

The use of Harmala ordinary (Wild rue, Burial ground) in ancient and modern medical practice: an overview

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The use of Peganum harmala in ancient and modern medical practice: review

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#### SUMMARY

The article is a review of scientific literature on the use of harmala (*Peganum harmala* L.) in ancient, modern folk and scientific medicine (for the period from 1973 to 2014) in Russian, Tajik, Uzbek, English, German. Attention is focused on the chemical analysis of biologically active substances of harmala, the results of experimental studies and the prospects for application in modern clinical medicine.

Key words: burial ground, ordinary harmala, *Peganum harmala*, wild rue, harmaline, harmalol, peganin, oriental medicine, folk medicine.

#### RESUME

The review of the scientific literature on the use of *Peganum harmala* in ancient, modern folk and scientific medicine (for the period from 1973 to 2014) in Russian, Tajik, Uzbek, English and German languages is presented. The attention is focused on the chemical analysis of biologically active substances of harmala, the results of experimental studies and future applications in modern clinical medicine.

Keywords: harmala, wild rue, *Peganum harmala*, harmaline, vasicine, eastern medicine, folk medicine.

#### General information

*Peganum harmala* L. is a well-known and very popular medicinal plant in the East. Since ancient times, Harmala has been used both in folk and traditional medicine. There is no family in the countries of Central Asia, wherever they know it and do not use it. In addition, the burial ground is a good dyeing plant. An excellent red dye, the so-called "Turkish", was extracted from its seeds, which was widely used to dye Turkish national headdresses - fez. The red pigment of the plant's seeds can be used to dye carpets.

Botanical description. The burial ground is a perennial herbaceous plant 20–80 cm tall, with a strong specific odor. Leaves twice or three times incorrectly triple-dissected into lanceolate-linear pointed lobes. Flowers are pale yellow or white, one at a time on short stalks. Sepals - 5, often tripartite, 11–25 mm long.

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- 5, 1.2-2.5 cm long. Fruit - flattened, spherical, three-celled and

tricuspid capsule (1–1.2 cm in diameter). Seeds are numerous, brown or dark brown, angular, finely tuberous, about 4 mm in length. Blossoms and bears fruit in May-August.

Ecology. The burial ground grows on saline, clayey soils and sands, near wells in desert pastures, along cattle driving paths, on rocky areas, along mountain says, on wastelands, along roads, rarely like a weed in crops. Found in the steppes and deserts of Central Asia. It often forms clean thickets at an altitude of 450–3700 m. In Bukhara and Kashkadarya regions, it is also found in urban gardens as a weed [13].

Chemical composition. Burial ground is a poisonous plant, its poisonousness due to the content of a significant amount of alkaloids (in the roots - 1.5-3.5%, in the leaves - 1-5%, in the flowers - 2-3%, in the fruit boxes - 1.0-1.5%, seeds - 2 , 8-5.0%). The following alkaloids have been isolated and identified: harmine, harmaline, harmalol, peganin, deoxypeganin, peganidine, peganol, pegamine, dipegin, quinoline, quinaldine,  $\beta$ -carboline, etc. (17 bases in total) [8, 14, 21, 41, 39] ... It was found that as the burial ground develops, the content of peganin decreases, while the amount of harmine increases.

In addition to alkaloids, a red dye and 10–25% of a drying fatty oil were isolated from the seeds of the plant. The aboveground parts of the burial ground contain 24% protein, 4% fatty oil and 31% extractive substances. Proteins from harmala seeds have pronounced antioxidant, antitumor, and antifungal activity [37, 47].

#### Application in ancient medicine

The burial ground (isband), as well as haoma (ephedra), was one of the most popular medicines in ancient oriental medicine. In the "Avesta" (VII-V centuries BC) it is described as a sedative and deodorizing agent. They fumigated the sick, temples and corpses. Dioscorides (1st century) recommended harmala for the treatment of visual impairment (for this, it should be rubbed with honey, wine, partridge or chicken bile and fennel juice). Abu Hanifa Dinawari (815–895) wrote that decoction of harmala roots was used to treat lingering fever [15].

Ancient medicine defined the nature of the burial ground as hot in the III degree and dry in the II degree [1, 6, 3, 5]. Reception of the burial ground cleans the organs of the chest and lungs from sticky moisture, dispels the winds of the intestines, dissolves condensed matter, increases the strength of the flesh to cold natures, makes the body well-fed, drives urine, milk, menstruation; removes black bile and thick phlegm through diarrhea, removes tapeworm [2, 13, 10].

The harmala powder was recommended for epilepsy, paralysis, insanity, memory loss and other "cold" diseases associated with the brain and nerves. The burial ground warms all organs, treats colitis, sciatica and dropsy. Here are some ancient recipes. The dose for the reception of the burial ground can be up to 9 g (orally) [10].

