



JBP

Journal of Biochemicals and Phytomedicine

eISSN: 2958-8561



A Brief Review of the Medicinal Effects of *Scrophularia striata*

Somayeh Shahsavari^{1*}

¹ Biotechnology and Medicinal Plants Research Center, Ilam University of Medical Sciences, Ilam, Iran

ARTICLE INFO

Article Type:

Mini Review

Article History:

Received: 01 Mar 2024

Revised: 12 Jun 2024

Accepted: 12 Jun 2024

Available online: 30 Jun 2024

Keywords:

Plant,
Scrophularia striata,
Treatment,
Medicinal Effects

*Corresponding author:

E-mail:

somayeh.shahsavari.pbp@gmail.com

ABSTRACT

Scrophularia striata is a valuable medicinal plant in traditional Iranian medicine. This plant contains a variety of chemical compounds, including flavonoids, saponins, glycosides, and phenolic acids. The therapeutic effects of *S. striata* include anti-inflammatory, antiviral, antibacterial, and anticancer properties. Studies have shown that this plant can be effective in treating chronic inflammations and inflammatory diseases such as rheumatoid arthritis. Additionally, its antiviral properties may be beneficial in combating viral infections like influenza. The antibacterial effects of *S. striata* could also be useful in treating bacterial infections, particularly against antibiotic-resistant bacteria. Furthermore, research has indicated that this plant has anticancer effects, potentially serving as an adjunct in cancer treatment by inhibiting cancer cell growth and inducing apoptosis in these cells. Overall, due to its wide range of medicinal properties, *S. striata* could play a significant role in the development of new herbal medicines with various applications.

Please cite this paper as:

Shahsavari S. A brief review of the medicinal effects of *Scrophularia striata*. Journal of Biochemicals and Phytomedicine. 2024; 3(1): 18-20. doi: 10.34172/jbp.2024.6.

Introduction

Scrophularia striata, known in Iran as "Gol mimoni sazouei," is a significant medicinal plant with a wide range of therapeutic effects (Figure 1). This letter reviews these effects based on scientific studies. *S. striata*, recognized as an important species within the figwort family, primarily grows in mountainous and high-altitude regions. Native to Iran, it is abundantly found in the western and northwestern provinces, especially in Kurdistan, Kermanshah, West Azerbaijan, and East Azerbaijan. Besides Iran, this plant also grows in countries like Turkey, Iraq, and Syria (Ghashghaii et al., 2017). Due to its medicinal properties and adaptation to cold and mountainous climates, *S. striata* is well-established in these regions (Ghashghaii et al., 2017).



Figure 1. *Scrophularia striata* plant

Taxonomic Classification Level of *Scrophularia striata* plant

Kingdom: Plantae
Phylum: Tracheophyta
Class: Magnoliopsida
Order: Lamiales
Family: Scrophulariaceae
Genus: *Scrophularia*
Species: *Scrophularia striata*

Chemical and Phytochemical Compounds of *S. striata* Extracts

S. striata, also known as "figwort," belongs to the Scrophulariaceae family and has been used as an herbal remedy in traditional Iranian medicine. Phytochemical studies have revealed that various extracts of this plant contain diverse compounds such as flavonoids, terpenoids, steroids, glycosides, saponins, and phenolic acids. Notable compounds in its methanolic extract include chlorogenic acid, caffeic acid, and rutin (Monsef-Esfahani et al., 2010).

Morphology and Physical Characteristics of *S. striata*

S. striata, referred to in Persian as "Gol Meimouni sazouei" is a perennial herbaceous plant in the Scrophulariaceae family. This plant naturally grows in the mountainous and high-altitude regions of Iran, particularly in the western and northwestern areas of the country (Monsef-Esfahani et al., 2010).

