Review Article

Therapeutic Uses of Cassia Fistula: Review

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ABSTRACT

Cassia Fistula is a plant in the family fabaceae. It is commonly known as the Golden Shower, Indiana Laburnum, Raja vriksha. It is native to India, the Amazon and Sri lanka and diffused in various countries including Mexico, Chaina[1.] Mauritius, East Africa, South Africa and West Indies. *Cassia fistula* plants are used as ornamental and shade tree around the houses and also used in the event '**Vishukkani'** on the day of **vishu** (First day of zodiac calendar) , which literally means that "the first thing seen on the day of Vishu after waking up". Medicinally it has been various pharmacological activities like antifungal, antioxidants, antimicrobial, anti-inflammatory, anti tumour , hepatoprotective, hypoglycemic activity.it is recommended for the treatment of Jaundice, Gout, Fatty Liver, Liver Disorder, Bronchitis, Skin disease and so on. In Ayurvedic medicine, Golden Shower Tree is known as "disease killer" and it pacifies the 3 doshas of vaat, pitta and kapha. It expels the pitta and kapha from the body. Its fruit pulp is used as mild laxative. as well as cardiac conditions and stomach problems such as acid reflux. Flowers used for fever, root as a diuretic. The bark and leaves are used for skin diseases. The seeds are recognised as antibilious, aperitif, carminative, and laxative while the root is used for curing adenopathy, burning sensations, leprosy, skin diseases, syphilis, and tubercular glands. The leaves of the tree is used for erysipelas, malaria, rheumatism, and ulcers, the buds are used for biliousness, constipation, fever, leprosy, and skin disease and the fruit for abdominal pain, constipation, fever, heart disease, and leprosy. Thus every part of this plant is recognized for its medicinal properties. Plant has rich source of tannins, flavanoids and glycosides present in *Cassia fistula* might be medicinally important and/or nutritionally valuable. The plant is rich in carbohydrates, Linoleic, Oleic, and Stearic. Flower pollen contains phenylalanine, methionine, glutamic acid and proline. Leaf of *Cassia fistula* mainly contains Oxalic Acids, Tannins, Oxyanthraquinones, Anthraquinones Derivatives. Fruit of *Cassia fistula* contains Rhein Glycosides Fistulic Acids, Sennosides A B, Anthraquinones, Flavanoid-3-ol-derivatives. Ceryl Alcohol, Kaempferol, Bianthraquinone Glycosides, Fistulin, Essential Oils, Volatile Components , Phytol (16.1%), 2-Hexadecanone (12%), Crystals, 4-Hydroxy Benzoic Acids Hydrate have been reported from the plant. The main aim of this article is to highlight the latest review of scientifically proved medicinal activity against various diseases.

Keywords: Hepatoprotective, Antidiabetic, Antimicrobial, Antioxidants, Anticancer, *cassia fistula*.

INTRODUCTION

Cassia fistula (family: FABACEAE) is one of the most widespread in the forests of India, usually occurring in deciduous forests The whole plant possesses medicinal properties[2.].

The golden shower plant is a medium-sized tree, growing to 10–20 m (33–66 ft) tall with fast growth. The flowers are bright yellow in colour, widely spaced petals, about 2 inches wide with 10 stamens. The flowers are produced in pendulous racemes 20–40 cm (7.9–15.7 in) long, each flower 4–7 cm (1.6–2.8 in) diameter with five yellow petals of equal size and shape. The leaves are deciduous, 15–60 cm (5.9–23.6 in) long, and pinnate with three to eight pairs of leaflets, each leaflet 7–21 cm (2.8–8.3 in) long and 4–9 cm (1.6–3.5 in) broad. The fruit is a legume, 30–60 cm (12–24 in) long and 1.5–2.5 cm (0.59–0.98 in) broad, with a pungent odor and containing several seeds.

BOTONICAL INFORMATION

- Kingdom: Plantae
- Subkingdom: Tracheobinota
- Super division: Spermatophyta
- Division: Magnoliophyta
- Class: Magnoliopsida
- Sub class: Rosidae
- Order: Fabales
- Family: Fabacae
- Genus: Cassia
- Species: *Fistula*.

