

Review article on Ethnopharmacological effects of *Senna auriculata*

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Abstract

Since the dawn of time, human cultures have been maintaining a strong relationship with what surrounds them and have utilized resources from nature to generate food and medicine. Almost all societies use medicinal plants as a source of medication, and through trial and error, it has been discovered how valuable plants can be in the production of both food and medicine. *Senna auriculata* is an ancient medicinal herb that is extensively utilized in India's Ayurvedic and Siddha medicinal systems to treat a wide range of diseases. The leaves have auriculate stipules and paripinnately complex. Bright yellow flowers with corymbose racemes in terminal or axillary inflorescences. *Senna auriculata* contains several phytochemicals, including alkaloids, flavonoids, carbohydrates, glycosides, α -amino acid, phenolic compound, steroids, tannins, terpenoid, and reducing sugars. Numerous pharmacological activities including, antioxidant, anti-inflammatory, hepatoprotective, anticancer, antihyperlipidemic and anti-diabetic, are exhibited by the extracts from its different parts and their isolated compounds. As a result, the purpose of this review is to explore and outline the historical use of *Senna auriculata*, covering its phytochemical, pharmacological and toxicological aspects.

Key words : Medicinal plants, *Senna auriculata*, antioxidants, phenolic compounds, Secondary metabolites.

Introduction

Nature consistently provides a clear indication of the notable occurrences of coexistence. Organic remedies for human illnesses are based on substances found in plants, animals and minerals. The acceptance of medicinal plant is growing and also currently in demand. Plants unquestionably contribute significantly to ecosystems by offering vital functions. Beyond a doubt, humans have thought about medicinal herbs since the beginning of time. It might be said that before recorded history began when prehistoric humans examined and exploited nearby vegetation for food, shelter, fuel and clothing, they gradually became aware of the attributes of those plants.

Since mankind have constantly turned to their circumstances for solutions to heal themselves of ailments, using medicinal plants has actually been an integral aspect of human history. Components of medicinal plants that can be employed includes a variety of seeds, roots and even the entire plant, many medicinal herbs are utilized as medical agents due to the active chemicals found in most of them have direct or indirect therapeutic effects. The systems of these plants produce and accumulate specific molecules that are referred to as active chemicals or substances that affect living things physiologically.

Since they possess a variety of traits including synergistic effects, medicinal plants are employed in health care. Plant constituents have the potential to interact with other components, which might have either a beneficial or detrimental impact on them both, or even reverse the adverse effects of both. An additional benefit of plant components is their capacity to halt the onset of specific illnesses. [1] India boasts a rich history of traditional medical practices such as Siddha, Ayurveda and Unani which utilize hundreds of medicinal plants with strong ethnopharmacological evidence to treat an array of ailments.

The Fabaceae family is the source of *Senna auriculata*, often referred to as *Cassia auriculata*. It is among the medicinal herbs that have long been used in Unani, Siddha, and Ayurvedic medicine. [2] *Senna auriculata* referred to as Ranawara or Avaram, is a legume tree that is a member of a Caesalpinioideae subfamily. The tightly pubescent branchlets of the massively branching shrub *Senna auriculata* have smooth cinnamon coloured bark and alternating leaves.



Figure 1. *Senna auriculata* plant

The components of plants like roots, buds and blossoms have been employed to treat gout, gonorrhea, diabetes, rheumatism, conjunctivitis, fever and eye complications. [3] The five parts of the plant—roots, leaves, flowers, bark, and unripe fruits—are used to make the herbal tea known as kalpa (Avarai panchaga chooranam). [4] Traditional secondary metabolites of plants, phytochemicals offer a variety of therapeutic advantages. [5] The primary goal of this article is to validate *Senna auriculata*'s morphological features and to look into the preliminary phytochemical properties and to ascertain the ethnopharmacological aspects from *Senna auriculata*.

Taxonomical classification of *Senna auriculata*

Division	Class
Kingdom	Plantae
Class	Dicotyledonae
Subclass	Polypetalae
Order	Parietales
Family	Cesalpinaceae/Fabaceae
Genus	Cassia
Species	Auriculata

Table 1. Taxonomical classification of *Senna auriculata*

Synonyms

Cassia auriculata

Avaram

Tanner's cassia

Styptic weed

Matara tea [6]

Origin and distribution of *Senna auriculata*

This shrub is extensively distributed throughout the dry zones of India's south, west, centre and even in Sri Lanka. [2] It is found in wooden grass lands, and can grow up to 500m in height. In arid areas with 300 m of annual precipitation and 15–28°C temperatures, it reproduces wild. It requires sunlight to flourish and does well in certain regions. [7]

Vernacular names of *Senna auriculata* [8]

Language	Names
English	Tanner's cassia
Tamil	Avarai
Sanskrit	Avarttaki, Vibhandi, Carmaranga
Kannada	Tangedu
Gujarati	Aval, Awal
Hindi	Tarvar, Taroda
Marathi	Taroda, Taravada

Table 2. Vernacular names of *Senna auriculata*

Plant Morphology

- **Appearance:** Perennial shrubs up to 1.5-2.5 m high; younger stems cylindrical and pubescent.



