Original Article

Development of Technology for Obtaining Dry Extract "LEFOSED"

M.T. Matazimov[1], Z.E. Sidametova[2], N.K. Olimov[3]

[1]Teacher, Andijan State Medical Institute.

[2]Teacher, Tashkent Pharmaceutical Institute.

[3]Teacher, Tashkent Pharmaceutical Institute.

Abstract

For the first time, a technology for obtaining a dry extract of "Lefosed" with sedative activity and meeting the requirements of GF XI from a 4-component collection has been developed. The extraction method was chosen, as well as optimal conditions allowing depleting the raw materials as much as possible and enriching the extract with a complex of biologically active compounds contained in the feedstock. The technological characteristics of the dry extract have been studied and determined, with the aim of its further use as a raw material for the production of finished dosage forms.

Keywords: Sedative Collection, "Lefosed", Dry Extract, Technology, Extraction, Preparation.

DOI: 10.47750/pnr.2022.13.S08.253

INTRODUCTION

Recently, research aimed at expanding the assortment of drugs from medicinal plant raw materials has been relevant. Pharmaceutical practice largely needs to expand the nomenclature of raw materials of plant origin, especially since not all medicinal plants are used in practical medicine. The introduction of modern medicines to the market is possible due to the use of alternative sources of medicinal raw materials - plants that have a similar chemical composition and are systematically close to pharmacopoeia [1].

The creation of effective and safe medicines is possible only with the use of standard technologies, as well as modern standardization techniques that ensure quality control of finished medicines. Standardization methods should simultaneously meet several criteria, namely: unification and harmonization, at all stages of production from medicinal plant raw materials to the finished drug, which corresponds to the system of "end-to-end standardization" [2,6,7]. In order to expand the range of sedatives, we have developed the composition of the plant collection “Lefosed”, consisting of local medicinal plants: containing a fairly rich complex of biologically active substances. Among which there are flavonoids. Currently, a dosage form in the form of a dry extract has been obtained from the sedative collection “Phlegmen”.

Dry extracts are one of the oldest medicinal forms of official medicine. After the discovery of a method for producing alcohol, the ancient Roman physician Galen first introduced into medicine the use of alcohol extracts from plants – galenic preparations. The result of the further development of this type of extraction of biologically active substances from plant material was alcohol extracts. Nowadays, these ancient medicinal categories have not lost their relevance, they are constantly developing and, as a result, in many states they have pharmacopoeial status [3].

THE EXPERIMENTAL PART

The creation of drugs from medicinal and vegetable raw materials in the form of dry extracts instead of decoctions and infusions is advantageous from the point of view of the cost-effectiveness and rationality of the use of medicinal raw materials, since in this case the maximum yield of biologically active substances (BAS) is ensured, the pharmacotherapeutic effect increases, the problem of dosage of the drug is facilitated. The purpose of this work is to develop a technology for obtaining an extract from a 4–component sedative collection containing the most complete complex of BAS and having sedative activity.

Herbal collections are the most popular and widely used form of processing medicinal plant raw materials. However, in order to expand the range of medicines, the issue of developing a rational dosage form based on it is relevant – dry extracts, which are the most acceptable option for increasing the shelf life and dosing accuracy.

The main factors affecting the speed and completeness of

the extraction of biologically active substances from plant raw materials are the type of extractant, temperature, pulverization of raw materials, duration of extraction, hydrodynamic conditions [2].

As we know, dry extracts are concentrated extracts from medicinal raw materials, which are bulk masses with a moisture content of no more than 5%, obtained by removing the extractant used. They should be considered the most rational type of extracts. They are easy to handle, have the lowest possible weight. The disadvantages of dry extracts include their high hygroscopicity, as a result of which they turn into lumpy masses that lose their flowability.

Dry extracts are divided into: 1) extracts with a limited upper limit of active substances; 2) extracts with an unlimited upper limit of active substances.

Extracts with a limited upper limit of active substances are obtained from raw materials containing biologically highly active compounds. Such extracts must contain active substances in a strictly defined amount. This is achieved by adding fillers or mixing extracts containing active substances in certain proportions that are more or less than the norm. Milk sugar, glucose, potato dextrin, etc. are used as fillers. Fillers are more often added to the dried product at the grinding stage.

Extracts with an unlimited upper limit of active substances are obtained without adding fillers to them. Such extracts are obtained from medicinal raw materials that do not contain potent substances.