Recipe 1. Soak 300 g of the dried burial ground in 2 liters of sweet water for a day. Then clarify this water. It was believed that if you consume daily

100 g of this water, then it will crush all the black-bile substances and purify the blood.

Recipe 2. Crush 25 g of the burial ground and boil in 100 g of water, then clarify the broth and drink with 75 g of honey and 50 g of sesame oil. As a result, it will lead to severe vomiting and cleanse the organs of the chest and upper body of "sticky matter", cure asthma and wet coughs [1, 10].

Recipe 3. Crush 300 g of a dry burial ground and boil in 9 liters of grape juice until a quarter of its amount remains. It was believed that if you drink 50 g of this composition, then harmala will cure epilepsy, chronic headache and infertility.

Recipe 4. With sciatica, drink burial powder with saffron and chicken egg yolk.

Recipe 5. Mix 100 g of burial herb powder with 100 g of flax seeds and grind the mixture with 1.5 kg of honey. It was believed that if you use this composition one spoonful 3 times a day, then it will cure asthma, provided there is no high blood pressure [5, 10].

Recipe 6. Water a decoction of harmala herb on weakened organs, and it will strengthen them, remove numbness.

Recipe 7. Mix the harmala herb powder with dill oil and smear the navel and groin area. It was believed that this would cure chronic colitis.

Recipe 8. Hot dressings with heated powder from the burial ground to treat paralysis, weakening of the limbs, pain due to winds. If one-third of its weight is added to the burial ground powder, ginger powder, a dough with nightshade herb juice, tied to weakened organs and sitting in the sun, the effect will be stronger [5, 10].

Recipe 9. Harmala oil. To obtain oil, harmala herb is boiled in turba (radish) juice, then it is clarified. The same amount of olive oil is added to this broth and boiled until all the water has evaporated. The harmala oil is hot in the III degree and dry in the II degree. When applied externally and internally, it warms organs, treats paralysis, numbness of the limbs. It was believed that if you do enemas with this oil, then it cures low back pain, sciatica, kidney coldness [10].

Recipe 10. If you sprinkle grass powder in a room, then all harmful insects will leave it [1].

Recipe 11. If you crush the root of the burial ground, mix it with mountain iris oil and insert it into the anus, then such a medicine will open the mouth of the hemorrhoids and remove the blood stagnant there [11].

Recipe 12. Soak a piece of wool or cotton wool in the milky juice of harmala many times until they begin to smell. This cotton wool should be used to rub the skin affected by scabies and sunbathe in the sun [5].

Contraindications It was believed that ingestion of harmala herb is harmful to people with a hot nature - it leads to headaches, nausea. This is eliminated by the intake of acidic foods, vinegar [10].

#### Application in modern traditional medicine

Garmala is one of the most popular medicines in Central Asian traditional medicine. Tajiks fumigate patients with paralysis with this plant, and poultices are made from the leaves for tumors. Decoction of seeds with flax seeds or

sesame seeds treat asthma, shortness of breath, rheumatism; used as a sedative, choleric, diuretic and diaphoretic [4, 15]. Local residents of some regions of Northern Tajikistan make an ancient "special" medicine from the burial ground. To do this, the burial bush at the beginning of its growth is closed with an old battered (with cracks or holes) cauldron so that air can flow. The burial ground continues to grow and within several weeks a layer of sticky resinous substance is formed from its secretions on the walls of the cauldron, which is scraped off with a knife. This "substance" is considered the most effective medicine from the burial ground for all ailments [15].

The burial ground has long been used to treat skin and colds, malaria, fever, epilepsy, as well as an antihelminthic and hypnotic agent. "Tea" from the aerial parts of the plant is drunk for neurasthenia, seizures, syphilis, for kidney disease, they rinse their mouth with gum disease, and are used externally for eye diseases [7, 15].

Among the people, a burial ground called "Khazorispand" ("medicine for a thousand diseases") is drunk in the form of a decoction for paralysis and measles. He helps women in labor, as well as animals (calving cows, sheep, etc.) - they are fumigated with this herb. In this case, the spell is pronounced three times. The people also believe that fumigation with this plant protects a person from any "unclean and disease-causing force" and "evil eye" [13, 15]. In ancient times, harmala (Ispand) was also lit and pronounced "suf-kuf" several times. When the Ispandha smoke passes under the raised clothes, the fumigated person sneezes and "spoilage comes out of him." Hazorispan is still placed in a cradle, under bedding and mattresses, and worn under clothing on the body "from the evil eye" [15, 12].

Seeds (up to 10 pieces per day) are eaten for gastrointestinal diseases and as a choleric agent [12]. Plant baths are taken for skin diseases associated with metabolic disorders [13, 15], and are used in the treatment of childhood paralysis [19].