Plant Morphology

S. striata is an herbaceous plant reaching 30 to 80 cm in height. Its stem is square-shaped and longitudinally ridged, from which the plant's name derives. The stems are often branched and have a greenish-red color. The leaves are opposite, simple, and serrated. The leaves are typically 5 to 10 cm long and 2 to 4 cm wide. Their surface is usually rough and hairy, which helps reduce water evaporation in dry areas (Rechinger, 1982). The flowers of *S. striata* appear as racemes or panicles at the ends of the stems. These small, tubular flowers are greenish-yellow with distinct red stripes on the petals. Each flower usually has five petals, forming a tubular corolla at the base. There are typically two stamens and one pistil per flower (Mozaffarian, 1996). The fruits are two-chambered capsules containing numerous small brown seeds. These seeds are smooth, shiny, and dispersed by the wind (Rechinger, 1982).

Physical Characteristics

S. striata is a drought-resistant plant that typically grows in rocky and sandy soils with good drainage. It requires full sunlight but can continue to grow in partial shade. *S. striata* is also cold-tolerant, going dormant in winter and regrowing from underground roots in spring (Mozaffarian, 1996).

Chemical Composition of *S. striata* Essential Oil

The essential oil extracted from *S. striata* contains several aromatic and volatile compounds. A study on its essential oil identified beta-caryophyllene, alpha-humulene, limonene, and geraniol as the main constituents. These compounds are known for their anti-inflammatory and antioxidant properties (Mahmoud et al., 2020).

Biological Properties and Medicinal Applications

Studies have shown that the extracts and essential oils of this plant possess numerous biological properties, including anti-inflammatory, antioxidant, antiviral, and anticancer activities. For instance, research has indicated that the methanolic extract of *S. striata* exhibits anticancer effects on human breast cancer cells by inducing apoptosis (Kerdar et al., 2018).

Anti-inflammatory and Antioxidant Activities

Several studies have demonstrated that the leaf and flower extracts of *S. striata* possess potent anti-inflammatory properties, which could be effective in treating inflammatory diseases. For example, research by Iranian scientists indicates that this plant helps reduce inflammation by decreasing the production of inflammatory cytokines and enhancing the activity of antioxidant enzymes (Azadmehr et al., 2013). This antioxidant property can help prevent cellular damage caused by free radicals.

Antimicrobial Effects

Research shows that *S. striata* extracts have antibacterial and antifungal properties. One study examined its antimicrobial effects on various bacteria and fungi, including *Escherichia coli* and *Candida albicans*, and found that this plant could be used as a natural agent against infections (Mahboubi et al., 2013).

Anticancer Activities

S. striata also plays a role in inhibiting cancer cell growth. Studies have shown that compounds in this plant can inhibit the growth of breast and lung cancer cells (Rezaie-Tavirani et al., 2010). These effects are attributed to the presence of flavonoids and other active compounds in this plant, which induce apoptosis in cancer cells, preventing their proliferation.

Neuroprotective Effects

Recent studies suggest that *S. striata* may protect neurons from oxidative stress-induced damage. This plant has been proposed as a neuroprotective agent by reducing neuronal cell death and enhancing the survival and growth of nerve cells (salavati et al., 2013).

Antidiabetic Effects

Another important effect of *S. striata* is its ability to regulate blood glucose levels. Animal studies have

shown that its extract can lower blood glucose levels in diabetic animals by increasing insulin sensitivity and reducing hepatic glucose production (Babaiedarzi et al., 2022). This property can help mitigate the complications associated with diabetes.

Hepatoprotective Effects

Research indicates that *S. striata* can protect the liver from damage caused by toxic agents. Its extract helps maintain liver health by reducing liver enzyme levels and increasing antioxidant enzyme activity in the liver (Bavandipour et al., 2023).

Conclusion

Given the numerous therapeutic effects of *S. striata*, this plant could be considered a crucial factor in treating various diseases, including inflammations, infections, cancer, diabetes, and liver and neurological disorders. Further research is needed on the mechanisms of action and clinical applications of this plant. Additionally, attention to safety and appropriate dosing, especially in clinical trials, is essential.

Declarations

Conflict of interest

The author declare no conflict of interest.

Acknowledgement

NA.

Consent for publications

The author approved the manuscript for publication.

