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CASSIA AURICULATA: A COMPREHENSIVE REVIEW OF ITS PHYTOCHEMISTRY, PHARMACOLOGY, AND THERAPEUTIC POTENTIAL

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ABSTRACT

Cassia auriculata used for a long period in various chronic diseases therapeutically. Aim of the current review is to search literature for the pharmacological properties, safety/ toxicity studies, pharmacognostic studies and phytochemical investigation of Cassia auriculata plant. Particulars of pharmacological activities, phytochemical isolation, toxicity studies etc. were extracted from the published reports focusing on the safety profile of the plant. Safety of the whole plant was concluded in the review. The compiled data may be helpful for the researchers to focus on the priority areas of research yet to be discovered. This study was undertaken to investigate the effect of *Cassia Auriculata* leaf extract on tissue lipid peroxidation and antioxidant status in experimental hepatotoxicity. Administering ethanol to rats for 60 days resulted in significantly elevated levels of serum total bilirubin, aspartate transaminase(AST), alanine transaminase(ALT) and alkaline phosphatase (ALP) as compared with those of the experimental control rats. Significantly elevated levels of tissue thiobarbituric acid reactive substances (TBARS), hydroperoxides and lowered activities of superoxide dismutase(SOD), catalase(CAT) and reduced glutathione (GSH) were also observed on alcohol treatment as compared with those of experimental control rats. Concentration of serum non-enzymatic antioxidants such as vitamin E and vitamin C were also significantly lowered on alcohol supplementation. Treatment with *Cassia auriculata* leaf extract at a dose of 250 mm kg-1 body weight and 500 mm kg-1 body weight to rats administered alcohol, lowered the levels of TBARS and hydroperoxides and elevated the activities of SOD and CAT and the levels of reduced GSH in the liver, brain, kidney and intestines significantly compared to unsupplemented alcohol treated rats. *Cassia auriculata* leaf extract treatment restored the serum vitamin E, and vitamin C levels also to near those of the experimental control animals. Our data indicate that supplementation with *Cassia auriculata* leaf extract can offer protection against free radical mediated oxidative reagent in experimental hepatotoxicity. In addition, histopathological studies of the liver and brain confirmed the beneficial role of *Cassia auriculata* leaf extract.

KEYWORDS: Cassia Auriculata, Traditional medicine, Phytochemicals, Anti-oxidative properties, hepatoprotective activity, Caesalpiniaceae.

INTRODUCTION

Traditional medicine continues to be the primary method of treating illnesses for many people in developing countries, including india. Even among those with access to western medicine, the use of complementary and alternative medicine is rapidly increasing globally.[1]

Nearly 50% of the medicines available in the market are derived from natural sources. The world health organization(WHO) estimates that about 80% of the populations in developing countries rely almost exclusively on traditional medicine for their primary healthcare needs, with medicinal plants playing a crucial role in these pratices. In India, the materia medica consists of approximately 2,000 drugs of natural origin, most of which are derived from various traditional

systems and folklore practices.[2]

Among these, around 400 are of mineral and animal origin, while the remainder is of vegetable origin. India has a rich heritage of traditional medicine, which has been thriving in many countries. The last decade has seen a significant increase in the use of herbal medicine, highlighting its importance in healthcare.(Use of traditional medicine in middle-income countries: a WHO-SAGE study).[3]

It was also investigated that Cassia leaf extract affected the conidial germination of fungi Microsporum gypseum. Nowadays medicinal plants are rarely used in traditional and modern medicinals. Their claimed therapeutic properties could be due in part to their capacity for scavenging oxygen free radicals.[4]

Which may be involved in many diseases. For example, in the case of plants used to treat inflammatory diseases and gastric ulcers. In the present study, an attempt has been made to enrich the knowledge of antibacterial activity of *cassia auriculata* plant extract against Gram-positive and Gram-negative bacterial.[5]

Cassia auriculata linn (Family: Caesalpiniaceae) commonly known as Tanners Senna, is distributed throughout hot deciduous forests of India and holds a very prestigious position in Ayurveda and Siddha systems of medicine. The plant has been reported to possess antipyretic.[6]

The flowers are used to treat urinary discharges, nocturnal emissions, diabetes and throat irritation.[7]

PLANT DESCRIPTION

Cassia auriculata Linn commonly known as Tanners Senna, is also known as Avaram tree. Regional and Other Names: Tanner's Cassia, Tanner's Senna, Mature Tea Tree(English) Aivartaki, Pitapuspa, Pitkalika, Manojyna, Pitkala, Charmaranga (Sanskrit), Tarwar, Awal, Tarval (Hindi), Tangedu, Merakatange Edu (Telagu), Arsual, Taravada, Tarwad (Marathi).[8]

It is widely distributed across southern, western, and central India, as well as in other regions such as Myanmar, Pakistan, Sri Lanka, Nigeria, and Tanzania.[9]