The above-ground parts of the burial ground, oregano and ferula root (in equal parts) are mixed, poured over with water, and boiled to a resinous state. The resulting thick sticky extract is wrapped in cloth and applied to carbuncles, boils, boils.

In folk medicine of Kazakhstan, harmala herb baths are taken for rheumatism. To do this, take 100 g of grass per 10 liters of water, boil in a closed vessel for 15–20 minutes, then cool, filter and pour into a bath with warm water (30–40 ° C). Baths are taken for 10-15 minutes, after 2 days. The course of treatment consists of 10 baths. In addition, a decoction from the aerial parts of the plant is used to treat skin diseases. In Moroccan folk medicine, water infusions of burial seeds are used as an antitumor agent for skin cancer and as an abortive agent [19].

The plant is very popular in Iranian traditional medicine as anti-inflammatory, sedative, antineoplastic agent [39]. Some doctors of traditional medicine in Central Asia still use the grass and seeds of the burial ground very widely in their practice. "Majun", described by Avicenna and consisting of burial seed powder, flax and honey, for example, was used as

symptomatic antitussive agent in 120 patients with various colds at the age of 3 to 65. In all cases, this remedy within 5-10 minutes. relieved cough, while exerting an expectorant effect. A particularly effective remedy was found for coughs of allergic genesis [13].

In case of allergic diseases, a powder of 5-7 seeds of the burial ground is still prescribed inside. Oil from the burial ground is used for external treatment of facial nerve neuritis with a positive effect and a significant reduction in the duration of the disease [13].

### Research results

Harmala has been used in scientific medicine since 1928. It has been experimentally and clinically shown that salts of the alkaloid harmine are effective in treating the consequences of epidemic encephalitis, tremors and Parkinson's disease. Under the influence of harmine in patients, voluntary movements improve, which become faster and more free.

Garmin has an exciting effect on the central nervous system, lowers blood pressure, quickens breathing, relaxes the muscles of the intestines, uterus, heart and expands peripheral vessels, has a high antibacterial activity [41]. This alkaloid has a detrimental effect on the causative agents of leishmaniasis [33, 30] and teleriliosis [38]. The analgesic properties of harmine have been described [40].

In high doses, harmine causes seizures. Harmine is currently excluded from the drug range. The alkaloid peganin in the form of peganin hydrochloride has recently been approved for use in medical practice as an anticholinesterase agent for myopathy and myasthenia gravis, as well as a laxative for constipation and atony [13].

Peganin hydrochloride in experimental studies is stronger than the drug omeprazole inhibits the secretory activity of the stomach, has a gastroprotective effect [46]. 1% broth and 0.25% solution of peganin and peganidin have very strong antimicrobial properties. [41]. Modern research has confirmed many other beneficial properties of harmala, known since antiquity. This is how the antiseptic properties of the burial ground smoke were confirmed, which are associated with the presence of harmine [43]. Pharmacological studies of 1% and 10% infusions from the aboveground part of the burial ground have shown that they have anti-staphylococcal (*Staphylococcus aureus*) activity [41]...

Seed preparations from the burial ground have shown pronounced antitumor properties [35]. According to the results of experimental studies, a similar effect of the herb is associated with alkaloids [23], and the most potent antitumor agent of harmala is harmine, and the most potent antiproliferative agent is peganin [36].

Three biologically active compounds from the seeds of an alkaloid burial ground (harmine, harminol, harmaline) reliably exert a vasodilating effect [44, 45, 31]. The same alkaloids have an anti-thermal effect [17]. Experimentally, a pronounced bactericidal effect of  $\beta$ -carboline alkaloids from the burial ground has been established [41, 31, 42]. Shown them (harmine and harman)

inhibitory effect on the process of platelet aggregation [29, 31]. Also, thanks to  $\beta$ -carboline alkaloids, the seeds and roots of the burial ground inhibit monoamine oxidase, thereby exerting an antidepressant effect [28].

According to preliminary data, the plant is promising in the treatment of Alzheimer's disease [20], and harmine and harmaline prevent the pathogenic effect of dioxins by inhibiting specific enzymes [24, 25, 26].

Modern toxicological studies have made it possible to establish that water extracts of the plant have an inhibitory effect on spermatogenesis [27]. In case of harmala poisoning, various neurological disorders are noted, as well as an increase in blood pressure, respiratory depression, up to paralysis of the respiratory center, hallucinations, and gastrointestinal disorders [9, 34, 48, 18]. Lethal cases of using the preparations from the burial ground have also been described [19].

#### conclusions

1. The carried out information and analytical research allowed to establish that common harmala is a promising plant for obtaining preparations of various spectrum of action.

2. The high toxicity of the repository alkaloids does not allow the use of it for self-medication or as an over-the-counter medicine.

3. Taking into account the area of ordinary harmala, the medical use of this plants on the territory of the Russian Federation should be carried out with extreme care and within the existing legal space.

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