

**ACTUAL ASPECTS OF MEDICAL USE OF
WOLOSKI NUT EXTRACTS
(*JUGLANS REGIA* L.) AND BLACK WALNUT
(*JUGLANS NIGRA* L.)
(REVIEW)**

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Recently, in the development of local medicines for the treatment of wounds, the interest of researchers in the use of plant raw materials with antimicrobial, anti-inflammatory and reparative properties, such as extracts of Chinese poplar, black walnut and walnut leaves, broccoli sprouts herb, oak bark, etc., has not disappeared (Zotsenko L. O., Kyslychenko V. S., 2021; Gladyshev V.V. et al., 2022). High percentage of wound infectious complications in patients, development of resistance in microorganisms, decrease of general and local immunological reactivity of the organism require further study of plant raw materials and development of new drugs of this pharmacological group [1-5].

It is known from literature sources that among plant substances that can be used in the treatment of wound infection, walnut is the most promising one (*Juglans regia* L., *Juglandaceae*; homeland - Asia Minor, Central Asia, Iran, mountain regions of the Balkans) and black walnut (*Juglans nigra* L., *Juglandaceae*; home land – North America).

Walnut is well studied today, its importance in folk and traditional medicine has long been known.

The medicinal use of walnut, as an ancient culture, has its own history. All parts of this plant are used in medicine and cosmetology: fruits, green component of the outer part of the nut, leaves, bark of branches and roots (Sharma M., 2022). Walnut leaves were used in the form of infusions and decoctions in the treatment of purulent and fungal lesions of the skin, pulmonary and other forms of tuberculosis, diabetes, diseases of the mucous membrane of the oral cavity, thrush, vitamin deficiency, etc. [5-6].

Walnut – *Juglans regia* L. – a tree of the nut family, all parts of which contain many biologically active substances: bark - triterpenoids, steroids, alkaloids, vitamin C, tannins, quinones; leaves - aldehydes, essential oil, alkaloids, vitamins C, PP, carotene, phenolcarboxylic acids, tannins, coumarins, flavonoids, anthocyanins, quinones and high aromatic hydrocarbons; the pericarp also contains a lot of tannins, organic and phenolic carboxylic acids, coumarins, and juglone, which have a bactericidal effect. The walnut kernels contain a variety of organic and mineral compounds: fats, proteins, 13 % carbohydrates (glucose, sucrose, dextrins, starch, etc.), tannins and aromatic substances, vitamins, 2.9 % fibre, and 1.6 % ash. The fruits contain 50-70-78 % oil and 15-20 % protein. Most of the vitamin C is found in the shell of unripe fruits, and

its amount is not inferior to citrus fruits, black currant and rose hips, so vitamin concentrates are prepared from the shells of unripe fruits of *Juglans regia* L. Betasitosterol has been isolated from the shell, and the shell contains phenolic carboxylic acids, tannins and coumarins, while the pellicle (a thin brown skin covering the fruit) contains steroids, phenolic carboxylic acids, tannins and coumarins (Baglay T.O., 2020). Walnut leaves contain 3 % - 4 % tannins, glycosides, flavonoids, essential oil, juglone, inositol, carotenoids, vitamins C, B₁ and P, and a lot (up to 30 %) of provitamin A. May walnut leaves are not inferior to rose hips in terms of vitamin C and provitamin A content. The chemical composition of walnut fruits and leaves is represented by phenolic compounds (naphthoquinones, flavonoids, phenolic carboxylic acids, tannins), proteins, vitamins, fatty oil, carbohydrates, organic acids, macro- and microelements [7-10].

In ancient times, walnuts were considered a very powerful antidote that helped to cure poisoning from the strongest poisons. To do this, you had to eat two walnuts with two wine berries, leaves and salt.

Walnuts were also used by domestic doctors in the treatment of various diseases. In the XVII century, military doctors treated wounds with walnut leaves.

Since ancient times, doctors have been using walnut leaves and blueberry leaves in preparations for diabetes mellitus. For example, Nosal M.A. and Nosal I.M. noted that when walnut leaf tea is taken orally, the percentage of sugar in the urine decreases. Researchers claim that walnut leaves and sage, common hop flowers (1:2:2) belong to the collections of plants with lactic effect (Kazmirchuk V.V., 2020; Klyuchnikova A.S., 2022). It is also known that walnut leaves, together with nettle leaves, valerian root and licorice root, are recommended in a collection of plants that affect thyroid function. It should be noted that the fruits of *Juglans regia* L. contain a large amount of phytosterols, a source of steroid hormones (sex hormones, gonadotropic hormones, adrenal cortical substance) [11].