Growth Form	:	Multi-branched shrub, able to grow up to 1 - 1.5 m tall.
Foliage	:	Green leaves, even-pinnate and measuring 8 - 10 cm long, each leaf has 8 - 12 pairs of leaflets and each leaflet measures about 2 - 3 cm long.
Stems	:	Stem is smooth and reddish brown in colour.
Flowers	:	Bright yellow flowers on a short, erect raceme, flower measuring about 4 - 5 cm wide.
Fruit	:	Fruit is a flattened brown pod, measuring about 7 - 11 cm long and contains about 10 - 20 seeds.
Etymology	:	Genus Senna is derived from the Arabic name "sana", which refers to the laxative leaves and pods. Species auriculata refers to the base of the leaves which resembles ear lobes.
Ethnobotanical Uses	:	Medicinal: All parts of plants are used for treatment, especially in Ayurvedic. They are widely used in Indian Folk medicine for the treatment of diabetes, conjunctivitis, rheumatism, constipation and urinary tract disorders.

TAXONOMY
Kingdom : Plantae
Clade : Tracheophytes
Clade : Angiosperms
Clade : Eudicots
Clade : Rosids
Order:Fabales
Family : Fabaceae
Subfamily : Caesalpinioideae
Genus : Senna
Species : S.Auriculata.

CHEMICAL CONSTITUENTS
Cassia auriculata, also known as Avaram senna, is a medicinal plant that has been used in traditional Ayurvedic and Siddha systems of medicine. Several studies have investigated bioactive compounds with potential therapeutic applications.

Cassia Auriculata contains significant amount of alkaloids, glycosides, saponins, polyphenols, tannins, phloro-tannins, terpenoids, triterpenes, carbohydrates, proteins, amino acids, anthraquinone, aloe-emodin, and sitosterol.[10]

PHARMACOLOGICAL PROPERTIES OF CASSIA AURICULATA
Many type of pharmacological activities were reported in cassia auriculata some of them are:

Anti-diabetic activity
Cassia auriculata has been used in Ayurveda to treat diabetes. The leaves contain various antidiabetic metabolites, including n-hexadecanoic acid, emodin, and squalene. For 30 days, oral treatment of the flower's aqueous extract at a dose of 0.45 g/kg body weight significantly decreased blood glucose and increased plasma insulin; however, the effects were not statistically significant at 0.15 and 0.30 g/kg. In the tissues under investigation, the aqueous extract also reduced the production of free radicals. This study demonstrates the hypoglycemic activity of Cassia auriculata flower extract.[11]

The antioxidant characteristics of CFEt are evident in the decline in lipid peroxides and the rise in reduced glutathione, superoxide dismutase, catalase, glutathione peroxidase, and glutathione S-transferase. The animals who received 0.45 g/kg body weight showed the greatest impact from CFEt. Glibenclamide was not as effective as CFEt.[12]

Ani-oxidant properties
CAFt rich extract of C. auriculata Linn, a member of the Caesalpiniaceae family, contains. The results showed that the total phenolic content in CAF was 67.32 µg/mg of extract calculated as the equivalent of gallic acid (r2 = 0.976), and the total flavonoid compound was 31 µg/mg of extract calculated as the equivalent of rutin (r2 = 0.985). DPPH free radical scavenging activity, reducing power activity, and hydrogen peroxide scavenging activity were among the experiments used to screen the extract for possible antioxidant properties. The results of the in-vitro antioxidant experiment demonstrated the antioxidant activity of both CAS and CAF. Therefore, C. auriculata Linn. may be helpful in the production of strong antioxidant nutraceuticals for the treatment of a variety of human disorders and their after effects.[13]

Anti-inflammatory activity
The medicinal properties of *Cassia auriculata*, commonly known as Avaram, are highly regarded in Indian traditional medicine, particularly for managing painful inflammation and diabetes. This study aimed to evaluate the anti-inflammatory potential of *Cassia auriculata* flower extract using various assays, including albumin denaturation, proteinase inhibition, and membrane stabilization, at different concentrations.[14]

Standard anti-inflammatory drugs such as aspirin and Voltaren were employed for comparison. The *Cassia auriculata* flowers were procured from a herbal health center in Chennai, and the extract was prepared by mixing 5 grams of powdered flowers with 50 ml of ethanol and subjecting it to an orbital shaker for 72 hours, followed by boiling at 62-70°C for 5-10 minutes and filtration.[15]

The results demonstrated significant anti-inflammatory activity of the ethanolic extract, as evidenced by the BSA and EAA assays, indicating its effectiveness compared to conventional anti-inflammatory medications. Overall, the findings support the therapeutic potential of *Cassia auriculata* as an effective anti-inflammatory agent.[16]