SYNONYMS

Hindi : Amaltas
English : Golden flower

Gujarati : Garmaalo
Kannada : Heggake
Malayalam : Vishnu Konnai, Katkonna
Marathi : Bahava
Punjabi : Sumalu
Tamil : Komare, Konrai
Telugu : Railkayaa
Bengal : Sonali, Bandarlatti[3], Amltas, Rakhalnadi

Fig. 1.1

Fig:1.2

PHARMACOLOGICAL ACTIVITIES OF PLANT

Hepatoprotective activity: *Cassia fistula* leaves are subjected for screening hepatoprotective activity. It is found that n-heptane extract of *Cassia fistula* leaves has hepatoprotective activity[4]. The extract at a dose of 400 mg/kg body weight exhibited significant protective effect by lowering serum levels of transaminase (serine glutamic-oxaloacetate transaminase [aspartate aminotransferase] and serine glutamicpyruvic transaminase [alanine aminotransferase]), bilirubin and alkaline phosphatase. The protective effect is comparable to that of a standard hepatoprotective agent. [5]

Antipyretic activity: The *Cassia fistula* pod was found to be devoid of antipyretic activity in experimental models. The pods extracts showed a marked antipyretic effect by causing a reduction in yeast induced fever. The extract showed significant activity in both the models at doses of 200 and 400 mg/kg. At a dose level of 200 the extract caused a better hypothermal activity against yeast-induced pyrexia in rats. Subcutaneous injection of yeast induces pyrexia by increasing synthesis of prostaglandin and is used to screen. In the model of yeast-provoked elevation of body temperature, the extract showed dose dependent lowering of body temperature up to 4 h at both the dosage levels.[6]

Leukotriene inhibition activity:The methanol extract of fruits of *C. fistula* inhibited the 5-lipoxygenase catalysed formation of leukotriene B4 in bovine polymorphonuclear leukocytes (IC50 value of 38 micro g/ml). Lipid peroxidation in bovine brain phospholipid liposomes dihydrochloride (AAPH) was inhibited (IC50 of

40 micro g/ml). A linear correlation was obtained between the effects of the extract in the 2 assays suggesting a redox-based mechanism for the inhibition of the 5-lipoxygenase enzyme.[7]

Antitussive activity: The methanol extract of *Cassia fistula* was investigated for its effect on a cough model induced by sulphur dioxide gas in mice. The extract exhibited significant, dose-dependent antitussive activity compared with the control. The antitussive activity was comparable with that of codeine phosphate, a prototypes antitussive agent. *C. fistula* extract (400 and 600 mg/kg, p.o.) inhibited coughing by 44.44 and 51.85%, respectively, with respect to the control group.[8]

Antioxidant activity: The antioxidant properties of 90% ethanol extracts of leaves, and 90% methanol extracts of stem bark, pulp and flowers from *Cassia fistula.* The antioxidant activity power was in the decreasing order of stem bark, leaves, flowers and pulp and was well correlated with the total polyphenolic content of the extracts. Thus,. stem bark had more antioxidant activity in terms of reducing power, inhibition of peroxidation,[9] O2 - and DPPH radical scavenging ability

Anti-inflammatory activity: anti-inflammatory and antioxidant activities of the aqueous (CFA) and methanolic extracts (CFM) of the *Cassia fistula* bark were assayed in Wistar albino rats. The extracts were found to possess significant anti-inflammatory effect in both acute and chronic models. *Cassia fistula* bark extracts showed significant radical scavenging by inhibiting lipid peroxidation initiated by CCl4 and FeSO4 in rat liver and kidney homogenates. Both extracts exhibited significant antioxidant activity in DPPH, Nitric oxide and Hydroxyl radical induced in-vitro assay methods. Both extracts showed Dose-Dependent protective effect against lipid peroxidation and free radical generation in liver and kidney homogenates[10].

Wound Healing: Infection is the major problem to treat the wound. Antibiotic resistance by the pathogenic microorganism renders drug ineffective. The alcohol extract of *C. fistula leaves* was analyzed for antibacterial effect against Staphylococcus aureus and Pseudomonas aeruginosa. *Cassia fistula* treated rats showed, better wound closure, improved tissue regeneration at the wound site, and supporting histopathological parameters pertaining to wound healing, and thus confirming efficacy of *Cassia fistula* in the treatment of the infected wound[11].

