RHEOLOGY-BASED CHOICE OF THE GELLING AGENT IN THE COMPOSITION OF THE SEMISOLID FORM FOR APPLICATION IN THE COMBUSTIOLOGY

Beandaza Zafizhaonari Eric
Scientific supervisor: assoc. prof. Krikliva I. O.
National University of Pharmacy, Kharkiv, Ukraine
irinakrikliva@ukr.net

Introduction. In medicine, burns are one of the widespread types of injuries that can occur in the home or in the workplace, and represent not only a medical but also a socio-economic problem.

Burns in developed countries are one of the most common types of injuries in peacetime. According to the World Health Organization, burns occupy 3rd place among injuries, with the number of victims constantly increasing.

Aim of the study. The purpose of our work is to develop the composition and technology of gel for the treatment of thermal burns, which included vinylin, sea buckthorn oil and essential oil of lavender. As gel formers used – Lecigel (sample number 1), Sepinov EMT 10 (sample number 2), Sepineo P 600 (sample number 3).

Materials and methods. The choice of the gelling agent in composition of the gel was carried out on the basis of structural and mechanical studies. The rheological parameters of the prototype samples were measured on a rotary viscometer «MYR 3000 V2R» (Viscotech, Spain) in the coaxial cylinders system using the SPU technique in the range of shear rates from 0 to 200 rpm. The research was carried out at a temperature of (25 ± 0,1) °C. Based on the results of the measurements, the rheograms of the shear stress (τ) dependence on the shear rate gradient (Dr) were plotted, on which determined the type of flow, the yield point and the presence of thixotropic properties.

Results. All studied samples are characterized by the non-Newtonian type of flow. Their fluidity begins after some mechanical stress applied, that is, with the increase of kinetic energy, there is a breaking of bonds between its elements. All samples have similar stable behaviour, but sample number 3 has the best plasticity, so it will be easily applied to the skin and squeezed out of tubes, indicating good consumer characteristics

Conclusions. The conducted studies have shown that the most promising for further development of the composition and technology of the gel for use in combustiology is sample number 3 – gel former Sepineo P 600.

CHOICE OF THE METHOD FOR BIOLOGICALLY ACTIVE SUBSTANCES EXTRACTION FROM ROOTS AND RHIZOMES OF RHODIOLA ROSEA.

Benzakur Kaoutar
Scientific supervisor: assoc. prof. Khohlova L.N.
National University of Pharmacy, Kharkiv, Ukraine
e-mail ztl@nuph.edu.ua

Introduction. One of the urgent tasks of modern pharmacy is the search for rational ways of using medicinal plant materials. In this respect, medicinal plants containing phenylpropanoids, which have adaptogenic, tonic, nootropic, antidepressant and immunomodulating properties, are of great interest. A valuable source of drugs of this spectrum of biological activity are rhizomes with the roots of Rhodiola rosea. This medicinal plant raw material has long been used in folk and official medical practice. However, the range of medicines derived from Rhodiola Rosea is small, despite the rather diverse chemical composition.

Of extraction preparations of Rhodiola Rosea, the pharmaceutical market of Ukraine has tincture and liquid extract. Tablets and capsules containing biologically active substances of this plant are mainly food supplements and are produced abroad.

Aim. The purpose of this study was to select an effective technology for obtaining an extract of rhizomes and roots of Rhodiola Rosa for the development of modern preparations in the form of solid dosage forms: tablets, granules, capsules on its basis.

Materials and methods. The objects of study were samples of water-alcohol extracts of Rhodiola Rosea, obtained by various methods – classical accelerated fractional maceration, modified maceration, combining extraction at room temperature and at heating to 80-90 ° C, as well as modern modification of percolation – vacuum filtration extraction.

The effectiveness of biologically active substances extraction in these ways was characterized by the content of dry residue in the resulting extracts.

Result and discussion. The main disadvantages of traditional methods of biologically active substances extraction from rhizomes with roots of Rhodiola rosea (fractional maceration – when obtaining tincture and repercolation – when producing liquid extract) include the complexity and duration of the technological process, incomplete extraction of biologically active substances and the instability of the obtained extraction preparations.

The incomplete extraction of biologically active substances is explained by the fact that this raw material contains a lot of extractive substances, which result in a thick consistency of the finished product. The high viscosity of the extracts does not allow for an exhaustive extraction – on average, it is 50-58%.

To optimize the extraction process, a preliminary study of the technological properties of the crushed vegetable raw materials prepared for extraction is necessary (table).

Table.

Technological properties of raw rhizomes with roots of Rhodiola rosea, crushed in various ways.

