Aim. To determine a number of parameters of a new medicine – 5 % "Venocoryl" ointment with the dense extract from common hazel leaves.

Materials and methods. The object of our study was 7 batches of "Venocoryl" ointment developed in the laboratory conditions. In all batches such indicators as uniformity, colloidal stability, thermostability, as well as the pH of water extracts, the particle size, and the microbiological purity of the ointment were determined. The spectral characteristics of the solution were recorded; the optical density of the solution obtained was measured on a Cary 60 UV-Vis Agilent Technologies spectrophotometer (USA) in the wavelength range of 300-500 nm.

Results and discussion. The ointment of all batches represents a homogeneous oily mass with light brownish-yellow color and a specific pleasant odor. All batches of the ointment meet the requirement of uniformity and satisfy the test on the colloidal stability. They are also thermostable. The pH of "Venocoryl" ointment was in the range from 5.68 to 5.75. The content of the amount of flavonoids calculated with reference to rutin should be not less than 1.0 %.

Conclusions. In 7 batches of a new original medicine – "Venocoryl" ointment – a number of indicators, such as uniformity, colloidal stability, pH and thermostability has been determined; determination of the quantitative content of the amount of flavonoids has been carried out (the lower limit of the quantitative content of the amount of flavonoids calculated with reference to the substance is not less than 1.0 %). The data obtained are included in the specifications for "Venocoryl" ointment.

Key words: "Venocoryl" ointment; dense extract of ordinary hazel; flavonoids; quantitative determination

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**Determination of a number of indicators of “Venocoryl” ointment**

**Key words**: "Venocoryl" ointment; dense extract of ordinary hazel; flavonoids; quantitative determination

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**Визначення ряду показників мазі «Venocoryl»**

**Метою цієї роботи було визначення ряду параметрів нового лікарського засобу 5 % мазі «Venocoryl» з густим екстрактом листя звичайної ліщини.**

**Матеріали та методи.** Об'єктом дослідження були 7 серій мазі «Venocoryl», напрацьованих у лабораторних умовах. В усіх серіях визначали однорідність, колоїдну стабільність, термостабільність, провели визначення рН водних витяжок, розміру часток, мікробіологічної чистоти мазі. Знімали спектральні характеристики розчину, вимірюючи оптичну щільність отриманого розчину на спектрофотометрі Cary 60 UV-Vis Agilent Technologies (USA) в інтервалі довжин хвиль 300-500 нм.

**Результати та їх обговорення.** Мазь усіх серій – це однорідна масляниста маса світло-коричневого кольору зі специфічним приємним запахом. Всі серії мазі відповідають вимогам однорідності і витримують випробування з колоїдної стабільності, а також є термостабільними. Показник рН мазі «Venocoryl» коливався від 5.68 до 5.75. Вміст суми флавоноїдів у перерахунку на рутин має бути не менше 1.0 %.

**Висновки.** У 7 серіях нового оригінального лікарського засобу мазі «Venocoryl» визначено ряд показників, таких як однорідність, колоїдна стабільність, рН і термостабільність, проведено визначення кількісного вмісту суми флавоноїдів (встановлено нижню межу вмісту суми флавоноїдів у перерахунку на субстанцію – не менше 1,0 %). Отримані дані включено в нормативну документацію на мазь «Venocoryl».

**Ключові слова:** мазь «Venocoryl»; густий екстракт листя звичайної ліщини; флавоноїди; кількісне визначення

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**Определеение ряда показателей мази «Venocoryl»**

**Целью этой работы было определение ряда параметров нового лекарственного средства 5 % мази «Venocoryl» с густым экстрактом листьев обыкновенной лещины.**

**Материалы и методы.** Объектом исследования были 7 серий мази «Venocoryl», наработанных в лабораторных условиях. Во всех сериях определяли однородность, коллоидную стабильность, термостабильность, провели определение рН водных извлечений, размер частиц, микробиологическую чистоту мази. Знимали спектральные характеристики розчину, измеряя оптическую плотность полученного раствора на спектрофотометре Cary 60 UV-Vis Agilent Technologies (USA) в интервале длин волн 300-500 нм.

