composition and technology of suppositories with bee-bread. The use of rectal dosage forms also allows to reduce the level of allergic reactions and prolongs the therapeutic effect, especially in the site of inflammation, increases the rate of absorption of the drug [2, 3].

Experimental part

In the process of development of the optimal composition of suppositories the main attention is paid to the study of such pharmaceutical factors as the base nature and the effect of excipients on the drug therapeutic efficacy [1, 2].

The main conditions of the activity of medicinal substances are their release from the dosage form, absorption through biological membranes and transport to the site of effect with the blood, lymph. It depends mainly on the physical and chemical properties of active substances. Therefore, special attention is drawn to the solubility properties of bee-bread (Tab. 1).

It is known that the suppository dosage forms are compositions consisting of medicinal substances, evenly distributed in the base, which is their carrier. Analysis of literature sources concerning the pharmacy practice indicates the use of more than 100 bases for suppositories [2-5].

Thus, the purpose of the research was to study the structural and mechanical properties of hydrophobic and hydrophilic bases prepared by classical methods for the further substantiation of the optimal composition for suppositories (Tab. 2).

As the main components of suppositories on lipophilic bases hydrogenated fat (TC 18-17/22-77), solid

Table 1

Solubility of bee-bread

Solvents	Amount of the solvent (ml) required for dissolving of 1.0 g of bee-bread	
	at 20°C	at 50°C
Purified water	1:15000	1:12000
Glycerol	1:9	1:5
Dimethylsulfoxide	1:8	1:4
Propylene glycol	1:18	1:9
Macrogol-400	1:27	1:15
Ethyl alcohol	1:30	1:20

Table 2

Composition of suppository bases

Components	Number of components in the base, %											
	№1	№2	№3	№4	№5	№6	№7	№8	№9	№10	№11	№12
Hydrogenated fat		95						90	95	90	95	90
Paraffin							5	5		5		5
Emulsion wax						5				5	5	
Distilled monoglyceride						5		5	5			
Beeswax		5	5									
Macrogol-1500				95	90							
Macrogol-400				5	10							
Solid fat	5		95			90	95					
Witepsol H_{32}	95											5

confectionery fat based on plasticized hydrogenated fat (MSPh 42-1117-86) and witepsol H_{32} (MSPh 42U-36-743-98) were used. To prepare hydrophilic bases the mixture of macrogol-1500 and macrogol-400 in the ratio of 5:95 was used.

All carriers were obtained by casting methods. The time of full deformation and dissolution (for hydrophilic suppositories) meets the SPhU requirements. According to the results of the substance solubility bee-bread was introduced into the dosage form as a powder and by the type of suspension with dimethylsulfoxide [2-9].

Results and Discussion

The choice of auxiliary substances has practical importance for the pharmacotherapeutic action, including a base, which must meet specific requirements such as to be sufficiently solid at the room temperature and melt at the temperature not higher than 37°C; be chemically and pharmacologically indifferent; must not possess the irritant effect and must not change under the influence of external factors (light, heat, moisture, oxygen of the air, microorganisms); create an appropriate form and must not interact with other substances in the mixture; readily release medicinal substances and promote the therapeutic effect; must have appropriate rheological parameters and optimal structural and mechanical properties [2].

Carries of dosage forms must meet a number of reasonable requirements. Therefore, when preparing medicinal substances for rectal introduction it is necessary to do individual selection of the base that will provide not only the comfort application, but the bioavailability of substances as well.

That is why for preparation of suppositories we have used the bases of two types: those that melt in the rectum – hydrophobic (witepsol H_{32}, hydrogenated fat, solid fat), and soluble in mucus – hydrophilic (macrogol-400 and macrogol-1500) [1-7].

According to preliminary investigations on solubility bee-bread is a hygroscopic substance related to hydrophobic substances and stipulates the choice of a hydrophobic base for suppositories. It has been found in the experiment that macrogol used in samples №4, 5, is not combined with the active substance of suppositories and causes its sedimentation. It is also known that macrogol has a high osmotic pressure and may cause dehydration and irritation of the mucous membranes.

Samples №1-7 and 10, 11 haven't passed the test for homogeneity due to the presence of visible particulate matter, uneven color and the absence of a solid consistency at the room temperature; it leads to disruption of uniformity of dosing and distribution of active ingredients in the dosage form.

Thus, among the used compositions of suppository bases obtained by the casting method samples №8, 9 and 12 have been chosen for further study. They have hydrogenated fat and witepsol H_{32} as a base.

The experimental research conducted has substituated the optimal choice of the base for suppositories with bee-bread for further study of the rheological properties of the given dosage form.

CONCLUSIONS

1. Preliminary studies on the bee-bread solubility have shown that the active substance is hygroscopic and is related to hydrophobic substances.

2. The study on the choice of the base for suppositories with bee-bread for optimum uniformity of dosing and distribution of active ingredients in the dosage form has been conducted.

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РАЗРАБОТКА СОСТАВА И ТЕХНОЛОГИИ СУППОЗИТОРИЕВ С ПЕРГОЙ

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Приведены экспериментальные данные по разработке состава и технологии лекарственного препарата для лечения мочеполовой системы у мужчин. Полученные результаты показали отчетливость направленного действия суппозиториев с пергой, что позволяет считать их перспективной лекарственной формой в медицинской практике.

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РОЗРОБКА СКЛАДУ ТА ТЕХНОЛОГІЇ СУПОЗИТОРІЇВ З ПЕРГОЮ

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Наведені експериментальні дані щодо розробки складу та технології лікарського препарату для лікування сечостатевої системи у чоловіків. Отримані результати показали виразність направленої дії супозиторіїв з пергою, що дозволяє вважати їх перспективною лікарською формою в медичній практиці.