Given the available information on the use of this plant in folk practice in the treatment of ringworm and deep infected wounds, microbiologists, physicians and other specialists have conducted extensive experimental studies of the leaves and green achene of the walnut. They found that the preparations made from the leaves and immature achene of *Juglans regia* L. have pronounced antistocidal, bactericidal, fungicidal properties and a wide range of antimicrobial effects. Therefore, preparations made from the leaves and green component of the outer part of the walnut nut of the immature walnut fruit are recommended by scientists for use in medical practice in the treatment of purulent, fungal skin diseases and diseases caused by protozoa, in particular in the treatment of trichomonas colpitis [12].

It has been experimentally proved that volatile fractions of phytoncides, tissue juice and aqueous extracts (1:2; 1:5; 1:10) from the leaves and green component of the outer part of the walnut have a pronounced antimicrobial activity. Moreover, the

bactericidal activity of various dilutions of tissue juice and aqueous extracts is directly dependent on the concentration of the solution and the exposure to its effects. Thus, the tissue juices of leaves and especially green anthers have a fungicidal effect on pathogenic fungi, while aqueous extracts from leaves and anthers have weak fungicidal properties and cannot be recommended for use in the treatment of skin diseases caused by pathogenic fungi. Yeast-like fungi of the genus *Candida* are very sensitive to the effects of the native sap of green leaves and anthers, as well as aqueous extracts from them. Studies have shown that the fungicidal activity of green walnut anther is much higher than that of its green leaves. M. M. Eyubova-Kasumova determined by phytochemical analysis that the main chemical components of green leaves and walnut achenes are alkaloids, glycosides and resinous substances, which are low toxic and harmless to the body [12]. It has been experimentally established that flavonoids from walnut leaves have hypotensive, antispasmodic and anti-inflammatory effects in animal experiments [13].

It should be noted that the most effective therapeutic effect is provided by the leaves of *Juglans regia* L. collected in June. At this time, they contain more vitamin C (up to 5%) and other biologically active substances. The leaves are quickly dried in the sun, spread out in a thin layer on a clean cloth or paper. Brown and blackened leaves are removed after drying. The pericarp of unripe fruits is harvested in August. It is recommended to store the walnut kernels peeled: this way they retain their valuable substances longer.

Aqueous extracts from walnut leaves have pronounced bactericidal and wound healing properties. They are used to accelerate wound healing, in the treatment of tuberculosis lesions of the skin and larynx. The walnut pericarp is used to produce the bactericidal drug juglon, which was previously used for skin tuberculosis, ringworm, eczema, allergies, streptococcal and staphylococcal skin diseases.

In folk medicine, decoctions and infusions of walnut leaves and fruit shells are still used to treat wounds, ulcers, boils, and frostbite as a wound healing, bactericidal, and anti-inflammatory agent. In case of lichen, purulent rashes, abscesses and boils, eczema, seborrhea, hair loss, acne, psoriasis, dermatitis, the decoction of the leaves is used in the form of baths, washings, lotions, compresses.

Preparations of the bark of the roots and trunks of *Juglans regia* L. can also be used for rinsing the mouth and throat in case of inflammatory diseases.

Nut oil effectively heals wounds, burns and skin lesions. In folk medicine, it is also used to treat conjunctivitis and inflammation of the middle ear.

Today, the attention of scientists and doctors is drawn to the black walnut (*Juglans nigra* L.), a medicinal plant that is related to our familiar walnut. The black walnut tree reaches a height of 50 metres. The crown is branched, dense, and low to the ground. The fruits of black walnut are larger than walnut, approximately 5.5x3.8 cm in size. The skin of the fruit is hard, green,

covered with hairs. The leaves, depending on their location on the branches, grow in different lengths: from 6 to 50 cm. When the leaves bloom, the tree blooms. The flowers are groups of earrings 6-15 cm long or flowers of 3-5 pieces. The frost resistance is high.

Another related species that attracts the attention of doctors and scientists is the oriental black walnut (*Juglans nigra* L.). Black walnut should not be confused with walnut. Although they belong to the same family, they have significant differences. First of all, it is the habitat and the appearance of the fruit. The homeland of the black walnut is North America. In Ukraine, the black walnut grows only in the territory of the Krasnokutskiy arboretum.

