DRUGS PREPARED BASED ON THE HAWTHORN PLANT

Muxsinova Shaxlo Mulximovna

Assistant Samarkand State Medical University

Turdimuratova Aynura Alauatdin qizi

Ismatova Raksana Ashur qizi

Students Samarkand State Medical University

Abstract: Hawthorn is a shrub that mainly grows in the temperate regions of the Northern Hemisphere and is one of the most studied phytotherapeutic agents with proven efficacy. The fruits of the plant are used in clinical practice as cardiotonic, spasmolytic, and sedative agents. They also help normalize heart activity, blood circulation, blood pressure, and blood sugar levels. The main active substances in dog-rose include flavonoids and triterpenic acids, as well as pectin, sucrose, and essential oils. Drugs prepared from dog-rose have cardiotonic effects. They increase myocardial contraction but reduce its excitability; triterpenic acids improve blood circulation in coronary and cerebral vessels, enhance the sensitivity of the heart muscles to the effects of cardiac glycosides, and eliminate pain and discomfort in the heart area. Dog-rose preparations are used for the complex treatment of heart activity disorders, cardialgia, climacteric syndrome, hypertension, and functional disorders of astheno-neurotic diseases. In medicine, alcoholic tinctures, as well as liquid and thick extracts from flowers and fruits, are used.

Keywords: Rosacea, flavonoid, hyperoside, terpenoid, polyphenol, cardiotonic, hypotensive effect.

ЛЕКАРСТВЕННЫЕ СРЕДСТВА, ПРИГОТОВЛЕННЫЕ НА ОСНОВЕ РАСТЕНИЯ БОЯРЫШНИК

Мухсинова Шахло Мулхимовна

Ассистент Самаркандского государственного медицинского университета

Турдимурадова Айнура Алауатдин кизи
Исматова Раксана Ашур кизи
Студенты Самаркандского государственного медицинского университета

Аннотация: Боярышник - кустарник, произрастающий в основном в умеренных регионах Северного полушария и являющийся одним из наиболее изученных фитотерапевтических средств с доказанной эффективностью. Плоды растения используются в клинической практике в качестве кардиотонических, спазмолитических и седативных средств. Они также помогают нормализовать сердечную деятельность, кровообращение, кровяное давление и уровень сахара в крови. Основными активными веществами шиповника являются флавоноиды и тритерпеновые кислоты, а также пектин, сахароза и эфирные масла. Препараты, приготовленные из шиповника, обладают кардиотоническим действием. Они усиливают сокращение миокарда, но снижают его возбудимость; тритерпеновые кислоты улучшают кровообращение в коронарных сосудах и сосудах головного мозга, повышают чувствительность сердечной мышцы к воздействию сердечных гликозидов, устраняют боль и дискомфорт в области сердца. Препараты шиповника применяются для комплексного лечения нарушений сердечной деятельности, кардиалгий, климактерического синдрома, гипертонической болезни, функциональных нарушений астено-невротических заболеваний. В медицине используются спиртовые настойки, а также жидкие и густые экстракты из цветков и плодов.

Ключевые слова: розацеа, флавоноид, гиперозид, терпеноид, полифенол, кардиотонический, гипотензивный эффект.

Hawthorn (lat. Crataegus) – is a genus of leafy, green tall shrubs or small trees belonging to the Rosacea family. There are 890 species in total, with 10 species growing in Uzbekistan. The species such as black hawthorn, yellow hawthorn, and red hawthorn are cultivated as ornamental plants. It grows in the mountainous

