

THERAPEUTIC POTENTIAL OF SELECTED MEDICINAL PLANTS DISTRIBUTED IN GEORGIA: A COMPARATIVE REVIEW OF PHARMACOLOGICAL ACTIVITY, CLINICAL EFFICACY, AND SAFETY

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Abstract

The scientific evaluation of medicinal plants distributed in Georgia requires a clear distinction among three related but conceptually different domains: the botanical and geographical occurrence of a plant species, experimental or monographic evidence of pharmacological activity, and the strength of clinical evidence obtained in humans. The present source-based narrative review evaluates three medicinal plants with distinct pharmacognostic and therapeutic profiles: *Hypericum perforatum* L., *Valeriana officinalis* L., and *Allium sativum* L. The first two species are widely represented in the natural vegetation of Georgia, whereas *Allium sativum* is an ancient cultivated medicinal and food plant with a long history of use in the country. The review is based exclusively on the books supplied for the study: *Cultivation of Medicinal Plants* by Roza Bidzinashvili and Nino Eradze, the CENN field guide *Plants of Georgia*, Niko Ketskhoveri's *Vegetation of the Georgian SSR*, *PDR for Herbal Medicines*, and Andrew Chevallier's *Encyclopedia of Herbal Medicine*. No additional scientific databases, internet sources, or contemporary journal articles were used.

The medicinal material of *Hypericum perforatum* consists primarily of the aerial parts collected during flowering. The principal phytochemical constituents described in the reviewed sources include hypericin, pseudohypericin, hyperforin, flavonoids,

xanthenes, catechin-type tannins, procyanidins, and volatile oil. Clinical evidence summarized in PDR for Herbal Medicines includes placebo-controlled studies and comparisons with conventional antidepressants in patients with mild to moderate depressive disorders. At the same time, St. John's wort is characterized by a clinically complex safety profile, particularly because of its potential to induce drug-metabolizing systems and reduce the exposure to medications such as cyclosporine, indinavir, digoxin, and theophylline. Its combination with serotonergic drugs also requires caution.

The medicinal material of *Valeriana officinalis* consists of the rhizome and roots. The monographic sources describe valepotriates, valerenic acid, volatile oil, and additional constituents whose combined effects are associated with sedative, anxiolytic, spasmolytic, and muscle-relaxant activity. A randomized placebo-controlled study involving 121 patients, summarized in the PDR monograph, reported improvement in sleep quality, while Chevallier describes a comparative study in which valerian was evaluated against oxazepam. The overall safety profile is relatively favorable, although drowsiness, gastrointestinal symptoms, and additive effects with other central nervous system depressants remain relevant considerations.

The bulb of *Allium sativum* is the principal medicinal material. Its pharmacologically important chemical profile is associated with alliin, allicin, ajoenes, and other organosulfur compounds. The PDR monograph describes antimicrobial, antioxidant, lipid-lowering, antiplatelet, and fibrinolytic activity. Clinical findings regarding hyperlipidemia are heterogeneous. Some studies report reductions in total and LDL cholesterol, whereas others fail to demonstrate a significant effect, emphasizing the importance of preparation, processing, and product standardization. Major safety concerns include an increased risk of bleeding when garlic preparations are combined with anticoagulant or antiplatelet drugs, gastrointestinal adverse effects, contact dermatitis, and the possibility of chemical burns following prolonged topical exposure.

A comparative analysis of these three plants demonstrates that pharmacological activity, clinical efficacy, and safety do not represent equivalent levels of evidence. Among the reviewed plants, *Hypericum perforatum* has the most extensively described clinical evidence for a defined therapeutic indication, but also the most complex interaction profile. *Valeriana officinalis* has a more favorable safety profile and is primarily supported by evidence related to sleep quality and nervous tension. *Allium sativum* has broad biological activity, but its clinical effects on cardiovascular risk markers vary according to preparation and standardization. These differences illustrate the importance of integrating botanical identification, pharmacognosy, clinical evidence, and safety assessment when evaluating medicinal plants relevant to Georgia.

Keywords: *Hypericum perforatum*, *Valeriana officinalis*, *Allium sativum*, medicinal plants, pharmacognosy, pharmacological activity, clinical efficacy, safety, Georgia.

1. Introduction

The contemporary evaluation of medicinal plants cannot be based exclusively on their historical use, traditional reputation, or geographical availability. The therapeutic significance of a medicinal plant should be considered at several interconnected levels, including botanical identity, the plant organ used medicinally, phytochemical composition, pharmacological effects associated with a particular dose and preparation, clinical outcomes in humans, adverse reactions, and interactions with conventional medications. Together, these factors determine whether the medicinal use of a particular herbal material can be regarded as a sufficiently defined and potentially reproducible intervention.