The American fruit appeared in Europe in the early seventeenth century. There is an assumption that it got there with the ships of the Spanish conquistadors: along with the looted gold, they brought amazing plants. Having settled in a mild, warm climate, the black walnut began to spread to other parts of the Old World and came to us under the Latin name *Juglans nigra*. The English synonym for the species is Black walnut [14].

The tree requires a large area. Some representatives of this family live up to 500 years and grow over 60 meters in height. The straight trunk is covered with hard bark in 6-8 years, which is also a characteristic feature of the American walnut. Its wood is often used for furniture. The oval leaves reach 50 cm in length. Unripe green fruits are covered with hairs. The thick skin gives off a pungent aroma and darkens when ripe. The kernels inside are very tasty and have a specific smell. For a long time, the medicinal properties of *Juglans nigra* remained unexplored. It was only at the turn of the XX century that the tree was noticed.

The fruits, peel and leaves of black walnut contain many vitamins and minerals. They are all sources of nutrients.

The medicinal properties of black walnut largely depend on the composition of the kernels, as they are most often the basis of biologically active supplements. The kernels of a ripe black walnut fruit contain up to 60 % polyunsaturated fatty acids, 30 % proteins and 7 % carbohydrates, as well as trace elements: cobalt, selenium, phosphorus, iron, manganese and potassium. Of great importance for health is juglone, which is found in nuts. The substance has antifungal, antiparasitic, antibacterial and antifungal effects, improves intestinal function, and restores the mucous membrane.

The biologically active substances contained in the fruit are: tannins; bioflavonoids; phytosterols; anthocyanidins; organic acids. Unripe black walnut fruits contain a high concentration of vitamin C.

The black walnut tree reaches a height of 50 m, the nuts themselves are small: from 3.5 to 5 cm in diameter. They are covered with a thick, dark brown shell. The round fruits with a pointed top contain kernels inside that taste like walnuts and look like hazelnuts, but with a wrinkled, unevenly colored skin. It is four-nested and very strong, 5-10 mm thick. The black walnut is named after the color of the fruit and the roots of the tree.

Indian healers from the tribes of the places where the tree can grow prepared infusions and decoctions based on the shell, kernels and leaves of the nut, calling it the "elixir of life". It was considered one of the most useful fruits in the tribe.

The complex effect of black walnut on the human body is associated with the content of trace elements (cobalt, selenium, phosphorus, iron, manganese, potassium and others) necessary for various metabolic processes. A "vitamin cocktail" of groups B, PP, C, E, A, P, F, involved in various biochemical transformations. Flavonoids, which strengthen vascular walls, normalize cholesterol and fat levels, regulating blood pressure. Carotene (provitamin A) is a source of youth and longevity, capable of stimulating the immune system. Tannins have an astringent effect, which promotes rapid healing of tissues and mucous membranes. Anthocyanins are powerful antioxidants, freeing it from decay products. Alpha-linoleic acid in tandem with various components relieves inflammation, rejuvenates the body, and heals wounds. Tannins have a positive effect on the condition of the skin and mucous membranes. They reduce inflammation and irritation. Black walnut contains a unique substance with unique properties - juglone. It is a natural preservative and antibiotic with antifungal and antiparasitic effects. The structural formula of juglone is shown in Fig. 1.

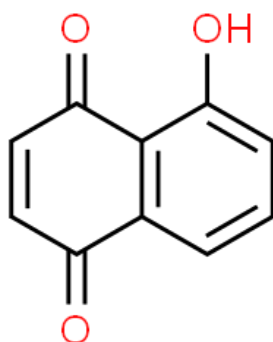


Fig. 1 Structural formula of juglone

It has a slight laxative effect. The substance is not classified as toxic, but it has a powerful effect on cancer cells. On the basis of black walnut, drugs are created that are needed in the treatment of cancer. The shell of an unripe walnut contains vitamin C, the amount of which is 50 times more than in citrus fruits. The entire green mass of the tree has healing properties: leaves, branches, and bark contain a unique set of components. They are the basis for the preparation of infusions and decoctions. Black walnut has phytoncidal and antispasmodic effects, prevents the development of tumours [14].

The characterization of the chemical composition of *Juglans regia* L. is usually limited to the assessment for the presence of polyphenolic compounds, mainly tannins, which significantly narrows the range of

possible medical uses of raw materials and phytopreparations of *Juglans nigra* L.