regions of Uzbekistan. It is widely used as a medicinal plant. The species with large fruits are commonly consumed. Hawthorn is a tree or shrub that usually grows 3–5 meters tall, sometimes reaching up to 10–12 meters. It often grows with multiple stems or in a bush form. It can live up to 400 years. Its crown is dense, round, spherical, or oval. The bark of the hawthorn is brown or gray. Its branches are strong and grow straight. Many species have numerous thorns, which are usually leafless and range from 0.5–1 cm up to 6–7 or even 10 cm long, with fewer leaves. European and Asian species have small or no thorns at all. The buds are oval, conical, or elongated, pointed or often blunt, 2–10 mm long. The leaf edges are coarsely toothed and lobed like a paw. Leaves are arranged spirally, often clustered at the tips of short buds, oval or elliptical, sometimes rounded or rhomboid, entire or truncated, 1–12 cm long, either smooth or densely hairy. The North American hawthorn is distinguished by entire leaves and large, strong thorns. In autumn, some hawthorn leaves turn bright colors such as gold, dark orange, and purple, and in many species, they retain their color for a long time before turning green or brown. The flowers are small, 1–2 cm in diameter, grouped in clusters. The fruit is small, 0.5–4 cm in size, ripening in September-October. Hawthorn fruits are spherical, pear-shaped, or elongated. The color depends on the species and variety: it can be pale orange-yellow, red, bright orange, or rarely almost black. Fruit size varies with color. Red hawthorns have a diameter of only 5–7 mm, while the large-fruited American types can reach 3–4 cm. Most hawthorns produce fruit annually and are highly productive. Depending on the species, one tree can yield 10 to 50 kg of fruit. The fruit contains 1 to 5 seeds. The flowers bloom in spring or early summer and have an unpleasant smell. They are mainly pollinated by various types of flies, as well as beetles and bees. For medicinal purposes, flowers are collected in dry weather, and fruits only after full ripening. Hawthorn fruits stand out due to the diversity of biologically active compounds they contain. Chemical analysis of the plant reveals over 150 compounds, including flavonoids, terpenoids, steroids, organic acids, monosaccharides, and pectins. The most important biologically active substances

in hawthorn raw materials are flavonoids and proanthocyanidins. These flavonoids and proanthocyanidins largely provide various biological activities of hawthorn extracts, such as cardiotonic, antiarrhythmic, hypotensive, hypolipidemic, antidepressant, diuretic, and antioxidant effects. Flavonoids maintain the permeability and fragility of blood vessels. Proanthocyanidins improve blood circulation, reduce swelling, moisturize the skin, and lower cholesterol. Hawthorn is highly valued biologically, partly due to the high content of vitamin C in its fruits. It positively affects the condition of capillaries, increases their strength, and improves the function of muscles, including the heart muscle. The plant contains macroelements such as calcium and microelements including manganese, nickel, zinc, bromine, strontium, rubidium, iron, calcium, iron, and zinc in high amounts. Besides minerals, hawthorn fruits are rich in B vitamins, especially folic acid. Hawthorn fruits contain carbohydrates such as glucose (2.02 mg/g), fructose (2.21 mg/g), sucrose (0.23 mg/g), arabinose (1.82 mg/g), xylose (3.88 mg/g), mannose (4.25 mg/g), galactose (1.31 mg/g), as well as more than 150 other substances including carotenoids, tannins, oils, pectins, monoterpenoids, triterpenoids, flavonoid glycosides, sitosterol, choline, sugars, vitamins, steroids, hydroxycinnamic acid, organic acids, and nitrogen. Hawthorn fruits contain ursodeoxycholic acid, a unique compound that combines antibacterial, anticancer, anti-inflammatory, hepatoprotective (liver-protecting), and vasodilatory properties. This component also stimulates collagen production in the body. Ursolic acid is important for bile production and helps normal functioning of the gastrointestinal tract. It reduces the level of free radicals. Because of these properties, hawthorn can be used to prevent the growth of malignant cells. Due to the presence of pectin, hawthorn helps in treating poisoning with harmful toxins and heavy metal salts. The flowers and leaves of the plant are used to treat dermatitis. Hawthorn fruits lower blood sugar levels and are a low-calorie product. Hawthorn is rich in antioxidants that help boost immunity. Hawthorn fruits are used in cardiology as cardiotonic and antiarrhythmic agents. The biologically active components reduce the excitability of the heart muscle, improve its contractility, normalize heart