Figure 2. Habitat of flowering plant

- **Leaves:** The leaves are arranged in an alternating pattern, measuring 5.0-12.0 cm in length and 1.5-3.0 cm in width. The petioles are robust and cylindrical, measuring 0.7-1.5 cm in length and 0.5-1.5 mm in diameter, slightly canaliculate above, tomentose; the rachae are 5.5-9.0 cm in length and 0.5-1.0 mm in diameter, slightly canaliculated above, tomentose, with glands present in between each pair of leaflets, yellow or brown; the leaflets are oblong to elliptic-oblong, 1.5-3.0 cm in length and 0.5-1.4 cm in width, mucronate, with entire margins, rounded or oblique bases, rigidly subcoriaceous upper surfaces, and both surfaces pubescent; the petiolules are about 1 mm long, dark brown, tomentose; the stipules are auriculate or lunatereniform, 1.3-2.5 cm long and 1.0-1.8 cm wide, with pointed appendages curved towards the leaves, the appendages 0.1-0.4 cm



Figure 3. Leaves

- **Inflorescences:** Axillary or terminal corymbose racemes with five to ten flowers that are 4.5 to 7.0 cm long and 4.0 to 5.0 cm wide. The peduncles are 5.0 to 7.0 cm long and 1.0 to 2.0 mm in diameter, pubescent; the bracts are ovate-acuminate, 5-7 mm long and 3-4 mm wide, green, pubescent, persistent; the pedicels are 2.0 to 3.5 cm long and 0.8 to 1.0 mm in diameter, pubescent; the bracteoles are linear, 3.0-3.5 mm long and approximately 2 mm wide, green, pubescent, caduceus.



Figure 4. Inflorescence as seen

- **Flowers:** Bright yellow, complete, bisexual, irregular, zygomorphic, five merous, cyclic, and hypogynous, measuring 2.5–3.0 cm in length and 2.5–3.5 cm in width.



Figure 5. Flower

- **Calyx:** Five aposepalous sepals are present: two obovate, cucullate, 7–10 mm long and 4-5 mm broad outer sepals; two ovate, oblong, hooded, 1.2–1.4 cm long and 8–10 mm wide inner sepals; and one obovate, 1.0–1.2 cm long and 8.0–9.0 mm wide, imbricate, brownish-yellow, coriaceous, glabrous, persistent, inferior.
- **Corolla:** Five petals, apopetalous and rosaceous, with the posterior petal being broadly ovate or oblicular; limbs 1.5–1.8 cm long, 1.0–1.4 cm wide; claws 2.5–3.0 mm long; the two lateral ones obovate oblong, the limbs 1.5–1.8 cm long and 1.3–1.4 cm wide, the claws 4.0–5.0 mm long; the two anterior ones ovate-oblong, the limbs 1.8–2.0 cm long and 1.2–1.5 cm wide, the claws 5.0–6.0 mm long, valvate, bright yellow, membranous, veins reddish brown, reticulate, glabrous.

- **Stamens:** Stamens 10, apostamenous, 7 fertile and 3sterile, the fertile stamens 3 long and 4 shorts, the long filaments 1.2-1.5 cm long, the short ones 8.0-9.0 mm long, the larger anther lobes oblongoid, sickle shaped, 0.8-1.0 cm long, 1.2-2.0 mm in diameter, curved, the small ones rectangularly oblongoid, 5-6 mm long, 1.0-1.5 mm in diameter, straight or slightly curved, the anther tips truncate, brown or reddish-brown, ditheous, introse, basifixed, dehiscence by terminal pores, glabrous, the sterile filaments 2-2.5 mm long, the another lobes rounded and flattened, 2-3 mm long, about 2mm wide, light brown or yellowish-brown, glabrous, inferior.