Medicinal plant materials harvested from black walnut are characterized by a higher content of the sum of tannins in terms of tannin and the sum of naphthoquinones in terms of juglone than medicinal plant materials harvested from other species of the genus *Juglans* - walnut (*J. regia* L.) and gray walnut (*J. cinerea* L.) [16].

The pharmacological activity of biologically active substances (BAS) of black walnut has been studied and described in a number of scientific publications. The effect of total extracts obtained using ethyl alcohol of different concentrations was mainly studied. Some works describe the pharmacological effects of individual phenolic compounds isolated from medicinal plant material of black walnut [16].

The antibacterial effect of black walnut phenolic compounds was established against a number of microorganisms from different taxonomic groups, with a minimum inhibitory concentration in the range from 125 to 500 mg/ml [17]. Using the agar diffusion method, the antibacterial activity of black walnut kernel extracts against the gram-positive bacterium *Staphylococcus aureus* was found, which is associated with the content of quercetin-3-O-glucoside, quercetin, agnuside, and eriodictyol-7-O-in A [18]. The antibacterial effect of black walnut preparations is also due to the presence of the naphthoquinone juglone in their composition. It has been established that juglone isolated from natural raw materials and obtained synthetically has antimicrobial and antifungal activity [19-25].

Black walnut has been studied in Ukraine since 1809. Black walnut has unique pharmacological properties. It is 4-5 times higher than walnut in terms of the content of BARs, juglone and flavonoids. The hull of unripe fruit contains more vitamin C than black currant, it contains vitamins A, B, PP, essential oils, sugars, quinones, tannins, ellagic and gallic acids, naphthalene, quercetin, catechin, hyperazide, kaempferol, etc. Such a complex of rare organic compounds, diverse vitamin and trace element composition has led to its widespread use in medicine since ancient times. In terms of the spectrum of therapeutic effects, immunocorrective and antioxidant properties, black walnut has no analogues in the plant world. Black walnut has recently become the subject of multilateral research, including in pharmacy, as a potential source of medicinal plant material containing naphthoquinones. This class of BAS is associated with the fact that the fruits of black walnut have long been used by North American Indians as an antiparasitic agent [26-28].

In the ethnomedicine of the indigenous population of North America, all parts of the black walnut are used for indications similar to walnut in Asia and Manchurian walnut in the Far East. A decoction of black walnut bark is mentioned by North American Indians (Cherokee, Delaware, Iroquois and Meskwaki) as an analgesic, antiemetic, and topically applied to toothache, headache, and snake bites. The Comanche

used black walnut leaf powder to treat shingles, and the Delaware used the leaves as an insecticide to repel fleas. The kernels of the walnut are edible, so the indigenous peoples of North America eat them [29]. Different parts of the black walnut have been used in one form or another to relieve fever symptoms, treat kidney disease, gastrointestinal disorders, ulcers, syphilis, and as an antiparasitic agent [30].

Dudnikov M. E. proposed a low-waste technological scheme for processing the fertilization of *Juglans nigra* L., in the process of which it is possible to produce a tincture with antihypoxant, hypoglycemic action and oil extract.

The complex pathogenesis of the wound process necessitates the creation of fundamentally new drugs with multidirectional action. In these circumstances, it is important to create multicomponent ointments containing antibacterial and anti-inflammatory substances, antioxidants, and local anesthetics.

In the topical treatment of wounds, it is important to suppress pain. In this regard, a substance with local anesthetic effect (lidocaine hydrochloride, anesthetic, trimicaine) should be added to the medicine, taking into account such factors as duration and depth of action, level of anesthetic toxicity and time of onset of anesthesia.

When creating new medicines, in addition to finding effective and safe active substances, it is important to choose a rational carrier. Another key to successful wound treatment is a differential approach to treatment depending on the etiology and stage of the wound process. The theory of wet wound healing is still relevant, and therefore modern ointments have a hydrophilic base [31].

Soft medicines made on hydrophilic bases have a controlled dehydrating effect and can affect the release, bioavailability, and therapeutic effect of drugs [32]. Hydrophilic ointments should be used in the early stages of the injury. At the same time, it is quite possible to use them in other phases of the wound process, until epithelialization is complete.

Due to the above properties, water-soluble ointments are effective in treating wounds in all phases of the wound process. Thus, in modern ointments, the base is an active and important component of the products.