Technological indicators	Indicator value for the raw material	
	Grinded by cutting	Grinded by forge-rolling
Average diameter of particles, mm	1.72	0.4
Bulk weight, g/cm^3	0.2	0.4
Total surface of particles, g/cm^2	790.5	16985.2
Specific area of material, g/cm^2	6.994	162.96
Porosity	0.32	0.32
Fractional void volume	0.7	0.5
Flowability, g/sec	0.22	1.12
Natural slope angle	50°	35°
Ethanol absorption coefficient, cm^3/g	2.2	1.6

It has been found that the most suitable method of grinding the rhizomes with roots of Rhodiola Rose is rolling, which results in an increase in the specific surface of the material and the total surface of the particles, improved flowability of the raw material, reduced fractional void volume.

To extract the BAS from the rhizomes with roots of Rhodiola Rosea, we used the method of filtration extraction, which, unlike traditional technologies, allows reducing the time of extraction and increasing the yield of active substances. This is achieved by creating a highly developed surface of the raw material under dynamically nonequilibrium extraction conditions.

For filtration extraction, the roll-crushed raw material is evenly loaded into the extractor, the aqueous-alcoholic solution is passed ("filtered") through it, constantly keeping the "mirror" layer of the extractant, and the extraction is collected. From one load of raw materials weighing 100 g, five separate discharges of 100 ml are successively obtained, guided by the ratio of raw materials-extractant as 1: 5, since this results in maximum mass yield using the minimum amount of extractant. The first three extraction drains are obtained by gravity, then the extraction is carried out with the vacuum connected to overcome the hydroresistance of the swelling raw material. To confirm the benefits of this method, a similar extraction was obtained using standard fractional maceration technique. Analysis of the dry residue content in both extracts showed the undoubted advantage of the filtration extraction method – when used, up to 75 ± 10% of extractive substances were extracted from the plant material.

Conclusion. Extraction of biologically active substances from rhizomes with roots of Rhodiola rosea by the method of filtration extraction makes it possible to reduce the duration of the technological process and significantly increase its effectiveness by obtaining a more concentrated product.

DEVELOPMENT OF TECHNOLOGY OF ANTIOXIDANT ACTION MICROCAPSULES WITH PLANT EXTRACTS

Burayu Yusra
Scientific supervisor: assoc. prof. Khohlova L. N.
National University of Pharmacy, Kharkiv, Ukraine
ztl@nuph.edu.ua

Introduction. Scientific studies of the last decades show that oxidative stress precedes or accompanies many diseases – cardiovascular, oncological, and disorders of cerebral circulation. In this regard, antioxidant drugs have found wide application. Of particular interest are natural antioxidants isolated from plants. Promising in this regard may be drugs of prolonged action, the active components of which are extracts from plants with antioxidant activity in microencapsulated form. Microcapsules are a modern dosage form that ensures optimal delivery and prolonged action, stability of active ingredients.

Aim of the study. Substantiation of manufacturing technology of antioxidant action microcapsules based on plant extracts.

Materials and methods. The object of the study was the total phytocomposition in the form of extracts of the root of elecampane, oak and viburnum barks, containing natural phenols (tocopherols, quercetin, gallic acid and its derivatives), which affect the redox processes in cells, tissue regeneration, the negative effects of environmental factors, etc.

When choosing auxiliary substances for the phytocomposition microencapsulation, proceeded from their availability, the possibility of use in pharmacy and pharmacological indifference. Gelatin was chosen as the material for the shell of microcapsules, for its dissolution – purified water and glycerin; inert dispersion medium is represented by sunflower oil.

Technological, biopharmaceutical and physicochemical methods were used in the work.

Results. When choosing the optimal method of obtaining microcapsules with plant extracts, we compared two methods – simple coacervation and dispersion in the «liquid-liquid» system. The method of simple coacervation is rather long in execution – 24 hours and is characterized by a low technological yield. The physico-chemical method of dispersion occurs more completely – the yield of microcapsules is 90%, the total duration of the technological process is 8 hours.

Microencapsulation by dispersion was carried out in laboratory conditions using the following process steps: preparation of a film-forming solution, introduction of extracts into a gelatin mass, formation of microcapsules, filtration and washing with ethanol, drying.

Gelatin solution was prepared according to the generally accepted technology of solutions of high-molecular substances, at a temperature of 50-60 ° C, extracts of elecampane, oak, and viburnum were introduced with stirring. The resulting mass for encapsulation was poured into a dispersion medium heated to 40-50 °C at vigorous stirring. Then the temperature of the medium sharply decreased to 5 °C, the obtained microcapsules were washed on the filter with ethanol and dried to constant weight.

The obtained microcapsules represented brown particles of uniform spherical shape.

Conclusions. As a result of experimental studies, a technology was proposed for producing microcapsules with plant extracts of antioxidant action by the method of dispersion in the system «liquid-liquid».