**Результаты и их обсуждение.** Мазь всех серий представляет собой однородную маслянистую массу светло-коричневато-желтого цвета со специфическим приятным запахом. Все серии мази соответствуют требованию однородности и выдерживают испытание по коллоидной стабильности, а также термостабильны. Показатель рН мази «Venocoryl» колебался от 5.68 до 5.75. Содержание суммы флавоноидов в пересчете на рутин должно быть не менее 1,0 %.

**Выводы.** В 7 сериях нового оригинального лекарственного средства мази «Venocoryl» определен ряд показателей, таких как однородность, коллоидная стабильность, рН и термостабильность, проведено определение количественного содержания суммы флавоноидов (установлен нижний предел содержания суммы флавоноидов – не менее 1,0 %). Полученные данные включены в нормативную документацию на мазь «Venocoryl».

**Ключевые слова:** мазь «Venocoryl»; густой экстракт листьев обыкновенной; флавоноиды; количественное определение
Among 22 species of Corylus L. genus of Corylaceae Mirb. family 3 species grow on the territory of Azerbaijan. Our attention was drawn by one of representatives of this genus – common hazel (hazelnut) (Corylus avellana L.); it is a bush of 1.5-3.0 m high, which is widespread in the Gubinsky, Ovuzsky, Shaki, Lenkaran, Zakatalsky, Gakhsky, Leriksky districts of Azerbaijan [1].

In the literature available to us we found numerous data on application of leaves, fruits, bark, roots, kernels and a shell of nuts, a cupule and pollen of C. avellana L. in folk medicine when treating various diseases [2]. There are data on studying the content of amino acids, vitamins, polysaccharides, fatty acids, flavonoids, as well as tannins of leaves and bark of common hazel by the Ukrainian researchers [3-7].

Taking into account the prospects of this type of the raw material the chemical composition of leaves of C. avellana L. growing in Azerbaijan has been studied, and the quantitative content of the amount of flavonoids (not less than 4 %) presented both by aglycones, and glycosides [8] has been determined. In addition, a dense extract from leaves of this plant has been obtained. The studies of the chemical composition of extract conducted have confirmed the presence of kaempferol, quercetine, myricetin, afield, quercitrine, betulin triterpene alcohol in it.

The pharmacological studies of the substance obtained have shown that the extract of C. avellana L. leaves possesses the antioxidant, anticoagulant, vessel-strengthening and anti-inflammatory action [9-11]. It has been also found that the extract of C. avellana L. leaves does not have both irritative and ulcerogenic effects on the gastric mucosa [12]. The absence of the toxic effect of the extract on the dynamics of the body growth and the secretory function of the kidneys, the detoxification effect on the liver and blood clotting reduction have been confirmed [13].

The method for obtaining flavonoids from C. avellana L. leaves having the biological activity has been developed and tested under industrial conditions. The advantage of this method is that when obtaining the extract such reactants as hexane and ethyl acetate are not used; therefore, the loss of the target product decreases to the minimum. Flavonoid compounds are well extracted with chloroform [14].

In the extract obtained determination of the quantitative content of the amount of polyphenolic compounds calculated with reference to gallic acid, the amount of flavonoids calculated with reference to rutin, the amount of oxycinnamic acids calculated with reference to chlorogenic acid has been carried out by the spectrophotometric method, as well as the quantitative content of the amount of flavonoids (calculated with reference to rutin) in “Corylexin” tablets developed has been determined [15-17].

Considering sufficient product stocks of C. avellana L., the rich chemical composition and the pharmacological effect of the purified extract of this plant the original medicine – “Venocoryl” ointment has been developed.

The optimal composition of “Venocoryl” ointment has been found (per 100 g): a dense extract of hazel – 5.0 g; corn oil – 20.0 g; emulsifier No. 1 – 10.0 g; polyethylene oxide 400 – 10.0 g; nipagin – 0.15 g; nipasol – 0.05 g; purified water – 54.8 g. It possesses the vessel-strengthening, anti-inflammatory and antiedemic properties [18].

The aim of our study is to determine a number of parameters of a new medicine – 5 % “Venocoryl” ointment with the dense extract from common hazel leaves.