Georgia possesses considerable botanical diversity and a long tradition of medicinal plant use. These characteristics provide an important basis for integrated pharmacognostic research. Nevertheless, the occurrence of a plant species within the territory of Georgia does not independently establish its therapeutic efficacy. Floristic evidence can verify that a species occurs in a particular geographical area, while pharmacognostic and clinical sources are required to assess its medicinal constituents and therapeutic relevance.

The 2022 CENN field guide *Plants of Georgia* describes *Hypericum perforatum* as a perennial herbaceous species distributed throughout Georgia. It occurs from the lowlands to the subalpine belt and is found in meadows, shrublands, cultivated areas, fields, and forests. The same source describes *Valeriana officinalis* as a species occurring in the forest belt, including forest margins, meadows, shrub communities, and the banks of rivers and wetlands. It is reported from almost all regions of Georgia (CENN, 2022, pp. 188-190, 372-374). Historical geobotanical evidence presented in Niko Ketskaveli's work also records these species in different plant communities, further supporting their association with the natural vegetation of Georgia.

Allium sativum belongs to a different botanical and ethnopharmacological category. Bidzinashvili and Eradze explicitly state that garlic does not occur as a wild species and is one of the oldest cultivated plants. Their textbook also emphasizes its long-standing recognition in Georgia and its description in Georgian medical sources and traditional medical manuals for various preventive and therapeutic purposes. Therefore, in the present review, the concept of medicinal plants "distributed in Georgia" includes both naturally occurring species and a medicinal plant that has been cultivated and widely used in Georgia for a very long historical period. This distinction is maintained throughout the article, and *A. sativum* is not presented as a wild member of the Georgian flora (Bidzinashvili and Eradze, 2021, pp. 531-535).

The three medicinal plants selected for this review deliberately represent different pharmacological and clinical models. *Hypericum perforatum* is one of the most extensively documented examples of a clinically investigated herbal medicine in the supplied literature, particularly in relation to depressive disorders. *Valeriana officinalis* is primarily associated with sedative and sleep-promoting effects and has been investigated in humans, although its mechanism of action appears to be multicomponent and dependent on extract quality. *Allium sativum* represents a food

plant with established medicinal importance whose effects have been associated with organosulfur compounds, platelet function, lipid metabolism, fibrinolysis, and antimicrobial activity. Clinical outcomes, however, are not consistent across garlic preparations.

Combining these different examples within a single analysis makes it possible to evaluate not only their potential therapeutic benefits but also the methodological reasons why biological activity and clinical efficacy must remain distinct concepts. An *in vitro* effect, an effect demonstrated in an animal model, an indication recognized in a Commission E monograph, traditional use, and a randomized clinical trial represent different categories of evidence. Treating them as equivalent may lead to an oversimplified and potentially misleading interpretation of herbal medicine.

Accordingly, the central principle of this review is to preserve the level of evidence presented by the original source. Where a book describes a clinical study, the clinical result is discussed. Where a source describes only a pharmacological mechanism, experimental effect, or traditional use, that information is not converted into a claim of established clinical efficacy.

2. Aim, Objectives, Materials and Methods

The aim of this study is to comparatively evaluate the botanical, pharmacognostic, pharmacological, clinical, and safety characteristics of three medicinal plants that occur naturally or are widely cultivated in Georgia: *Hypericum perforatum* L., *Valeriana officinalis* L., and *Allium sativum* L. The analysis is based exclusively on the books supplied for the study.

The specific objectives were to determine the botanical or cultural relationship of each species to Georgia, identify the medicinally used plant part, summarize the major phytochemical groups described in the sources, evaluate the reported pharmacological mechanisms and activities, separate human clinical observations from experimental and traditional evidence, assess major indications and adverse effects, identify clinically important herb-drug interactions, and compare the overall evidence profiles of the three plants.

The study was designed as a source-based narrative review. Georgian pharmacognostic and cultivation data were obtained from Bidzinashvili and Eradze's *Cultivation of Medicinal Plants* published in 2021. Contemporary botanical distribution within Georgia was evaluated using the CENN field guide *Plants of Georgia* published in 2022. Historical geobotanical context was derived from Niko Ketskhoveli's *Vegetation of the Georgian SSR*. International pharmacognostic, pharmacological, clinical, and safety information was evaluated using the supplied edition of *PDR for Herbal Medicines* and Andrew Chevallier's 2016 *Encyclopedia of Herbal Medicine*. No additional electronic databases, websites, clinical guidelines, or journal articles were incorporated into the analysis.

The information was evaluated within five principal categories. The first category was botanical identity and geographical distribution, for which priority was given to Georgian floristic and medicinal plant sources. The second category was medicinal raw material and phytochemical composition. For *Hypericum perforatum*, the analysis

focused on the flowering aerial parts and the described content of hypericin, pseudohypericin, hyperforin, flavonoids, and related constituents. For *Valeriana officinalis*, the rhizome and roots, valepotriates, valerenic acid, volatile oil, and related constituents were evaluated. For *Allium sativum*, the bulb, alliin, allicin, ajoenes, and other organosulfur constituents were reviewed.