Figure 6. Flower with calyx, corolla, stamens and pistils

- **Pistils:** The styles are glabrous, thin, and curved, while the stigma is filiform, hairy, and 0.8–1.5 mm long. The ovary is oblongoid, 0.9-1.2 cm long, 0.8-1.0 mm in diameter, with one ovule in each locule, marginal placentation, and ovary superior, which is light brown, tomentose, and has white hairs. The pistil is monocarpellary and unilocular.
- **Pods:** The flattened, oblongoid, dehiscent pods are 7–15 cm in length and 1.2–1.8 cm in diameter. They have flexible, glabrous, dark green ends.



Figure 7. Pods

- **Seeds:** Seeds 10-20, ellipsoid, 8.0-12.0 cm long, 3.0-5.0 cm in diameter, brown to dark brown, hard and glabrous. [9]



Figure 8. Seeds

Traditional uses of *Senna* species [10]

Varieties	Country	Utilized portion of the plant	Traditional use
<i>S. singueana</i>	India, Tanzania, China, Burkina Faso, Kenya	Leaves (sap), stem bark	Malaria and diabetes mellitus
<i>S. alexandrina</i> Mill.	China	Leaves	Control bowel movements, Purgative
<i>S. obtusifolia</i>	Asia	whole plant	Constipation, ophthalmic diseases and hyperlipidemia
<i>S. siamea</i>	Nigeria, Benin, Ghana, Uganda, Sierra Leone, Mali	Stem bark	Treatment of malaria, tuberculosis and allied diseases.
<i>S. spectabilis</i>	Brazil	Whole plant, leaves	Laxative, anti-microbial and anti-ulcerogenic
<i>S. macranthera</i>	Brazil	Seed and endocarp	Fever
<i>S. podocarpa</i>	Africa	Roots and leaves	Gonorrhea
<i>S. septemtrionalis</i>	AfrAfricaa, Asia,, MexMexicoo	Whole plant	Fever, stomach-ache, flu, wounds, vermifuge, hemorrhoids, laxative and snakebites
<i>S. surattensis</i>	Egypt	Leaves, fruits and bark	Diabetes, antidote to poison and gonorrhea.

<i>S. didymobotrya</i>	Africa and Asia	Stem bark and leaves	Hypertension, fungal, intestinal worm, sickle cell anemia and ringworm
<i>S. tora</i>	India	Seed	Regulate lipid in the blood serum
<i>S. angustifolia</i>	India	Whole plant	Laxative
<i>S. racemose</i>	Mexico	Stem bark, leaves and root	Fever, diarrhea, abdominal pain and diabetes
<i>S. velutina</i>	Brazil	Leaves, flowers, bark and root	Leukemia
<i>S. bicapsularis</i>	Africa and Asia	Leaves	Microbial infections
<i>S. rugosa</i>	Brazil	Root	Fever and skin infection
<i>S. villosa</i>	Mexico	Leaves	Skin infections, dysmenorrhea and inflammatory problems
<i>S. auriculata</i>	Sri lanka and India	Buds, flowers and roots	Eye diseases, diabetes, gout, rheumatism, gonorrhea and conjunctivitis
<i>S. acutifolia</i>	Egypt and India	Leaves and Flowers	Laxative

Table 3. Traditional uses of *Senna* species

Nutritional composition on flowers [11]

Nutritional properties	Values	Units
Moisture	11.73	%
Ash	5.51	%
Protein	9.54	%
Iron	189.95	Mg/kg
Fiber	1.89	%
Zinc	17.53	Mg/kg

Fat	2.98	%
Total phenols	249.13	Mg of GAE/100g
Tannins	1.82	Mg TAE/100g
Flavonoids	304	Mg of QE/100g mg
Oxalates	54.55	Mg/100g
Phytates	3.90	Mg/100g
Antioxidant activity	546.30	μg/100g

Table 4. Nutritional composition of flower

Nutritional composition of leaves [9]

Test parameter	Amount of contents (%)
Moisture	9.46
Ash	6.19
Carbohydrate	55.96
Energy value (Kcal/100g)	335
Crude protein	12.03
Ether extract (crude fat)	6.50
Crude fiber	9.86

Table 5. Nutritional composition of leaves

Phytochemical constituents

Senna auriculata leaves have been subjected to a preliminary phytochemical investigation, based on the standard method to ascertain the presence or absence of organic constituents such as alkaloids, flavonoids, reducing sugars, glycosides, phenolic compounds, tannin, carbohydrates, terpenoids, cyanogenic glycosides, starch, α -amino acid, saponin and starch. [9]