Materials and methods
The object of our study was 7 batches of “Venocoryl” ointment developed in the laboratory conditions. Determination of uniformity was carried out by the method of the State Pharmacopeia of Ukraine (SPhU) with the visual control of the experimental samples on a glass slide. The colloidal stability was determined according to the GOST 29188.33-91 “Cosmetic products. Methods for determination of stability of emulsions”. To determine the colloidal stability the laboratory centrifuge with a set of test tubes, a mercury thermometer with the temperature measurement interval from 0 to 100 °C and graduation of 1 °C, as well as a stop watch and a water bath were used.

The test tube was filled to 2/3 of its volume (approximately 9.0 g) with the samples of the emulsion ointment studied. Then the test tubes were placed on a water bath at a temperature of 45 ± 2 °C for 20 min, and centrifuged for 5 min. The sample was considered to be stable if after centrifugation there was no layering in the test tubes. The pH of water extracts was determined by potentiometry according to the SPhU (2.2.3) [19]. The particle size was determined by the microscopy method (not more than 20 µm, SPhU (2.9.13)) by a “Conus-Academy” laboratory microscope with the built-in camera [19]. The determination of thermostatability was carried out according to the State Standard 29188.33-91 “Cosmetic products. Methods for determination of stability of emulsions”. To determine thermostatability the test tube with 10 g of the ointment was placed in a TB-80-1 thermostat with a temperature of 40-42 °C, left for a week, then transferred to the refrigerator with a temperature of 10-12 °C for the same term, then kept for 3 days at the room temperature. The studies on microbiological purity of the ointment were conducted according to the requirements of the SPhU I (2.6.12) and (2.6.13) [20].

The spectral characteristics of the solution were recorded; the optical density of the solution obtained was measured on a Cary 60 UV-Vis Agilent Technologies spectrophotometer (USA) in the wavelength range of 300-500 nm.

Results and discussion
The ointment of all batches represents a homogeneous oily mass with light brownish-yellow color and a specific pleasant odor. All batches of the ointment meet the requirement of uniformity and satisfy the test on col-
The pH of “Venocoryl” ointment was in the range from 5.68 to 5.75. All batches of the ointment are thermostable.

Tests for microbiological purity were carried out using the direct inoculation method. The assessment of the microbial contamination degree of the ointment samples consisted of determination of the total aerobic bacteria and fungal count in 1.0 g of the sample (not more than 100 CFU in each batch), and the presence of bacteria of Enterobacteriaceae, Staphylococcus aureus and Pseudomonas aeruginosa families (absent in all batches).

The quantitative determination of the amount of flavonoids in “Venocoryl” ointment was carried out by spectrophotometry calculated with reference to rutin according to the method of the SPhU 2.0 [21].

**Initial solution.** Dissolve approximately 1 g of the ointment (accurate weight) in 30 ml of 70 % ethyl alcohol, stir, heat for 5 min at a temperature up to 50 °C, filter, place in a 50 ml measured flask, dilute the solution to the volume with 70 % ethyl alcohol and mix.

**Compensation solution 1.** Ethyl alcohol (70 %). **Compensation solution 2.** Place 2.0 ml of the initial solution in a 25 ml measured flask, add 1 drop of ice acetic acid, dilute the solution to the volume with 70 % ethyl alcohol and mix.

The content of the amount of flavonoids (calculated with reference to rutin) was calculated by the formula:

$$X = \frac{A \times 50 \times 25}{A \times 100 \times m \times 2} \%,$$

were: \(A_{\text{cm}}\) – is the specific indicator of absorption of the rutin complex with AlCl₃ at 415 nm; \(m\) – is the sample weight of the ointment.

The results of determination of the quantitative content of the amount of flavonoids in 7 batches of “Venocoryl” ointment are presented in Table [22].

**CONCLUSIONS**

A number of indicators of 7 batches of a new original medicine – “Venocoryl” ointment possessing the anti-inflammatory and vessel-strengthening action has been determined.

1. Such indicators as uniformity, colloidal stability, pH and thermostability have been determined.
2. Determination of the quantitative content of the amount of flavonoids has been carried out by spectrophotometry using a specific indicator of absorption calculated with reference to rutin in 7 batches of “Venocoryl” ointment (the lower limit of the content of the amount of flavonoids calculated with reference to the substance is not less than 1.0 %).
3. The data obtained are included in the specifications for “Venocoryl” ointment, which will be produced by “Azerbaijan LTD” company.

**Conflict of Interests:** authors have no conflict of interests to declare.

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