Existing drugs are often used for topical drug treatment without taking into account the phase of the wound process, the species composition of the wound microflora, etc. Most of the conventional drugs used have a unidirectional effect: only osmotic (hypertonic solutions, one-component sorbents), only antibacterial (antibiotics, antiseptics) or necrolytic (enzymes), and for the treatment of phase I it is necessary to influence the wound process in at least three directions: increasing the outflow from the wound, suppressing infection, and analgesia [33].

Abroad, scientists are developing ointments [33] for the treatment of dermatoses containing walnut extract, propanolol-1-(1-methylethylamino)-3-(1-

naphthyl-oxy)-propanol-2 and a fat-soluble ointment base. Scientists note that the drug will have anti-inflammatory, antiseptic and anesthetic effects. Unfortunately, no medicines based on walnut and black walnut extracts in the form of ointments with antimicrobial, anti-inflammatory and wound healing effects have been registered in Ukraine.

Experimental walnut preparations "Todicamp" (Moldovan company TODICAMP SRL) have antiparasitic, hepatoprotective and immunomodulatory effects, are effective in case of sphyaciasis, enterobiasis, ascariasis and heterakidiasis. They are superior to albendazole in terms of antichinococcal activity, and walnut preparations are less toxic in comparison with it. The drugs do not have immunotoxic, embryotoxic and teratogenic effects and, according to the classification of K.K. Sidorov, belong to the IV and V toxicity classes as low-toxic and practically non-toxic substances [34].

The State Register of Medicines of Ukraine includes the drug «Juglanex» (Europe-Biopharm NPO CJSC), a liquid extract obtained from fresh walnut fruits. It has anti-inflammatory, antioxidant, capillary-strengthening and venotonic effects. The flavonoids contained in the preparation have P-vitamin activity, reduce capillary permeability, increase their resistance, improve microcirculation, and participate in the enzymatic oxidation of ascorbic acid. Low molecular weight antioxidants: Ascorbate, quercetin, naphthoquinone-yuglone in the ionic medium - together constitute a non-enzymatic antioxidant defence system, inhibit the activity of cyclooxygenase and determine anti-inflammatory activity in changes in prostaglandin metabolism [35].

In modern domestic and foreign medicine, the leaves collected in spring and early summer, as well as the pericarp of the walnut tree, are widely used. Clinical trials have shown that an aqueous extract from the leaves and pericarp have a therapeutic effect in some forms of skin tuberculosis, larynx tuberculosis, and tuberculous lymphadenitis. Preparations based on the pericarp of the walnut tree, such as «Kornon» and «Yuglon» («Pleneta Herbs», Ukraine), are used for skin tuberculosis, eczema, allergies and other skin diseases.

Barabay's monograph notes that naphthoquinones, including: juglone, lawson, lapachol, and plumbagin, have pronounced activity, and the antitumor effect is achieved both by alkylating the DNA of tumor cells and by affecting the enzymes of nucleic acid synthesis [36].

According to researchers, naphthoquinones exhibit their antimicrobial, antiparasitic and cytotoxic activity through several mechanisms, including inhibition of electron transport, uncoupling during oxidative phosphorylation, intercalation of agents into the DNA double helix, restoration of alkylating properties of biomolecules and production of (ROS) under aerobic conditions [37].

Juglon is used in the treatment of burns, infected wounds as an antiseptic, wound healing agent; in the

treatment of gingivitis and other diseases of the oral mucosa as an antibacterial and antifungal agent.

Juglone suppresses the activity of pathogenic microflora, helps to normalize intestinal function. The role of juglone in changing the membrane potential of peripheral lymphocytes and creating a depolarizing effect has been proven. Juglon inhibits the activity of phosphatidylinositol 3-kinase, which indicates its anticarcinogenic properties, while no toxicity was found, which is inherent in other cytostatics. Juglon has a wide range of antibacterial activity, both against gram-positive microorganisms (*Staphylococcus aureus*, *Streptococcus mutans*) and gram-negative microorganisms (*Escherichia coli*, *Pseudomonas aeruginosa*), as well as pathogenic yeast fungi (*Candida albicans*) [38].

The specific mechanism of antibacterial activity of Juglone against *Staphylococcus aureus*, which is most often inherent in diseases of infectious or toxic nature caused by food poisoning, has been proved. The experiment revealed changes in the content of DNA and RNA and quantification of oxidative damage and found that Juglone effectively increases the expression of oxidoreductase protein and creates peroxide in the cell, which significantly reduces cell wall formation and increases membrane permeability [39].