The third category was pharmacological activity. Only effects and mechanisms explicitly presented in the supplied books were included. The fourth category was clinical efficacy. A finding was regarded as clinical evidence only when the source described a study conducted in humans or clearly summarized a clinical outcome. Traditional indications and Commission E monographic recognition were retained as distinct categories and were not automatically interpreted as equivalent to randomized clinical trial evidence.

The fifth category was safety. This included adverse reactions, photosensitization, sedation, bleeding risk, restrictions associated with pregnancy and breastfeeding, and clinically relevant herb-drug interactions.

This methodological approach has important limitations. The supplied edition of PDR for Herbal Medicines was published in 2000, and many of the clinical studies summarized in it reflect an earlier period of herbal medicine research. Chevallier's encyclopedia is a later herbal reference source, but it is not a formal systematic review or clinical guideline. The Georgian medicinal plant textbook combines pharmacognosy, cultivation, traditional use, and evidence from different historical periods. Therefore, the purpose of this article is not to establish the complete evidence standard applicable to medical practice in 2026. Its purpose is to accurately present the types of pharmacological, clinical, and safety information contained in the books supplied for the study.

3. Results and Discussion

3.1. *Hypericum perforatum* L.

Hypericum perforatum is botanically well documented in Georgia. According to the CENN field guide, it is a perennial herbaceous plant, approximately 20-50 cm in height, occurring from the lowlands to the subalpine belt in meadows, shrublands, agricultural fields, open landscapes, and forests. The source specifically states that the species is distributed throughout Georgia (CENN, 2022, pp. 372-374).

Bidzinashvili and Eradze describe St. John's wort as a perennial plant reaching approximately 30-100 cm in height and identify the flowering aerial parts as the medicinal raw material. Their Georgian source describes tannins, resinous substances, volatile oil, hyperin, hypericin, vitamins, nicotinic acid, glycosides, and other constituents (Bidzinashvili and Eradze, 2021, pp. 365-367).

The PDR monograph provides a more detailed phytochemical profile. It describes naphthodianthrone, particularly hypericin and pseudohypericin, together with flavonoids such as hyperoside, quercitrin, rutin, and isoquercitrin. Biflavonoids, xanthones, acylphloroglucinols, particularly hyperforin, volatile oil constituents, procyanidins, catechin-type tannins, and caffeic acid derivatives are also described. Because of this complex composition, the pharmacological effects of St. John's wort

are not attributed to a single molecule. Instead, several constituents and mechanisms may contribute to the overall activity of standardized preparations (Gruenwald et al., 2000, pp. 719-723).

The most important pharmacological direction described in the supplied books relates to the central nervous system. The PDR monograph describes mild antidepressant, sedative, and anxiolytic activity. It also summarizes research associating antidepressant activity with effects on the reuptake of serotonin and other neurotransmitters. Effects on serotonin, noradrenaline, and dopamine reuptake are described, with hyperforin presented as a potentially important contributor.

Chevallier similarly lists antidepressant and anxiolytic actions among the principal effects of *Hypericum perforatum* and notes that clinical research contributed substantially to its use in mild to moderate depression (Chevallier, 2016, p. 106).

The pharmacological profile of *Hypericum perforatum* is not limited to neuropharmacology. According to PDR, oil-based *Hypericum* preparations have anti-inflammatory activity associated with their constituent profile, including flavonoids. The monograph also describes antibacterial activity of hyperforin against Gram-positive bacteria and discusses the relevance of topical preparations in infected wounds and eczematous skin conditions.

The Commission E indications summarized in PDR include depressive mood, anxiety, inflammatory skin disorders, blunt injuries, wounds, and burns. These indications demonstrate an important pharmacognostic principle: preparations derived from the same plant species may be used in different therapeutic contexts depending on formulation and route of administration. Standardized oral extracts are primarily discussed in relation to neuropsychiatric effects, whereas topical oil preparations are associated with skin and soft-tissue applications.

3.1.1. Clinical efficacy and safety of *Hypericum perforatum*

Among the three medicinal plants reviewed, *Hypericum perforatum* has the largest amount of clinical material in the supplied books. PDR describes a meta-analysis of 23 randomized trials involving 1,757 outpatients with mild to moderate depressive disorders. According to the monograph's summary, *Hypericum* preparations were more effective than placebo, and adverse effects were reported less frequently than with conventional antidepressants. However, the summarized literature also contained variation in standardization, diagnostic criteria, and dosing. This is important because a positive overall result does not establish equal efficacy for every St. John's wort preparation (Gruenwald et al., 2000, pp. 720-721).

PDR also describes a randomized double-blind comparative study involving 149 outpatients in which a St. John's wort extract was compared with fluoxetine over six weeks. The monograph reports comparable efficacy. In another double-blind study, 135 patients with depression received either a *Hypericum* extract or imipramine for six weeks. The therapeutic results were described as comparable, while adverse events were fewer and generally milder in the *Hypericum* group.