The production of dry extracts can be carried out according to two schemes. In the first case, the process consists of four stages: 1) Extraction of the hood; 2) Cleaning of the hood; 3) Thickening of the hood; 4) Drying of the condensed hood. In the second case, the process of producing dry extracts is carried out, bypassing the thickening stage, and then it includes three stages: 1) Extraction of the hood; 2) Cleaning of the hood; 3) Drying of liquid or slightly Condensed hood. Drying of the liquid extract can be carried out in spray, sublimation (lyophilic, molecular) or other dryers. The slightly condensed extract is dried in vacuum roller dryers.

In the production of dry extracts, various methods are used to obtain extracts from raw materials: 1) Remaceration and its variants; 2) Percolation; 3) Repercolation; 4) Circulating extraction; 5) Countercurrent extraction in a battery of percolators with circulating mixing; 6) Continuous countercurrent extraction with the movement of raw materials and extractant; as well as other methods including grinding of raw materials in an extractant medium; vortex extraction; extraction using electromagnetic vibrations, ultrasound, electrical discharges, electroplasmolysis, electrodialysis, etc.

To obtain dry extracts, it is possible to use a wide range of solvents, taking into account the specific properties of the extracted substances, since the extractant is partially or completely removed. Water (in some cases hot), aqueous solutions of ammonia, chloroform water, ethanol of various concentrations, organic solvents, liquefied gases, vegetable and mineral oils are used as extractants in the production of thick and dry extracts.

When receiving our extract, 70% alcohol was selected as the extractant. When choosing an extractant, the solubility of active substances in the studied collection was taken into account. According to the literature, flavonoids are known to dissolve well in high-concentration alcohol. Considering that Regel's zopnik and Turkestan motherwort contain flavonoids, 70% ethyl alcohol was selected for extraction.