rhythm, and improve the walls of blood vessels and coronary circulation. Hawthorn helps lower blood pressure, improves the functioning of blood vessel walls and venous blood flow, and dilates peripheral and internal organ vessels. The blood pressure reduction occurs through its direct myotropic, spasmolytic, sedative, and diuretic effects. The hypotensive effect of hawthorn is associated with the presence of flavonoids, primarily hyperoside, vitexin, and triterpenic acids. Hyperoside lowers blood pressure, has a calming effect, and improves blood circulation. The nature and combination of flavonoids in various hawthorn raw materials (leaves, flowers, fruits) determine their antihypertensive activity. Hawthorn flavonoids exert a spasmolytic effect on coronary and cerebral vessels, as well as internal organ vessels (bile ducts, intestines, uterus, bronchi), show antioxidant properties, enhance collagen bonding in blood vessel endothelium, and strengthen blood vessels. Tannins in hawthorn inhibit the production of the angiotensin-converting enzyme and prevent the formation of angiotensin II, resulting in lowered blood pressure. Hawthorn preparations have anti-atherosclerotic effects, influencing plasma and endothelial levels of atherogenic lipoproteins. The flavonoids and pectins in hawthorn extract reduce blood cholesterol levels. The decrease in total cholesterol, triglycerides, and low- and very low-density lipoproteins occurs due to hawthorn components like catechins, triterpenoid saponins, and quercetin (a bioactive supplement). As a result, the development of atherosclerosis is prevented or its progression slowed if it has already begun. High levels of triglycerides and increased low-density lipoproteins can lead to the development of atherosclerosis or the formation of atherosclerotic plaques in blood vessels. These plaques can completely block the blood vessel, which may cause a heart attack or stroke. Studies have shown that treatment with hawthorn extract in rats reduced total cholesterol and low-density lipoprotein levels. Patients with atherosclerosis who took hawthorn extract experienced a significant reduction in the thickness of plaques in the carotid artery.

Additionally, hawthorn flavonoids help improve metabolic processes, microcirculation, and permeability of blood vessel walls. They exhibit antioxidant,

capillary-strengthening, and choleretic (bile-promoting) properties and help normalize digestion. Hawthorn increases the secretory activity of pancreatic beta cells, which helps lower blood glucose levels. Because of its blood glucose-lowering and metabolic-improving properties, hawthorn plays an important role in the treatment of diabetes, atherosclerosis, arterial hypertension, and heart failure. Hawthorn preparations also help reduce psycho-emotional stress. The antidepressant activity of hawthorn is linked to the flavonoid hyperoside and chlorogenic acid found in its fruits. The antidepressant effect of chlorogenic acid develops by preventing reactive monoamine oxidase activation. The hydroxycinnamic acid in hawthorn aids digestion, improves liver function, and supports kidney function. Hawthorn fruits contain fibers that improve metabolism, reduce the risk of constipation, and act as prebiotics (components of food that are not digested in the stomach but reach the large intestine and support healthy intestinal microflora). Compounds in hawthorn fruits also stimulate the production and activity of digestive enzymes. When hawthorn fruit extract was given to rats with liver disease, inflammation levels and organ damage were significantly reduced. Hawthorn fruits are an excellent source of polyphenols, which have strong antioxidant properties. Polyphenols are a diverse group of micronutrients with antioxidant and anti-inflammatory effects. They reduce the risks of type 2 diabetes, asthma, osteoporosis, and premature aging. They also benefit blood vessels and lower the risk of stroke. Hawthorn fruits prevent premature skin aging caused by excessive exposure to sunlight or ultraviolet rays, which leads to a decrease in collagen levels in the skin. There are also contraindications for hawthorn. If symptoms such as excessive sweating, headache, unpleasant sensations in the heart, gastrointestinal disorders, or drowsiness occur after consuming hawthorn, its use should be stopped. Hawthorn enhances the effects of blood thinners, blood pressure-lowering medications, and drugs used to treat heart failure. Frequent and prolonged use of hawthorn decoctions can lead to serious heart diseases and cause a decrease in blood pressure. It should also be noted that people with low blood pressure, pregnant women (due to increased risk of bleeding

and premature birth), and breastfeeding mothers should not consume tea made from hawthorn fruits. Excessive doses of the drink can cause nausea, migraine, and even poisoning. It is not recommended to use hawthorn preparations before surgery (because it reduces blood clotting). Any form of hawthorn is not advised for people allergic to its plant components. To prevent allergic reactions, it is recommended to start with a small amount. Hawthorn should not be taken on an empty stomach, as this can cause severe muscle spasms. Use of hawthorn in any form is not recommended for children under 10 years old. Always consult a doctor before consuming hawthorn fruits. Hawthorn is stored dried or frozen. Proper preparation of raw materials for storage is very important: damaged flowers and fruits should be removed, and drying should be done in a warm, dry, well-ventilated room. An oven or electric dryer can be used. It can be stored in glass containers or tightly sealed wooden boxes. Drying preserves more beneficial substances. To prepare hawthorn drink, add 6-7 tablespoons of dried fruits to 2 liters of boiling water, cover the thermos after 10-15 minutes, and keep the drink for one day. After that, it can be consumed hot or cold with added honey.

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