The complex of pharmacological properties of Juglone (anti-inflammatory, wound healing, antimicrobial, disinfectant, epithelializing) determines its effectiveness in the treatment of various skin diseases (acne, eczema, boils, skin tuberculosis, pyoderma, etc.) [41-42].

Also, the laboratory of antimicrobial agents of the SI IMI NAMS conducted studies and found high and moderate antimicrobial effect of walnut (*Juglans regia* L.) and black walnut (*Juglans nigra* L.) extracts, the antibacterial effect of Juglone and its derivatives against pathogenic microorganisms *Porphyromonas* spp, *Streptococcus mutans*, *Actinobacillus viscusus*, *S. sobrinus*, *S. salivarius* was proved [40].

Conclusion. Based on the above, the development of a new medicinal product based on plant materials - extracts of black walnut (*Juglans nigra* L.) and walnut (*Juglans regia* L.) in the form of an ointment with antimicrobial action for the treatment of infected wounds is relevant and promising.

Current aspects of the medical application of walnut (*Juglans regia* L.) and black walnut (*Juglans nigra* L.) (review)

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Recently, in the development of local medicines for the treatment of wounds, the interest of researchers in the use of plant raw materials that have antimicrobial, anti-inflammatory and reparative properties does not disappear. It is known from literary sources that among the plant substances that can be used in the treatment of wound infection, walnut (*Juglans regia* L.) and black walnut (*Juglans nigra* L.) nut family – *Juglandaceae*. The medical use of walnut in medicine and cosmetology is found in all parts of this plant: fruits, green pericarp,

leaves, bark of branches and roots. Walnut leaves were used in the form of infusions and decoctions in the treatment of purulent and fungal lesions of the skin, pulmonary and other forms of tuberculosis, diabetes mellitus, diseases of the mucous membrane of the mouth and throat, thrush, vitamin deficiency. Black walnut should not be confused with walnut. Although they belong to the same family, they have significant differences. For a long time, the medicinal properties of *Juglans nigra* remained unexplored. The beneficial properties and contraindications of black walnut largely depend on the composition of the kernels, as they are most often the basis of biologically active supplements. Ripe fruits contain eight fatty acids, up to 30 % protein and 7 % carbohydrates. Juglone found in nuts is of great importance for health. The substance has an antifungal, antiparasitic, antimicrobial effect, improves intestinal function, restores the mucous membrane. Juglone inhibits the activity of phosphatidylinositol-3-kinase, which indicates its anticarcinogenic properties, while the toxicity inherent to other cytostatics was not detected. Juglon has a wide range of antibacterial activity, both in relation to gram-positive microorganisms (*Staphylococcus aureus*, *Streptococcus mutans*), and in relation to gram-negative microorganisms (*Escherichia coli*, *Pseudomonas aeruginosa*), as well as to pathogenic yeast fungi (*Candida albicans*). The complex pathogenesis of the wound process necessitates the creation of fundamentally new drugs with multidirectional action. Under these circumstances, it is important to create multicomponent ointments containing antibacterial and anti-inflammatory substances, antioxidants, and local anesthetics. The antibacterial effect of juglone and its derivatives against oral pathogens *Porphyromonas* spp, *Streptococcus mutans*, *Actinobacillus viscusus*, *S. sobrinus*, *S. salivarius* has also been proven. The complex of pharmacological properties of juglone determines the effectiveness in the treatment of various skin diseases. Based on the above, the development of a new original combined medicinal product based on plant raw materials - extracts of black walnut or walnut, antiseptic miramistin and anesthetic lidocaine hydrochloride in the form of an antimicrobial ointment for the treatment of wounds and wound infection is expedient and promising. In the laboratory of antimicrobial agents of SI IMI NAMS studies on antimicrobial activity were conducted and high and moderate antimicrobial effect of extracts of walnut (*Juglans regia* L.) and black walnut (*Juglans nigra* L.) was established, the antibacterial effect of *Porphyromonas* spp, *Streptococcus mutans*, *Actinobacillus viscusus*, *S. sobrinus*, *S. salivarius* was proved [40]. **Conclusion.** Based on the above, the development of a new original combined medicinal product based on plant raw materials - extracts of black walnut (*Juglans nigra* L.) and walnut (*Juglans regia* L.), antiseptic miramistin and anaesthetic lidocaine hydrochloride for injection. relevant and promising.

Keywords: walnut (*Juglans regia* L.), medical application, black walnut (*Juglans nigra* L.)

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