Chevallier's 2016 encyclopedia also states that clinical studies conducted from the 1970s onward contributed to the recognition of St. John's wort as an herbal treatment

for mild to moderate depression and refers to later research supporting this application (Chevallier, 2016, p. 106).

Nevertheless, the safety profile of St. John's wort is one of the most clinically important aspects of its use. PDR describes photosensitization, particularly in association with high doses or prolonged exposure. Reported adverse effects include pruritus, skin eruptions, fatigue, restlessness, headache, and gastrointestinal complaints. Chevallier also warns about increased sensitivity to sunlight and emphasizes the need for professional advice when prescription medications are being used.

Drug interactions represent the most important safety problem associated with *Hypericum perforatum*. The PDR monograph describes induction of the cytochrome P450 system and the resulting potential to reduce plasma exposure to a variety of drugs. It reports reduced cyclosporine concentrations and cases of transplant rejection, substantial reductions in indinavir exposure, decreased digoxin concentrations, reduced theophylline levels, and breakthrough bleeding associated with oral contraceptive use. The monograph also emphasizes the risk of serotonergic toxicity when St. John's wort is combined with selective serotonin reuptake inhibitors and describes clinical presentations resembling serotonin syndrome (Gruenwald et al., 2000, pp. 721-722).

Thus, *Hypericum perforatum* illustrates a fundamental principle of clinical herbal pharmacology: comparatively strong evidence of efficacy does not necessarily imply a simple safety profile. In fact, pharmacologically active herbal preparations may create clinically significant drug interactions precisely because they exert measurable effects on metabolic and neurochemical systems.

The Georgian medicinal plant textbook also specifically emphasizes caution when St. John's wort is used together with other medications, particularly immunosuppressive agents, and notes that it may accelerate the elimination of medicines from the body and reduce their therapeutic effects (Bidzinashvili and Eradze, 2021, p. 366).

Accordingly, St. John's wort should not be evaluated simply as a traditional antidepressant herb. Its therapeutic value is inseparable from the identity and standardization of the preparation, the indication for which it is used, and the patient's complete medication profile.

3.2. *Valeriana officinalis* L.

Valeriana officinalis is another medicinal species widely distributed in Georgia. According to the CENN field guide, it is a perennial herbaceous plant occurring in the forest belt, on forest margins, in meadows and shrublands, and along rivers and wetlands. The species is reported from almost the entire territory of Georgia.

Bidzinashvili and Eradze additionally describe its occurrence in Racha-Lechkhumi, Samegrelo, Guria, Kartli, Mtiuleti, Tusheti, Pshavi-Khevsureti, Outer Kakheti, Trialeti, Javakheti, and Meskheta. The medicinal raw material consists of the rhizome with roots, which is generally harvested in late autumn (CENN, 2022, pp. 188-190; Bidzinashvili and Eradze, 2021, pp. 508-511).

According to the Georgian textbook, valerian rhizomes and roots contain volatile oil, free isovaleric acid and other terpenoid constituents, alkaloids including valerine and chatinine, tannins, saponins, glycosides, sugars, and organic acids.

The PDR monograph provides a more detailed pharmacognostic description, including valepotriates such as isovaltrate and related iridoid monoterpenes, volatile oil, valerenic acid and its derivatives, small quantities of pyridine alkaloids, and caffeic acid derivatives. It also emphasizes that the spectrum of active constituents may differ among subspecies and plant materials and that pharmacological activity is strongly influenced by the quality and composition of the extract used (Gruenwald et al., 2000, pp. 783-786).

From a pharmacological perspective, PDR describes central nervous system depressant, sedative, anxiolytic, spasmolytic, and muscle-relaxant effects, as well as experimentally described anti-ulcerogenic activity. According to the monograph, the principal human effect is associated with improved sleep initiation.

For valerenic acid-related constituents, *in vitro* data summarized in the monograph describe reduced GABA degradation, while experimental studies describe inhibition of GABA reuptake and increased availability of this inhibitory neurotransmitter in the synaptic space. These findings support the interpretation that valerian's sedative activity is not produced by a single constituent but rather by the combined effects of multiple compounds.

Chevallier lists sedative, relaxing, antispasmodic, and anxiolytic actions among the principal properties of valerian. The source describes its use in conditions associated with stress, anxiety, nervous tension, and insomnia. An important feature of this pharmacological profile is that valerian is generally presented not as a powerful hypnotic but as a plant that reduces nervous excitability and mental overactivity and may improve sleep quality (Chevallier, 2016, p. 148).