Hepatoprotective activity
In this study a novel formulation of *Cassia auriculata* polymer nanospheres containing silymarin, aimed at site-specific delivery to the liver. We assessed its efficacy against carbon tetrachloride-induced hepatotoxicity in rats, using doses of 50 mg/kg and 100 mg/kg body weight. Key serum enzyme activities were measured, including SGOT, SGPT, alkaline phosphatase, total protein, albumin, globulin, total cholesterol, HDL, GSH, and total bilirubin. The results indicated that the *C. auriculata* nanospheres significantly reduced serum enzyme levels and bilirubin while increasing HDL and other proteins ($p<0.001$), demonstrating their potential as a therapeutic option for liver protection against chemical-induced damage.[17]

Analgesic activity
Cassia auriculata, used in Ayurveda for various ailments, have a long history of safe use. Recent studies on the ethanolic extract of its leaves have shown promising biological activities, including antidiabetic and anticancer effects. Toxicity tests indicate safety up to 3 g/kg body weight, while phytochemical analysis reveals the presence of beneficial compounds such as flavonoids and saponins. The extract demonstrated significant

analgesic activity (p<0.001) in Eddy's hot plate and tail flick methods and reduced paw edema in carrageenan-induced inflammation (p<0.01) at doses of 300 mg and 500 mg/kg. The flavonoids may contribute to these effects by inhibiting inflammatory mediators, highlighting the therapeutic potential of Cassia auriculata for pain management.[18]

Antimicrobial activity

The antimicrobial potential of *Cassia Auriculata* leaves was evaluated using methanol,chloroform and aqueous extracts six bacterial strains: Bacillus cereus, Staphylococcus aureus, Escherichia coli, Klebsiella pneumoniae4, Pseudomonas aeruginosa, and Proteus mirabilis, The methanol and chloroform extracts exhibited strong inhibited activity (12-20 mm zones of inhibition), against all tested organisms, except Pseudomonas aeruginosa (10 mm or nil), while the aqueous extract showed moderate activity (≤12 mm or nil). Phytochemical screening revealed the presence of carbohydrates, proteins, alkaloids, flavonoids, steroids, saponins and tannins in the extracts. The antibacterial activity is likely attributed to the presences of flavonoids, steroids, saponins and/or tannin. Further research is needed to identify the precise active principles responsible for the antimicrobial effects of Cassia Auriculata leaves.[19]

Antiviral activity

The methanolic extract of Cassia auriculata flowers was evaluated for its in vitro antiviral and cytotoxic activities across various cell lines, including HeLa, Vero, CRFK, and HEL. Using a polarity-based cold maceration method for extraction, the study assessed antiviral efficacy against multiple viruses, such as herpes simplex types 1 and 2, vaccinia, and respiratory syncytial virus. The cytotoxicity was determined via the MTT assay. Results indicated that the extract exhibited strong antiviral activity against herpes simplex viruses (EC50 = 50 µg/ml for HSV-1 and 45 µg/ml for HSV-2) and moderate activity against other viruses (EC50 > 100 µg/ml). However, cytotoxic effects were observed at concentrations exceeding 100µg/ml. These findings suggest that Cassia auriculata flowers could be a valuable source of anti-herpetic compounds, warranting further research to identify the specific active constituents responsible for these antiviral effects.[20]

PLANTS SPECIES OF CASSIA

- Cassia Auriculata
- Cassia afrofistula
- *Cassia angolensis*
- *Cassia aerie*
- *Cassia artensis*
- *Cassia bakeriana* —pink cassia, wishing-tree
- — Brewster's cassia, cigar cassia
- *Cassia burttii*
- var. *cowanii*
- var. *guianensis*
- var. *peruviana*
- *Cassia eremophila* —desert cassia
- *Cassia fastuosa*
- var. *calva* var. *fastuosa*
- *Cassia ferruginea*
- var. *ferruginea*
- var. *velozona*
- *Cassia fikifiki*
- *Cassia fistula* — golden shower, Indian-laburnum, purging cassia]
- *Cassia grandis*— pink shower cassia
- *Cassia hintonii*
- *Cassia hippo phallus*
- *Cassia javanica*—apple-blossom cassia, Palawan cherry
- subsp. *bartonii*
- subsp. *javanica*
- var. *javanica*
- var. *microcalyx*
- subsp. *Nodosa*
- subsp. *pubiflora*
- *Cassia johannae*
- *Cassia lancangensis*
- *Cassia leiandra*
- *Cassia leptophylla* —gold medallion tree
- *Cassia mannii*
- *Cassia marksiana*
- *Cassia midas*
- *Cassia moschata*
- *Cassia mystacicarpa*
- *Cassia pilocarpa*
- *Cassia queenslandica*
- *Cassia regia*
- *Cassia roxburghii*
- *Cassia rubriflora*
- *Cassia sieberiana*
- *Cassia spruceana*
- var. *scarlatina*
- var. *swartz ioides*
- *Cassia thyrsoidea*
- *Cassia tomentella*

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