Pharmacological activities

1. Antioxidant property

Using the DPPH technique, reducing power method, hydrogen peroxide scavenging method, and nitric oxide scavenging activity, the antioxidant activity of many *Senna auriculata* leaf extracts was evaluated. To evaluate the antioxidant activity, an improved test based on the decolorization of the radical monocation of 2,2-azinobis-(3-ethylbenzoline-6-sulfonic acid) and 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging technique was used. *Senna auriculata* flower extract (1000 μg/ml) exhibited considerable antioxidant activity, scavenging 82% of DPPH radicals (IC₅₀: 724.44 μg/ml) and 83.5% of ABTS radicals (IC₅₀: 700 μg/ml). the results demonstrated the antioxidant properties of the *Senna auriculata* flower extract: 76% of hydroxyl radicals (IC = 711.90 μg) and 79% of hydrogen peroxide radicals (IC₅₀: 735.17 μg) were hindered. [12]

2. Anti-inflammatory property

The methanolic extract of *Senna auriculata* (MECA) and its leaves showed potent anti-inflammatory effects in both acute and chronic animal models. Additionally it was discovered that in rats with carrageenin – induced odema, a 50% acetone extract of the *Senna auriculata* flower had strong anti-inflammatory effect. The flavonoid glycoside 5-O- methyl quercetin 7-O- glucoside, as well as tannin and steroids, which are found in the flowers and leaves, were the causes of the impact. [12]

3. Antidiabetic property

Streptozotocin- induced diabetic rats were given a high-fat diet and treated with *Senna auriculata* which suppressed the onset of diabetes in the rats. Bud ethanol extract (CABE500) may be a more effective means of halting the progression of the disease than floral extract. The GRIA2 gene was expressed in all experimental groups in the same way, according to the results of the gene expression investigations, and the IRS2 gene was regulated in buds but not in animal livers treated with *Senna auriculata* floral extract. Flower extract may not be as good at controlling diabetes as bud extract. [13]

4. Anticancer property

The vitality of liver cancer cells decreased in a concentration-dependent way after being administered with *Senna auriculata* flower extract in acetone and methanol. The anticancer activity of the extract was more effective at higher concentrations. The percentages of IC₅₀ for methanol and acetone extracts have been estimated to be $40.94 \pm 2.16 \mu\text{g/ml}$ and $36.10 \pm 2.46 \mu\text{g/ml}$, correspondingly, whereas the conventional doxorubicin dosage on liver cancer cells was $50.30 \pm 1.73 \mu\text{g/ml}$. When compared with acetone extract, methanol extract revealed higher inhibition. The presence of phytochemical compounds contributes to the range in hindering percentage. [14]

5. Hepatoprotective property

The hepatoprotective efficacy of an aqueous extract of *Senna auriculata* leaves given orally once daily for 30 days at rates of 250 and 500 mg/kg of body mass was evaluated in connection with alcohol intoxication. The reversal of spongiosis in the brain and steatosis in the liver and witnessed tissue lipid lowering effects equivalent to the control group and there was a noteworthy improvement in body weight followed the extract administration. For 30 days, 250 and 500 mg/kg of body weight as doses, the aqueous extract showed hepatoprotective efficiency against ethanol induced hepatotoxicity. Then it came to conclude that there was an apparent reduction in the concentration of hepatic marker enzymes, along with increased liver activities of superoxide dismutase and catalase, and an upturn of blood vitamin A and C levels. [15]

6. Anti hyper lipidemic property

With its anti-hyper lipidemic properties, Et-CAF may aid in sustaining cholesterol homeostasis. Increased HDL, dropped TC plasma level, and prevented atherosclerosis from emerging. The lower LDL concentration may potentially have a role in the decreased TC in hyper lipidemic rats injected with Et-CAF extract. The anti-hyper lipidemic and anti-diabetic effects of Et-CAF were found to be assisted by its antioxidant

activity. Nonetheless, this may also play a part in the cardio protective and anti-atherosclerotic capabilities. In contrast to lovastatin, which has been demonstrated to have negative consequences, ethoxycholic acid (Et-CAF) increased antioxidant activity, decreased lipid levels, and has no known carcinogenic properties. [16]

Conclusion

This review renders quite apparent that *Senna auriculata* includes an assortment of phytoconstituents, demonstrating its potential applications for a range of pharmacological objectives. The plant or any of its components can be utilized as anti-inflammatory, antidiabetic, anticancer, hepatoprotective, antihyperlipidemic property. Consequently, the current literature assessment found that the plant has a significant therapeutic value. The plant's high safety and efficacy for medicinal usage have been confirmed by traditional and ethnomedicinal literature. Reverse pharmacological techniques, in a natural drug development can be used to study a plant's potential for a powerful and safe medication that can treat a variety of chronic illnesses. The present review has showcased the presence of varied phytoconstituents, which are responsible for their biological activities. The study on their phytoconstituents may lead for the development of new therapeutic agents.