Bidzinashvili and Eradze describe valerian as a medicinal plant that strengthens inhibitory processes within the central nervous system, reduces reflex excitability, and exerts antispasmodic effects on smooth muscle. According to the Georgian source, valerian preparations in the form of infusions, decoctions, extracts, and powders have been used for insomnia, nervous excitability, vegetative neuroses, tachycardia, gastrointestinal spasms, and other conditions. However, these various uses should not automatically be interpreted as having the same level of contemporary clinical evidence.

3.2.1. Clinical efficacy and safety of *Valeriana officinalis*

One of the most specific clinical findings summarized in the PDR valerian monograph is a randomized, placebo-controlled, multicenter study involving 121 patients. Participants received either 600 mg of a 70% ethanolic valerian root extract or placebo one hour before bedtime for 28 nights.

According to the monograph, 66% of the participants receiving valerian rated the therapeutic effect as good or very good, compared with 29% in the placebo group. This finding supports a clinically relevant effect on sleep quality. However, the evidence relates to a specific extract and dose and should not automatically be generalized to

every valerian tea, tincture, or dietary supplement (Gruenwald et al., 2000, pp. 784-785).

Chevallier describes a German study published in 2002 in which valerian was compared with oxazepam. According to the encyclopedia, both interventions were effective, and 83% of participants receiving valerian rated their treatment very positively, compared with 73% of participants receiving oxazepam. The same source refers to studies conducted in Germany and Switzerland supporting valerian for improvement of sleep and sleep quality (Chevallier, 2016, p. 148).

The interpretation of these results requires caution because the encyclopedia itself is not a contemporary systematic review, and the methodological heterogeneity of the individual studies cannot be fully evaluated using the supplied source material alone.

PDR identifies nervousness and insomnia as Commission E-approved indications. Other applications, including stress-related complaints, impaired concentration, neuralgia, various spasmodic conditions, and anxiety, are described as broader or less firmly established uses. This distinction illustrates why monographic categories should be preserved and why every historical or herbal indication should not be presented as equally established clinical efficacy.

The safety profile of valerian is comparatively favorable but not entirely neutral. According to PDR, significant health risks are generally not expected at therapeutic doses, although gastrointestinal symptoms and, very rarely, contact allergic reactions may occur. With prolonged use, the monograph lists possible headache, restlessness, insomnia, mydriasis, and cardiac disturbances.

The Georgian medicinal plant textbook also states that continuous use for longer than approximately 1 to 1.5 months is not desirable and notes that prolonged administration may be associated with depression of activity, reduced work capacity, insomnia, and gastrointestinal dysfunction (Bidzinashvili and Eradze, 2021, p. 509).

Interaction with other central nervous system depressants is clinically relevant. PDR describes potentially additive effects with barbiturates and benzodiazepines and discourages combination with alcohol. Because of its sedative properties, caution is required when driving or operating machinery for several hours after administration. The monograph also does not recommend valerian use during pregnancy or breastfeeding. Chevallier similarly warns about drowsiness and advises against combining valerian with existing sleep medications without appropriate supervision.

Overall, the strongest cross-source support for *Valeriana officinalis* relates to nervous tension and sleep disturbances, while the principal safety consideration is potentiation of sedation when used with other central nervous system depressants.

3.3. *Allium sativum* L.

Allium sativum is included in this review as a medicinal plant that does not occur wild in the natural flora of Georgia but has a long-established place in the country's agricultural, nutritional, and medical traditions.

Bidzinashvili and Eradze describe garlic as a perennial plant that is generally cultivated as an annual crop. The principal medicinal and edible part is the compound bulb composed of multiple cloves. The Georgian source explicitly states that garlic

does not occur wild, but is one of the oldest cultivated plants and has been known in Georgia since ancient times. It is also mentioned in historical Georgian medical sources and traditional medical manuals for a variety of preventive and therapeutic purposes (Bidzinashvili and Eradze, 2021, pp. 531-535).

From a chemical perspective, the Georgian textbook describes carbohydrates, proteins, vitamin C, B-group vitamins, nicotinic acid, phytosterols, mineral salts, volatile compounds, and the glycoside alliin.

According to PDR, the principal pharmacological importance of garlic is related to alkylcysteine sulfoxides, particularly alliin. When fresh garlic is cut or crushed, alliin is converted by the enzyme alliinase to allicin. The monograph also describes ajoenes, vinylthiins, other sulfur-containing oil-soluble compounds, fructans, and saponins (Gruenwald et al., 2000, pp. 327-329).

PDR describes a broad range of biological activities for garlic. Alliin and its transformation products are associated with antimicrobial, lipid-lowering, antioxidant, and fibrinolytic effects. Clinical and experimental observations summarized in the monograph describe inhibition of platelet aggregation, changes in bleeding and clotting time, and enhancement of fibrinolytic activity.

Ajoene is discussed as one of the antithrombotic constituents, and several oil-soluble sulfur compounds are described as reducing platelet activity through different mechanisms. These effects demonstrate that concentrated garlic preparations extend pharmacologically beyond the role of garlic as an ordinary food.

