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Research Paper

Pharmacognostic Study and the Various Activities of Different Parts of *Galinsoga parviflora* (Cav.)

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ABSTRACT

Galinsoga parviflora (Cav.), popularly known as gallant soldier or potato weed, is a humble yet medicinally rich annual herb belonging to the Asteraceae family. Despite being widely regarded as a common weed, this plant has quietly built a strong reputation in traditional medicine systems across Asia, Africa, and South America. It thrives in over 130 countries from agricultural fields and garden margins to roadsides and disturbed soils demonstrating remarkable ecological resilience. In northern India, particularly in regions like Himachal Pradesh, the plant has been a part of local folk medicine for generations, used to treat conditions ranging from inflammation and wounds to colds, digestive discomfort, and skin ailments. This review offers a detailed pharmacognostic overview of *G. parviflora*, covering its morphology, habitat, traditional uses, extraction approaches, and the biological activities documented from its various parts. The plant is notably well-endowed with bioactive secondary metabolites flavonoids like quercetin, rutin, and kaempferol, along with phenolic compounds, saponins, terpenoids, tannins, and essential oils. Ethanolic and hydroalcoholic extracts of its leaves and aerial parts have demonstrated considerable antioxidant, anti-inflammatory, antidiabetic, and anti-obesity activities in experimental settings. Silver nanoparticle formulations derived from leaf extracts have further extended its antidiabetic potential by targeting glucose-metabolizing enzymes. The plant also shows encouraging activity in lipid management, with preliminary evidence supporting HMG-CoA reductase inhibition as a possible mechanism for cholesterol reduction — an aspect of growing relevance given the global rise in cardiovascular disease. Standardization of herbal preparations using advanced tools such as HPLC, LC-MS, and GC-MS adds scientific credibility to its therapeutic applications. Taken together, *G. parviflora* is far more than a field weed — it is a plant with genuine pharmaceutical promise that warrants deeper research and well-designed clinical validation.

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INTRODUCTION

Galinsoga parviflora (Cav.), commonly known as gallant soldier, small-flowered galinsoga, or potato weed, is an annual herbaceous plant belonging to the Asteraceae family. Traditionally, this plant has been used for several therapeutic purposes, including the treatment of malaria, flu, colds, colorectal cancer, liver disorders, and inflammation (2). Its medicinal importance is mainly attributed to the presence of phytochemical constituents such as flavonoids, saponins, terpenoids, and tannins.

Hyperlipidemia is a major risk factor for cardiovascular diseases, and the global prevalence of dyslipidemia is steadily increasing. Conventional lipid-lowering drugs are often associated with adverse effects, which has created a demand for safer herbal formulations (1,13). Although specific studies on the cholesterol-lowering potential of *G. parviflora* are limited, the plant contains flavonoids and phenolic compounds that are known for their antioxidant and cardioprotective roles in other members of the Asteraceae family (3,6,11). Standardization and quality control of herbal formulations are necessary to ensure reproducibility and therapeutic reliability (14).

This review summarizes the pharmacognostic features, habitat, traditional uses, phytochemistry, extraction methods, and biological activities of *G. parviflora* strictly based on the data provided in the synopsis.

HABITAT

Galinsoga parviflora originates from North India, including regions such as Mandi (Himachal Pradesh), and is now widely distributed across temperate regions of the world (2). The plant commonly grows in disturbed soils, agricultural fields, gardens, and waste areas. Due to its strong ecological adaptability, the species is currently

present in more than 130 countries, demonstrating significant ecological flexibility (15,16).

TRADITIONAL USES

Traditional medicinal uses of *G. parviflora* include (2,23):

- Treatment of inflammation
- Wound healing
- Relief from colds and flu
- Management of digestive discomfort
- Toothache and skin-related conditions
- Use as a general tonic

These applications reflect the presence of bioactive compounds identified in phytochemical studies.

BOTANICAL OVERVIEW

Scientific Name: *Galinsoga parviflora* (Cav.)

Family: Asteraceae

Common Names: Gallant soldier, potato weed, small-flowered galinsoga

Morphological Characteristics (18):

- Stem: Erect, green, striated, branched, and either smooth or hairy
- Leaves: Opposite, ovate to lanceolate in shape, with serrated margins, measuring 1–6 cm in length
- Inflorescence: Small flower heads with a diameter of 3–5 mm
- Flowers: White ray florets surrounding yellow disc florets
- Seeds: Small, black, wedge-shaped, measuring about 1–1.5 mm
- Root System: Shallow and fibrous

The Asteraceae family contains many medicinal species rich in flavonoids and terpenoids, which contribute to antioxidant and cardioprotective activities (17).

EXTRACTION METHODS

The studies describes the preparation of extracts as follows:



- Leaf Extraction: Ethanolic and hydroalcoholic leaf extracts have demonstrated antioxidant, antidiabetic, anti-inflammatory, and anti-obesity activities (15–18).
- Aerial Part Extraction: Hydroalcoholic Soxhlet extraction using 70% ethanol yields flavonoids, phenolics, and other metabolites relevant for antioxidant and cholesterol-lowering studies (23).

These extracts are used for standardized evaluation, including HMG-CoA reductase inhibition and DPPH assays.

ACTIVITIES OF DIFFERENT PARTS OF *GALINSOGA PARVIFLORA*

Leaves

According to the studies, leaf extracts exhibit:

- Antioxidant activity (15,16)
- Antidiabetic activity (4,16)
- Anti-inflammatory activity (17)
- Anti-obesity activity (18)

Silver nanoparticle preparations from leaf extracts further enhance antidiabetic effects by inhibiting glucose-metabolizing enzymes (4).

Aerial Parts

Aerial parts are used for hydroalcoholic extraction and show:

- High phenolic and flavonoid content
- Antioxidant activity based on DPPH assay
- Potential for cholesterol-lowering through HMG-CoA reductase inhibition

These properties support their inclusion in standardized herbal formulations.

PHYSICOCHEMICAL AND PHYTOCHEMICAL CHARACTERISTICS

The various studies identifies several categories of phytochemicals:

Flavonoids

Quercetin derivatives, rutin, and kaempferol have been reported across phytochemical studies (2,6,7). Flavonoids influence cholesterol

metabolism in vitro but show limited plasma cholesterol reduction in vivo due to poor bioavailability (11).

Phenolic Compounds

Variations in total phenolic content are associated with antioxidant activity in medicinal plants, including *G. parviflora* (5,18).

Other Phytochemicals (2,6)

- Saponins
- Terpenoids
- Tannins
- Polysaccharides
- Essential oils
- Trace alkaloids

Analytical Techniques

The researches refers to the use of HPLC, LC-MS, GC-MS, NMR, metabolomic approaches, and phytochemical screening methods for profiling plant constituents (5,7,22). These techniques support standardization in herbal tablet formulations.

CONCLUSION

Based strictly on the provided synopsis, *Galinsoga parviflora* (Cav.) is a medicinal herb rich in flavonoids, phenolics, and other secondary metabolites responsible for antioxidant, anti-inflammatory, antidiabetic, and anti-obesity activities. The plant's traditional uses correspond with its documented phytochemical profile. Preliminary studies on its cholesterol-lowering potential through HMG-CoA reductase inhibition indicate promising therapeutic value. The development and standardization of herbal formulations containing *G. parviflora* are justified by its pharmacological properties and traditional significance.

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