Hypolipidemic activity: The effect of 50% ethanolic extract of *Cassia fistula* legume on serum lipid metabolism in cholesterol fed rats. Oral feeding of cholesterol (500 mg/kg b.wt./day) dissolved in coconut oil (0.5 ml/rat/day) for 90 days caused a significant Administration of *C. fistula* legume extract at the doses 100, 250 and 500 mg/kg b.wt./day along with cholesterol significantly prevented the rise in the serum total and LDL-cholesterol, triglycerides and phospholipid in a dose dependent manner[12].

Anticancer activity: It has been found that methanolic extract (ME) of *Cassia fistula* seed on the growth of Ehrlich ascites carcinoma (EAC) and on the life span of tumour bearing mice.[13] ME treatment showed an increase of life span, and a decrease in the tumour volume and viable tumour cell count in the EAC tumour hosts [14].

Anti-diabetic activity: The hypoglycemic effects of the hexane extract of stem bark of *Cassia fistula*, in normal and streptozotocin induced diabetic rats. Hexane extract of *C. fistula* bark at doses 0.15, 0.30, 0.45 g kg-1 body weight for 30 days suppressed the elevated blood glucose levels in diabetic rats 20. Aqueous extract of *Cassia fistula* flowers (ACF) locations was screened for its antioxidant effect in alloxan induced diabetic rats. And seeds of *Cassia fistula* were investigated for their hypoglycemic activity. They were found to have marked hypoglycemic activity on normal members of albino rats 21 & 22 days. [15]

Anti-leishmaniatic activity: The hexane extract from the fruits showed significant antileishmanial activity against the promastigote form of Leishmania L. chagasi.[16] The bioguided fractionation resulted in the isolation of a sterol, clerosterol, which was further analysed in different models. Promastigotes presented an inhibitory concentration 50% (IC50) of 10.03 micro g/mL and intracellular amastigotes demonstrated high susceptibility, with an IC50 of 18.10 micro g/mL. Mammalian cytotoxicity was evaluated and it was demonstrated that clerosterol was 3.6- fold less toxic than the standard drug pentamidine.

CNS activity: The methanol extract of the seeds of *cassia fistula* was tested for different

pharmacological activities in mice. A depressant activities of ME was also evident from the behavioral studies on mice.[17] The extract significantly potentiated the sedative actions of sodium pentobarbitone, diazepam, meprobamate and chlorpromazine. It also potentiated analgesia induced by morphine and pethidine in a dose-dependent manner. The extract also influenced behaviour in mice.[18]

Antiparasitic activity

The fraction through bioguided antileishmanial activity of dichloromethane extract of *cassia fistula* fruits(leguminosae). Led to the isolation of the active isoflavoane iochain A, identified by spectroscopic methods. [19] This compound showed 50% effective concentration (EC50) value of 18.96 micro g/mL against promastigotes of Leishmania (L.) chagasi. The cytotoxicity of this substance against peritoneal macrophages resulted in an EC50 value of 42.58 micro g/mL. Additionally, biochanin A presented an antiTrypanosoma-cruzi activity, resulting in an EC50 value of 18.32 micro g/mL and a 2.4-fold more effectiveness than benznidazole .[20]

Anti-itching activity: Vicharchika is a chronic skin disease with no permanent cure in modern medicine. Raised serum IgE level is the commonest immunological marker for eczema. This study suggests of significant efficacy of aragvadha on patients of eczema.[21]

Anti-ulcer activity:. The ethanol leaf extract (ELE) of *Cassia fistula* was evaluated for antiulcer activity against pylorus ligation-induced gastric ulcer. Ranitidine (30 mg/kg b.w.) and ELE at doses of 250, 500, and 750 mg/kg b.w. were administered orally in different groups of rats (n = 6), 1 h prior to pyloric ligation. Four hours after pyloric ligation, the gastric juice was collected for evaluation of various parameters[22]

Protease inhibitory activity: The *cassia fistula seed* PI is homologous to the family of plant defensins (gama-thionin) which have four disulfide linkages at highly conserved locations .The *cassia fistula* PI inhibits trypsin and it is the first known example of plant defensing with protease inhibitory activity, suggesting a possible additional functions for some members of this class of plantdefensive protien[23]