Among the Commission E indications summarized in PDR are arteriosclerosis, arterial hypertension, and elevated cholesterol. The same monograph discusses garlic as an adjunct to dietary measures in elevated lipid levels and in the context of prevention of age-related vascular changes.

Chevallier lists antibiotic, expectorant, diaphoretic, blood pressure-lowering, anticoagulant, and antidiabetic properties among the principal actions of garlic. The encyclopedia also describes its long traditional use for infections involving the respiratory and digestive systems (Chevallier, 2016, p. 59).

Nevertheless, antimicrobial activity and clinical efficacy in infectious diseases should not be treated as automatically equivalent. PDR describes antibacterial and antifungal activity as pharmacologically relevant properties, while the principal Commission E indications summarized in the monograph are focused predominantly on cardiovascular and lipid-related conditions. This distinction is important because garlic has historically been attributed an extremely broad range of uses, whereas a modern pharmacognostic interpretation requires precise identification of preparation, dose, and therapeutic target.

3.3.1. Clinical efficacy and safety of *Allium sativum*

The clinical findings summarized in PDR illustrate both positive results and substantial heterogeneity among studies of garlic preparations.

In one randomized, double-blind, placebo-controlled 12-week study, 42 outpatients received 900 mg of standardized garlic powder daily. According to the PDR summary, total cholesterol decreased more substantially in the garlic group, and LDL

cholesterol decreased by approximately 11%, compared with approximately 3% in the placebo group. HDL cholesterol, triglycerides, glucose, and blood pressure did not change significantly in that study (Gruenwald et al., 2000, p. 328).

In another 12-week study involving 28 patients with hypercholesterolemia who received 900 mg of garlic powder daily, no statistically significant change in lipid or lipoprotein variables was demonstrated.

A further double-blind, placebo-controlled study involving 25 participants evaluated steam-distilled garlic oil but failed to demonstrate a significant hypocholesterolemic effect. PDR itself relates these contradictory results partly to differences in product composition and standardization and notes that fresh garlic may provide greater availability of active allicin-related compounds, whereas heat treatment may alter or inactivate relevant constituents (Gruenwald et al., 2000, pp. 328-329).

These findings are methodologically informative. The statement "garlic lowers cholesterol" is therefore too general when used without reference to a particular formulation. The actual effect appears to depend on chemical composition, availability of alliin and allicin-related constituents, manufacturing processes, dose, and the baseline clinical characteristics of the study population.

Accordingly, a positive result obtained with one standardized preparation should not automatically be generalized to culinary garlic, garlic oil, heated preparations, or every commercial dietary supplement. This principle is relevant to herbal pharmacotherapy more broadly.

The safety profile of garlic requires particular attention because of its antiplatelet and fibrinolytic activity. PDR specifically warns that combination with anticoagulants such as warfarin or antiplatelet agents such as aspirin and dipyridamole may increase the risk of bleeding. Potential additive effects on bleeding time are also described in combination with nonsteroidal anti-inflammatory drugs.

The monograph includes reports of postoperative bleeding and spontaneous spinal epidural hematoma, illustrating that pharmacologically concentrated preparations of a commonly consumed food plant are not necessarily clinically neutral.

Other adverse effects described in PDR include abdominal discomfort, nausea, vomiting, diarrhea, a sensation of fullness, headache, myalgia, fatigue, and dizziness. Repeated occupational or direct contact may lead to contact dermatitis or occupational asthma.

A particularly important practical safety issue concerns prolonged topical application. The source describes partial-thickness burns and tissue necrosis after crushed garlic had been left in direct contact with the skin for approximately 6 to 18 hours. Chevallier also advises professional consultation when garlic is used together with blood-thinning medication and recommends caution regarding medicinal doses in children.

The most balanced source-based interpretation of *Allium sativum* is therefore that it possesses well-described biological activity and some clinical evidence concerning

cardiovascular risk markers, but clinical outcomes are heterogeneous between preparations, and its antiplatelet activity creates a clinically meaningful safety concern.

4. Comparative Evaluation of Pharmacological Activity, Clinical Efficacy, and Safety

The three medicinal plants illustrate different models of translation from pharmacognostic knowledge to clinical application.

In *Hypericum perforatum*, the supplied literature describes a comparatively coherent relationship among phytochemistry, pharmacological mechanisms, standardized extracts, clinical trials, and recognized therapeutic indications. Its neuropharmacological activity has been linked to hyperforin, hypericin-related compounds, flavonoids, and other constituents, while standardized extracts have been investigated in human depression studies.

However, its therapeutic potential must be interpreted together with a complex safety profile. The capacity to alter drug metabolism and interact with immunosuppressive, antiviral, cardiovascular, hormonal, and serotonergic medications means that the use of St. John's wort cannot be evaluated independently of concomitant pharmacotherapy.