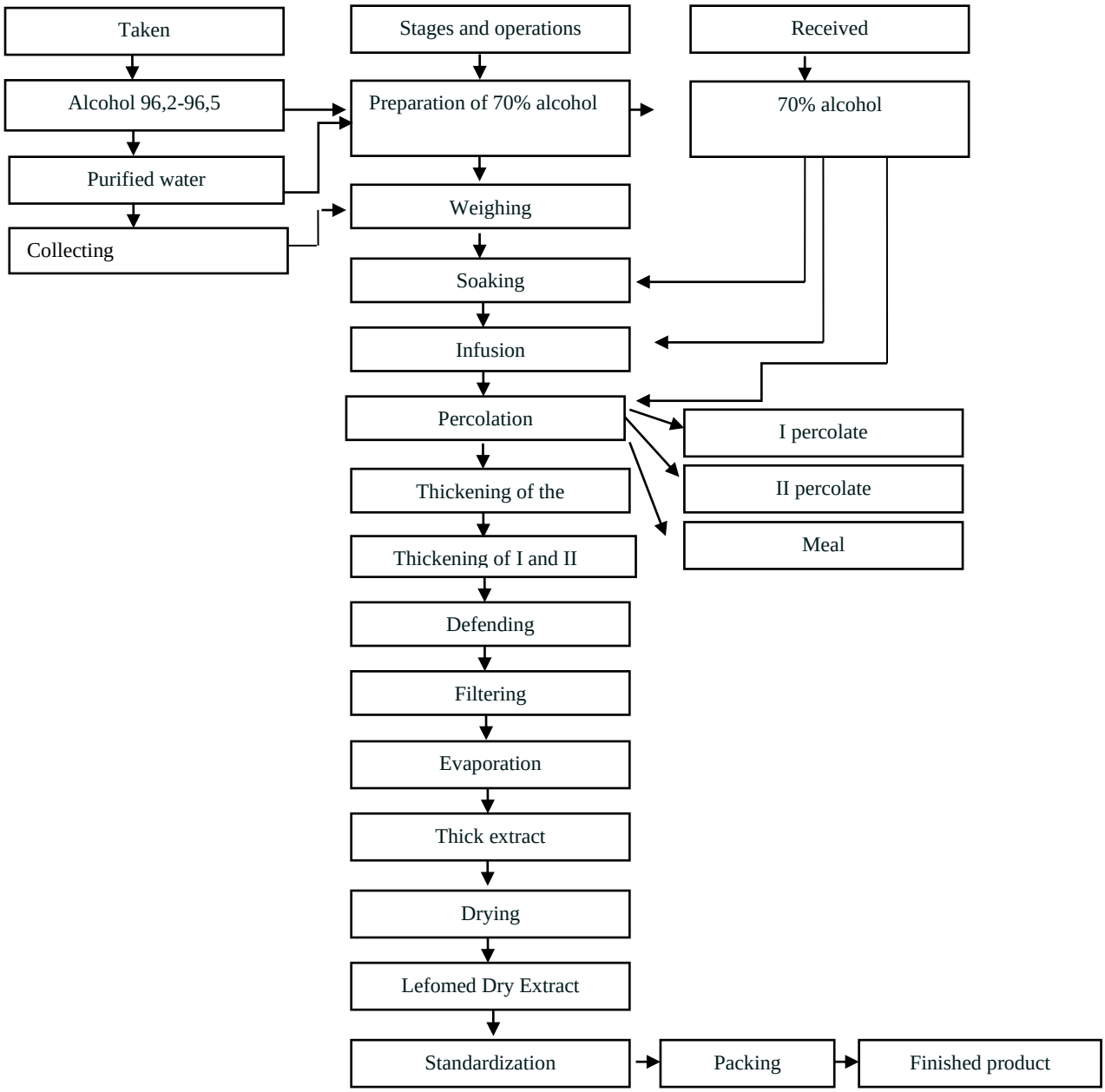

Fig.1. Technological scheme of obtaining dry extract "Lefosed"

The technological scheme for obtaining the dry extract "Lefosed" is shown in Fig. 1.

To obtain the dry extract, a vacuum drying cabinet "SHSV-45K" (Russia), an infrared radiation dryer "X-2M" (Russia) and a spray dryer of the nozzle type "Anhydro" (Denmark) were used.

The parameters of drying the extract are selected for each drying apparatus.

1. Vacuum drying cabinet:

The temperature of the drying chamber is 80-90 0C; vacuum is 0.6-0.8 kgf/cm2.

2. Infrared radiation dryer:

Drying temperature – 75 0C;

3. Nap-type spray dryer: coolant temperature at the inlet 160 0C, at the outlet 75 0C; solution feed rate - 6.66 l/h * m3; solution feed pressure – 0,2 мПа.

Extracts dried in a vacuum drying cabinet and an infrared radiation dryer had the appearance of a resin-like mass that was difficult to separate from the surface of the dryer. Whereas the extract dried in a spray dryer had a powdery appearance. The mass fraction of dry matter in the resulting extract from the vacuum drying cabinet is 10%, from the infrared dryer - 12%, from the spray dryer – 15%. Based on

the results obtained, it was determined that when drying the extract from these plants, the use of a spray dryer is optimal.

Based on the obtained research results, optimal conditions were selected and a scheme for obtaining a dry extract from the collection was developed, which includes the following main stages: extraction, purification of water extraction, evaporation, drying, and packaging of finished products.

Based on this, in order to develop dry dosage forms from the collection, the possibility of obtaining a dry extract from the collection was studied.

The advantage of dry extracts is that the problem of standardization of the quality of raw materials and finished products is solved. With conventional water-alcohol extraction, the solvent is removed at a low temperature (no more than 55 degrees. C), therefore, useful substances are preserved as much as possible. During extraction in vacuum mode at low temperatures, the maximum biological activity of the active substances is preserved and the high quality of medicinal substances is guaranteed.

Other medicinal products from medicinal plant raw materials include ease of use, stability during storage, the possibility of more accurate dosing. A promising direction in the development of dry extracts is the improvement and creation of new progressive resource-saving technologies for processing medicinal plant raw materials, providing maximum yield of biologically active substances.

For quality control, such methods as high-performance liquid chromatography, gas chromatography and spectrophotometry are used. Pharmaceutical analysis includes many modern physico-chemical methods that provide unique information and allow implementing modern requirements for the quality, depth and range of analysis of drugs and preparations. Physico-chemical methods have become crucial in the study of the composition, structure, properties and transformations of drugs at all stages from the creation and development of drugs to their use in drug therapy. The combination of these methods makes it possible to successfully solve the problems of separation of complex multicomponent mixtures, determine their qualitative and quantitative composition, as well as the nature of individual components.

Extracts in dry form contain all biologically active substances peculiar to this type of raw material. Extracts are convenient to store and transport. The high concentration of dry substances allows the use of extracts in the finished form in small quantities.