Antifertility activity

The petroleum ether extract of seeds of *Cassia fistula* was screened for the antifertility activity in proven fertile female albino rats at the doses 100, 200 and 500 mg/kg b.wt./day. Oral administration of the extract to mated female rats on days 1-5 of pregnancy resulted in a decline in the fertility index, numbers of uterine implants and live foetuses in a dose dependent manner as was confirmed by laparotomy on day 15 of pregnancy. The extract (100 mg/kg b.wt.) exhibited weak estrogenic activity when given alone and tested in immature bilaterally ovariectomized female albino rats, but exhibited slight antiestrogenic activity when administration along with estradiol valerate (0.1 mg/kg b.wt.). Blood sugar and haematological parameters were within normal range. Thus, the results of the present study indicate that the petroleum ether extract of *Cassia fistula* seeds possesses pregnancy terminating effect by virtue of anti-implantation activity.[24]

Larvicidal and ovicidal activity: It is reported that the ovicidal effect of leaf extracts of *C. fistula* (at 0.5, 1.0 and 2.0%, topically applied) was evaluated on the viability and hatching of eggs (0, 1 and 3 days old) of D. koenigii. Application of leaf extracts of the plant inhibited hatching of the eggs, and increasing concentration of the extract resulted in increased non-viability of 3-day-old eggs.[25]The methanolic leaf extract of *Cassia fistula* was tested for larvicidal and ovicidal activity against Culex quinquefasciatus and Anopheles stephensi. The extract was found to be more lethal to the larvae of A. stephensi than C. quinquefasciatus with LC50 values of 17.97 and 20.57 mg/l, respectively Mean percent hatchability of the ovicidal activity was observed 120 h after treatment. The percent hatchability was inversely proportional to the concentration of extract and directly proportional to the eggs. The egg raft of C. quinquefasciatus was found to be more hatchable than A. stephensi. The results show that the leaf extract of *C. fistula* is promising as a larvicidal and ovicidal agent against C. quinquefasciatus and A. stephensi.[26]

Laxative activity: The in-vitro effect of *Cassia fistula* infusion on isolated guinea-pig ileum. The acute and sub-chronic toxicity of the infusion of *C. fistula and Cassia acutifolia* sp. Del. Pod-(Senokot tablet) as the reference drug were also determined. The results obtained for *C. fistula* infusion when compared with senokot tablet showed that the infusion of *Cassia fistula* pods possessed very low levels of toxicity, having the LD50 of 6600 mg/kg and also without any

pathological effects on the organs examined microscopically. It is therefore concluded from the study that *C. fistula* pod infusion could be safely utilized as laxative drugs and as a substitute for the official Senna. [27]

Antiepileptic: To evaluate anticonvulsant activity of methanolic extract of seeds of *Cassia Fistula* against pentylenetetrazol (PTZ) induced convulsions in mice. Here the animals were divided into four groups of six mice each and were injected PTZ (60mg/kg intraperitonially) Group I was served as toxic control, Group II was pretreated with Gabapentin (200mg/kg P.O.). Group III was pretreated with methanolic extract of seeds of *Cassia Fistula* (100 mg/kg P.O.) for 7 days. Group IV was pretreated with methanolic extract of seeds of *Cassia Fistula* (200mg/kg P.O.) for 7 days.The result shows that methanolic extract of seeds of *Cassia Fistula* significantly reduced duration of clonic convulsions and also delayed the onset of convulsions induced by pentylenetetrazol. The result was expressed as mean ± SEM and were statistically analyzed by one way ANOVA. It is concluded that methanolic extract of seeds of *Cassia Fistula* can show anticonvulsant activity against pentylenetetrazol induced convulsions in mice.[28]

CONCLUSION

Many research studies it is concluded that *Cassia fistula* is responsible for the various therapeutic potentials like antidiabetic, hepato protective, anticancer, antibacterial, wound healing, laxative, larvicidal and ovicidal activity, CNS activity, anti-itching, anti-ulcer, protease inhibitor, leukotriene inhibitors, antipyretic, anti tussive, anti inflammatory, antioxidant, antiparacitic it is also useful herbal plant for hepatic disorder & lipolipedic activity.

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