References

- [1] Jamshidi-Kia, F., Lorigooini, Z., & Amini-Khoei, H. Medicinal plants: Past history and future perspective. *Journal of HerbMed Pharmacology*, 7(1), 1–7.2018.
- [2] Nille, G. C., Mishra, S. K., Chaudhary, A. K., & Reddy, K. R. C. Ethnopharmacological, Phytochemical, Pharmacological, and Toxicological Review on *Senna auriculata* (L.) Roxb.: A Special Insight to Antidiabetic Property. *Frontiers in Pharmacology*, 12,2021
- [3] Nagaraja Ganesh, B., Ganeshan, P., Ram shankar, P., & Raja, K. B. Assessment of natural cellulosic fibers derived from *Senna auriculata* for making light weight industrial biocomposites. *Industrial Crops and Products*, 139, 2019.
- [4] Nambirajan, G., Kaleshkumar, K., Garg, A., Rajendran, R., Kandasamy, R., Elangovan, A., & Thilagar, S. Evaluation of antidiabetic activity of bud and flower of Avaram *Senna* (*Cassia Auriculata* L.) In high fat diet and streptozotocin induced diabetic rats. *Biomedicine & Pharmacotherapy*, 108, 1495–1506,2018.
- [5] Prasathkumar, M., Raja, K. B., Vasanth, K., Khusro, A., Sadhasivam, S., Sahibzada, M. U. K., Gawwad, M. R. A., Farraj, D. a. A., & Elshikh, M. S. Phytochemical screening and in vitro antibacterial, antioxidant, anti-inflammatory, anti-diabetic, and wound healing attributes of *Senna auriculata* (L.) Roxb. leaves. *Arabian Journal of Chemistry*, 14(9), 103345,2021.
- [6] Chanderraj, P and Sundaram, L. Antioxidant and antibacterial activities of *Cassia auriculata* in urinary tract infection patients. *International Journal of Botany Studies*, 6(2), 277–281,2021.
- [7] Chung, W. J., Shim, J., & Ravindran, B. Characterization of cheese processed wastewater and treatment using calcium nanoparticles synthesised by *Senna auriculata* L

- flower extract. Journal of King Saud University Science,34(2),2022
- [8] Girme AS, Gaikar NV, Saste GB and Kunkulol RR. Chemical studies on antidiabetic botanical drug: *Cassia auriculata*. J Pharmacogn Phytochem;7(5):3417-3424, 2018.
- [9] Win, Ei Theingi, and Aung Kyaw Min. "Investigation of Phytochemical Constituents, Physicochemical Properties and Antimicrobial Activities from the Leaves of *Senna auriculata*(L.) Roxb." J. Myanmar Acad. Arts Sci 16.4: 295-314,2018.
- [10] Oladeji, O. S., Adelowo, F. E., & Oluyori, A. P.. The genus *Senna* (Fabaceae): A review on its traditional uses, botany, phytochemistry, pharmacology and toxicology. South African Journal of Botany, 138, 1–32. 2021.
- [11] Jyotirmayee Sahoo, T Kamalaja, S Suchiritha Devi and P Sreedevi. Nutritional composition of *Cassia auriculata* flower powder. J Pharmacogn Phytochem;9(5):867-870, 2020.
- [12] KB, Thorat, and V. V. Nimbalkar. "A Phytopharmacological Review Of Plant -*Cassia auriculata*" (2021).
- [13] H. G. H., Karthik, S., Jai, S., Umakanth, B. S., Ahmed, S. S., & M, R. K.,A Pharmacological review on *Cassia Auriculata*. Journal of Innovations in Applied Pharmaceutical Sciences, 113–117,2022.
- [14] Ansari, B., Singh, M., Sharma, S., Choudhary, B., & Mohseen, M.Preclinical Antihyperlipidemic Effect of Herbalism against Lipid Elevating Agents: A Review. Biomedical and Pharmacology Journal, 13(4), 1695–1707,2022.
- [15] Meena, V., Baruah, H., & Parveen, R. *Cassia auriculata*: A healing herb for all remedy. Journal of Pharmacognosy and Phytochemistry, 8(3), 4093–4097.,2019.
- [16] Padmalochana, K. Anticancer (liver cancer cell lines) and antioxidant activity of *Cassia auriculata* flower extract from acetone and methanol solvents. Journal of Drug Delivery and Therapeutics, 8(6-s), 274–278,2018.