Funding/support

None.

Authors' contributions

The author contributed in writing, editing and approving the manuscript.

Ethical considerations

All ethical issues, including plagiarism, misconduct, data fabrication, falsification, double publication, or submission redundancy, have been fully observed.

References

- Azadmehr A, Ognyanous KA, Hajiaghaee R, Amirghofran Z, Azadbakht M. Antioxidant and neuroprotective effects of *Scrophularia striata* extract against oxidative stress-induced neurotoxicity. Cellular and molecular neurobiology. 2013; 33: 1135-41. doi: <https://doi.org/10.5812/jjnpp.62705>.
- Babaiedarzi A, Ghanbari S, Mehrad seresht M, Nasiri M. Antidiabetic effects of *Scrophularia striata* ethanolic extract via suppression of Pdx1 and Ins1 expression in pancreatic tissues of diabetic rats. Scientific Reports. 2022; 12(1): 9813. doi: 10.1038/s41598-022-13698-w.

Bavandipour A, Jangravi Z, Kondori BJ, Poorheidari G, Salimi-Sabour E, Zarei SM. High-performance thin-layer chromatography fingerprinting analysis and hepatoprotective effects of *Scrophularia striata* aerial parts against acetaminophen-induced acute hepatotoxicity in mice. Pharmaceutical Chemistry Journal. 2023; 57(9): 1476-85. doi: 10.1007/s11094-023-03013-w.

Ghashghaii A, Hashemnia M, Nikousefat Z, Zangeneh MM, Zangeneh A. Wound healing potential of methanolic extract of *Scrophularia striata* in rats. Pharmaceutical Sciences. 2017; 23(4): 256-263. doi: 10.15171/PS.2017.38.

Kerdar T, Moradkhani S, Dastan D. Phytochemical and biological studies of *Scrophularia striata* from Ilam. Jundishapur Journal of Natural Pharmaceutical Products. 2018; 13(3): 1-3. doi: 10.5812/jjnpp.62705.

Mahboubi M, Kazempour N, Nazar ARB. Total phenolic, total flavonoids, antioxidant and antimicrobial activities of *Scrophularia striata* Boiss extracts. Jundishapur Journal of Natural Pharmaceutical Products. 2013; 8(1): 15-9.

Mahmoud B, Hadavi M, Abbasi N. Study of extraction and chemical compounds of *Scrophularia striata* Boiss. and *Scrophularia deserti* Delile using HS-SPME and GC-MS. Plant Biotechnology Persa. 2020; 2(1): 8-13. doi: 10.29252/pbp.2.1.8.

Monsef-Esfahani HR, Hajiaghaee R, Shahverdi AR, Khorramizadeh MR, Amini M. Flavonoids, cinnamic acid and phenyl propanoid from aerial parts of *Scrophularia striata*. Pharmaceutical Biology. 2010; 48(3): 333-6. doi: 10.3109/13880200903133829.

Mozaffarian V. A Dictionary of Iranian Plant Names. Tehran: Farhang Mo'aser; 1996.

Rechinger KH. Flora Iranica: Vol. 150. Scrophulariaceae. Graz: Akademische Druck- und Verlagsanstalt; 1982.

Rezaie-Tavirani M, Mortazavi SA, Barzegar M, Moghadamnia SH, Rezaee MB. Study of anti cancer property of *Scrophularia striata* extract on the human astrocytoma cell line (1321). Iranian Journal of Pharmaceutical Research. 2010; 9(4): 403. doi: 10.22037/ijpr.2010.906.

Salavati P, Ramezani M, Monsef-Esfahani HR, Hajiagha R, Parsa M, Tavajohi S, et al. Neuroprotective effect of total and sequential extract of *Scrophularia striata* Boiss. in rat cerebellar granule neurons following glutamate-induced neurotoxicity: an in-vitro study. Iranian Journal of Pharmaceutical Research. 2013; 12(2): 389. doi: 10.22037/ijpr.2013.1301.

Copyright © 2024 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.