Dry extracts contain less ballast substances than liquid ones, they are more stable, dry extracts are also very technological (easily weighed, mixed, dissolved), which cannot be said about thick ones. Dry extracts can be used to prepare liquid, solid and soft dosage forms.

Dry extracts are the most rational type of extracts. Their number is constantly growing, despite the relative complexity of production.

The extract obtained by percolation using 70% alcohol was evaporated in a vacuum evaporation apparatus at a temperature of 500-600 C to residual humidity. Then, the dry extract was ground to a homogeneous state and sieved through a sieve.

The yield of the dry extract was 12.5%.

The studied dry extract "Lefosed" was standardized according to the requirements of the industry standard TSt 42-01:2002 according to the following indicators: description, authenticity, heavy metal content, solubility, humidity and microbiological purity.

The dry extract is a dark brown powder with a characteristic aromatic smell and a weak sweet and sour taste.

Easily soluble 70% in ethyl alcohol and little in water.

The goodness was determined by the main active substances. Qualitative reactions to biologically active components of the obtained dry extract were carried out and their quantitative determination was carried out. Flavonoids were determined by the reaction of a cyanidine sample, reactions with boron-lemon reagent and a 5% solution of AlCl3, 10% NaOH, $FeCl_3$ and others. All this indicates the presence of flavonoids in the dry extract [4,5].

The saponin content in the dry extract was determined by foaming reactions, with a concentrated H2SO4 solution and with a FeSO4 solution. The content of essential oils in the composition of the dry extract was not carried out, since the extract was obtained by distillation under vacuum with subsequent shrinkage.

The microbiological purity of the dry extract was checked for compliance with the requirements specified in GF XI, Issue 2, p.193 and Amendment No. 2 of 12.10.2005, category 3.2. All experimental series withstood these requirements.

The determination of heavy metals was carried out according to the procedure described in GF XI. All the studied series of extracts withstood the general requirement (no more than 0.01%).

The weight loss during drying was determined in accordance with the requirements of GF XI, issue 1, c 176.

Numerical indicators of the dry extract "Lefosed" are given in Table 1.

Table 1: Numerical indicators of the dry extract "Lefosed"

Dosage form	Dry extract yield	Description	Solubility	Moisture content	Heavy metals
Dry Extract of "Lefosed"	12,5 g	Dark brown powder with a characteristic aromatic smell and slightly sweet and sour taste	It is easily soluble in ethyl alcohol and little water.	2,8	Not more than 0.01

Conclusion

For the first time, a technology for obtaining a dry extract from a sedative collection has been developed, an optimal technique has been chosen that allows to deplete raw materials as much as possible and enrich the extract with a complex of biologically active compounds. The quality assessment of the dry extract "Lefosed" was evaluated in accordance with the requirements of the GF XI edition and the industry standard TSt 42-01:2002. It is established that the dry extract "Lefosed" meets all the requirements of ND.

References

Авдеева Т.И., Кинкулькина М.А. Препараты растительного происхождения в терапии тревожных расстройств // Врач. – 2008.– № 11. – С.49–52.

Безчаснюк Е.М., Дяченко В.В., Кучер О.В. Процесс экстрагирования из лекарственного растительного сырья. // Фармаком. 2003. - №1. - стр. 54-56.

Вайс Р.Ф. Фитотерапия: Руководство: Пер. с нем. /Р.Ф. Вайс, Ф. Финтельман М.: Медицина, 2004. - 534 с.

Зиэп, Т.Т. Разработка методики количественного определения суммарного содержания флавоноидов в траве пустырника спектрофотометрическим методом / Т.Т. Зиэп, Е.В. Жохова // Химия растительного сырья. - 2007. - № 4. - С. 73—77.

Настойки, экстракты, эликсиры и их стандартизация /Под ред. проф. В.Л. Багировой, проф. В.А. Северцева. СПб.: СпецЛит, 2001. - 223 с.

Sidametova Z.E., Olimov N. K. Quality Assessment of Sedative Medicinal Plants and Their Remedies // RA journal of applied research.-2022.- Vol.08.-Issue 03.- P. 197-203. (SJIF =7,036).

Sidametova Z.E., Olimov N. K. Quality Assessment of Active Substances that Demonstrate Sedative Effect of «Flegmen» Syrup // Global Journal of Medical Research.-2022 - Vol. 22.-Issue 2 - P. 43-48. (SJIF =8, 23).