Valeriana officinalis represents a different model. Its pharmacological activity is multicomponent and appears to involve valerenic acid-related compounds, valepotriates, volatile constituents, and GABA-associated processes. The strongest clinical evidence described in the supplied books relates to sleep quality, insomnia, nervous tension, and related symptoms.

Compared with St. John's wort, valerian has a more favorable interaction profile, but its sedative action remains clinically relevant. Combination with other central nervous system depressants can intensify drowsiness and functional impairment.

Allium sativum represents a third model in which broad biological activity is accompanied by inconsistent clinical findings across formulations. Its organosulfur chemistry provides a pharmacological basis for antimicrobial, antioxidant, lipid-related, antiplatelet, and fibrinolytic activity. However, clinical lipid-lowering results differ among standardized powder preparations, oils, and other forms.

This variability demonstrates that the botanical species name alone does not define the medicinal product. Processing conditions may profoundly modify the chemistry of garlic, particularly because allicin is generated enzymatically from alliin after disruption of the plant tissue.

A comparative summary can therefore be expressed as follows. *Hypericum perforatum* is naturally distributed throughout Georgia, and its medicinal material is primarily the flowering aerial portion. Major constituents include hypericin, pseudohypericin, hyperforin, flavonoids, xanthones, procyanidins, and volatile components. Its major pharmacological profile is antidepressant, anxiolytic, and mildly sedative, with additional topical anti-inflammatory and antibacterial activity described in the sources. The clinical evidence summarized in the reviewed books includes randomized trials and a meta-analysis in mild to moderate depression, as well as comparisons with fluoxetine and imipramine. Its principal safety concern is extensive

herb-drug interaction, together with photosensitization and possible serotonergic toxicity.

Valeriana officinalis is naturally distributed across much of Georgia. Its medicinal material consists of the rhizome and roots. Principal constituents described in the sources include valepotriates, valerenic acid, volatile oil, small quantities of alkaloids, and caffeic acid derivatives. Its pharmacological effects include sedation, anxiolysis, spasmolysis, muscle relaxation, and effects associated with GABAergic processes. Clinical evidence in the supplied books includes a placebo-controlled trial evaluating sleep quality and a comparison with oxazepam. Principal safety issues are drowsiness, enhancement of the effects of other central nervous system depressants, and adverse effects associated with prolonged or inappropriate use.

Allium sativum does not occur wild in Georgia but has been cultivated and widely used since ancient times. The bulb and bulb-derived preparations are medicinally relevant. Alliin, allicin, ajoenes, other organosulfur compounds, fructans, and saponins are among the principal constituents described. Its major pharmacological activities include antimicrobial, antioxidant, lipid-lowering, antiplatelet, and fibrinolytic effects. The supplied books describe conflicting randomized trial results regarding lipid profiles, suggesting that efficacy depends strongly on formulation and standardization. Principal safety concerns include increased bleeding risk with anticoagulant and antiplatelet therapy, gastrointestinal adverse effects, contact dermatitis, and chemical injury after prolonged topical exposure.

Overall, the clinical evidence signal is most direct for *Hypericum perforatum* and relates to a defined diagnostic category, but this species also has the most complex safety profile of the three plants. The effects of *Valeriana officinalis* are comparatively milder, but the supplied studies support clinically relevant improvement in sleep quality, with potentiation of sedation as the principal safety consideration. In the case of *Allium sativum*, pharmacological activity is clearly described, but the magnitude and reproducibility of clinical effects vary with the specific product and its standardization.

These differences confirm that identification of the species alone is insufficient when evaluating an herbal medicinal product.

5. Botanical and Pharmacognostic Interpretation, Limitations, and Research Perspectives

The three selected plants clearly demonstrate why medicinal plant research should begin with botanical identification and conclude with the safety assessment of a defined preparation.

Hypericum perforatum and *Valeriana officinalis* are naturally distributed in Georgia, creating the possibility of investigating locally collected raw materials. *Allium sativum*, by contrast, is a cultivated species whose relationship with Georgia is based on ethnobotanical, nutritional, agricultural, and medical tradition. These statuses should not be artificially merged. Precise description of each botanical and cultural category improves the methodological quality of the research.

From a pharmacognostic perspective, the medicinally used plant part is a critical variable. In St. John's wort, the relevant medicinal activity is primarily associated with flowering aerial parts and extracts prepared from this material. In valerian, the principal medicinal raw material is an underground organ, the rhizome with roots, whose chemical profile may vary according to season, harvesting conditions, drying, and processing.

In garlic, the medicinal material is the bulb, but the pharmacologically important compound allicin is not continuously present in an unchanged form. It is produced enzymatically from alliin when the plant tissue is disrupted. Crushing, drying, heat treatment, extraction, and pharmaceutical manufacturing can therefore substantially change the final chemical profile.

The importance of standardization is particularly evident in the clinical results for *Allium sativum*. PDR explicitly suggests that conflicting findings regarding lipid reduction may be associated with differences in the products used and inadequate standardization. The same principle applies to St. John's wort. Depression trials predominantly evaluated specific standardized extracts, and transferring their clinical outcomes to any homemade infusion, tincture, or dietary supplement would be methodologically inappropriate.

The valerian monograph similarly emphasizes that pharmacological activity depends significantly on the composition and quality of the extract.

An important limitation of the present study is the deliberate restriction of the source base. In accordance with the study design, only the supplied books were used. This provides internal consistency and prevents unsupported addition of external information, but it also means that the review does not evaluate replication of older findings after publication of the supplied PDR edition, contemporary meta-analyses, later regulatory changes, or more recent safety signals.

Accordingly, the term "clinical efficacy" in the present paper should be understood as clinical efficacy described in the supplied books, rather than as a definitive assessment of the complete international evidence base available in 2026.

A second limitation is the heterogeneity of the sources. The CENN field guide is primarily botanical and geographical. Ketskhoverli's work is historical and geobotanical. Bidzinashvili and Eradze integrate cultivation, pharmacognosy, and medicinal use. PDR is a pharmacological and herbal monographic reference, while Chevallier provides a broader herbal medicine encyclopedia. These sources do not use identical methods of evidence appraisal. Therefore, combining information from different books does not imply that every statement has the same evidentiary weight.

One potentially productive direction for future research would be phytochemical profiling of authenticated *Hypericum perforatum* and *Valeriana officinalis* specimens collected in Georgia, followed by comparison with established monographic profiles.

For *Hypericum perforatum*, quantitative assessment of hypericin, pseudohypericin, and hyperforin would be particularly relevant, together with

evaluation of how their concentrations vary according to population, harvesting stage, and preparation type.

For *Valeriana officinalis*, research should focus on seasonal and technological variability in valerenic acid and valepotriate content and the relationship between these constituents and extract quality.

For *Allium sativum*, an important research question would be how alliin, allicin, ajoenes, and related organosulfur constituents vary among garlic cultivars grown in Georgia and how different processing methods alter the final pharmacological profile.

From a clinical perspective, future studies should evaluate defined preparations rather than plant names alone. The origin of the plant material, plant organ used, extraction procedure, chemical standardization marker, dose, treatment duration, and concomitant medications should be specified in research protocols.

This requirement is especially critical for *Hypericum perforatum*, because clinically important drug interactions may influence both the safety and the apparent therapeutic outcome of treatment.

6. Conclusions

Hypericum perforatum L., *Valeriana officinalis* L., and *Allium sativum* L. represent three different models through which medicinal plants distributed or cultivated in Georgia can be evaluated using botanical, pharmacognostic, pharmacological, clinical, and safety data.

Hypericum perforatum is widely distributed in the natural vegetation of Georgia, and the medicinally used material consists mainly of flowering aerial parts. Its phytochemical profile includes hypericin, pseudohypericin, hyperforin, flavonoids, and other constituents. Among the three reviewed plants, St. John's wort has the strongest clinical study profile in the supplied books, particularly for mild to moderate depression.

However, its principal limitation is a complex safety profile. Clinically significant drug interactions, photosensitization, and the risk associated with combination with serotonergic medications mean that efficacy and safety must always be evaluated together.

Valeriana officinalis is also widely distributed in Georgia, and the medicinal raw material consists of the rhizome and roots. Its pharmacological effects are associated with valepotriates, valerenic acid, volatile oil, and other constituents. A randomized study summarized in PDR and a comparative study described by Chevallier support a beneficial effect on sleep quality and nervous tension.

Despite a comparatively favorable safety profile, valerian is not pharmacologically neutral. Drowsiness may occur, prolonged use may be associated with adverse effects, and concomitant use with other central nervous system depressants may enhance sedation.

Allium sativum does not occur wild in Georgia, but it has been cultivated and used as both food and medicine since ancient times. Its pharmacological importance is mainly associated with organosulfur compounds. The supplied monographs describe antimicrobial, antioxidant, lipid-lowering, antiplatelet, and fibrinolytic activity.

Clinical results concerning the lipid profile are heterogeneous, demonstrating once again the importance of formulation and standardization. The principal safety

concern is an increased risk of bleeding, particularly in combination with anticoagulant and antiplatelet therapy. Gastrointestinal reactions and tissue injury following prolonged topical application are additional considerations.

The comparative analysis of the three plants demonstrates that pharmacological activity is not synonymous with clinical efficacy and that historical use is not equivalent to contemporary clinical evidence. The most reliable evaluation is achieved when botanical identity, medicinal plant part, chemical markers, formulation, dose, clinical indication, and safety risks are defined separately for each preparation.

This approach makes it possible to investigate the medicinal plant resources relevant to Georgia while preserving their ethnobotanical and pharmacognostic significance without extending therapeutic conclusions beyond the level of evidence actually supported by the source material.

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