



Some Novel Properties of *Cassia Fistula* Linn.-A Review

Neeta Vijayrao Jagtap¹ and Kiran Ramchandra Ranadive²

¹Department of Chemistry, Waghire College, Saswad, taluka-Purandar, District-Pune

²Department of Botany, Annasaheb Mahar Mahavidyalaya, Hadapsar, Pune.

ARTICLE INFO

Article history:

Received: 29 October 2022;

Received in revised form:

16 December 2022;

Accepted: 27 December 2022;

Keywords

Antioxidant,

Antifertility,

Cassia fistula,

Medicinal & Wound Healing.

ABSTRACT

Cassia fistula Linn. belongs to family Leguminosae, Sub – family Caesalpineae, a very common Indian plant is known for its medicinal properties. *C. fistula* is known to be an important source of secondary metabolites notably phenolic compounds like tannins, flavonoids and glycosides. Pharmacological activities include antibacterial, antidiabetic, antifertility, anti-inflammatory antioxidant, hepatoprotective, antitumor, antifungal activities. This article provides glimpses on morphology, traditional uses and its phytochemical and pharmacological activities.

© 2022 Elixir All rights reserved.

Introduction

Cassia fistula Linn. from family Leguminosae, a common Indian plant is known for its medicinal properties. It is a native of Tropical Asia. It is widely cultivated in South Africa, Mexico, East Africa and Brazil. This plant is used in folk medicine for tumors of the abdomen, glands, liver, curing burns, constipation, convulsions, diarrhea, dysuria, epilepsy, throat cancer, leprosy, skin diseases and syphilis. Ayurvedic medicines recognize as carminative and laxative. Phytochemical investigations prove its importance as an important valuable medicinal plant. *C. fistula* is known to be an important source of secondary metabolites notably phenolic compounds like tannins, flavonoids and glycosides. Pharmacological activities include antibacterial, antidiabetic, antifertility, anti-inflammatory antioxidant, hepatoprotective, antitumor, antifungal activities. This article provides glimpses on morphology, traditional uses and its phytochemical and pharmacological activities.

C. fistula L. Sp. Pl. 377.1753; Baker in Hook.f. Fl. Brit. India 2: 261. 1878; Cooke, Fl. Pres. Bombay 1:444. 1958 (Repr.); Pandey in J. Bombay nat. Hist. Soc. 68: 313. 1971; Sanj. Leg. India 15. 1991. 'Amaltas', 'Bava', 'Garma'. Trees, c 10 m tall. Leaflets 4–8 pairs, 5.0–12.5 x 2.5–6.0 cm, ovate. Flowers yellow, in 24–40 cm long, lax, drooping racemes. Pods 2.0–2.5 cm across, indehiscent. Seeds numerous, embedded in dark coloured pulp. Fls. & Frts.: April–October. Illus.: Wight, Ic. t. 269. 1840 (*C. rhombifolia*); Matthew, Fur. Illus. Fl. Tamilnadu Carnatic 2: tt. 224, ff. 1–15 & 225, ff. 1–2. 1988. *Distrib.*: Common throughout the state in deciduous forests. Also planted in home gardens. Its belongs to Fabaceae, Caesalpinioideae, a very common plant known for its medicinal properties is a semi-wild in nature. It is distributed in various regions including Asia, South Africa, China, West Indies and Brazil 1. It is commonly known as Amultas and in English popularly called “Indian Laburnum” has been extensively used in Ayurvedic system of medicine for various ailments. It is deciduous and mixed-monsoon

forests throughout greater parts of India, ascending to 1300 m in outer Himalaya, is widely used in traditional medicinal system of India.

Geographical distribution:

In deciduous and mixed monsoon forests throughout greater parts of India, ascending to 1300 m in outer Himalaya. In Maharashtra, it occurs as a scattered tree throughout the Deccan and Konkan. The plant is cultivated as an ornamental throughout India.

Taxonomic Position

Kingdom	: Plantae
Subkingdom	: Tracheobionota
Super Division	: Spermatophyta
Division	: Mangoliophyta
Class	: Magnoliopsida
Sub Class	: Rosidae
Order	: Fabales
Family	: Fabaceae
Genus	: <i>Cassia</i>
Species	: <i>fistula</i>

Morphology

It is a deciduous tree with greenish grey bark, compound leaves, leaflets are each 5–12 cm long pairs. A semi-wild tree known for its beautiful bunches of yellow flowers and also used in traditional medicine for several indications. A fruit is cylindrical pod and seeds many in black, sweet pulp separated by transverse partitions. The long pods which are green, when unripe, turn black on ripening after flowers shed. Pulp is dark brown in color, sticky, sweet and mucilaginous, odour characteristic, and somewhat disagreeable. Drug occurs in flator curved thick pieces; outer surface smooth to rough with warty patches; greenish grey to red; inner surface rough, reddish with parallel striations; fracture, laminate; odour, sweet and characteristic; taste, astringent.

Tele:

E-mail address: neetuvj7@gmail.com

© 2022 Elixir All rights reserved

A tree 6-9 m high; trunk straight; bark smooth and pale grey when young, rough and dark brown when old; branches spreading, slender. Leaves 23-40 cm long; main rachis pubescent; stipules minute, linear-oblong, obtuse, pubescent. Leaflets 4-8 pairs, ovate or ovate-oblong, acute, 5-12.5 by 3.8-9.5cm, bright green and glabrous above, paler and silvery pubescent beneath when young, the midrib densely pubescent on the underside, base cuneate; main nerves numerous, close, conspicuous beneath; petiolules 6-10 mm long, pubescent or glabrous.

Flowers in lax racemes 30-50 cm. long; pedicels 3.8-5.7 cm. long, slender, pubescent and glabrous. Calyx 1 cm long divided to the base, pubescent; segments oblong, obtuse. Corolla 3.8 cm across, yellow; stamens all antheriferous. The pods are pendulous, cylindrical, nearly straight, smooth, shining, brown-black, indehiscent, with numerous (40-100) horizontal seeds immersed in a dark coloured sweetish pulp. Seeds broadly ovate, 8mm. long, slightly less in breadth, and 5mm thick. The fruit pods are 40-70 cm long and 20-27mm in diameter, straight or slightly curved, smooth but finely striated transversely, the striations appearing as fine fissures. The rounded distal ends bear a small point marking the position of the style. The dorsal suture appears as a single vascular strand and the ventral suture as two closely applied strands. Internally the pod is divided by thin, buff coloured, transverse dissepiments at intervals of about 0.5cm. Each compartment contains one seed which is flat, oval, reddish brown with a well marked raphe. The seed contains a whitish endosperm in which the yellowish embryo is embedded.

Traditional Medicinal Uses

The root is prescribed as a tonic, astringent, febrifuge and strongpurgative 11-15. Extract of the root bark with alcohol can be used for backwart fever. The roots are used in chest pain, joint pain, migraine and blood dysentery. The extract of the root lowered the blood sugar level up to 30 per cent. Root is useful in fever, heart diseases, retained excretions and biliousness. The aqueous extract of the root bark exhibits anti-inflammatory activity. The root is used in cardiac disorders biliousness, rheumatic condition, haemorrhages, wounds, ulcers and boils and various skin diseases. *Cassia fistula* leaves are crushed to prepare a thick paste and mixed with coconut oil. This paste is applied over the burnt skin twice a day. The stem bark is used against amenorrhoea, chest pain and swellings. The bark possess tonic and antidysentric properties, it is also used for skin complaints, the powder or decoction of the bark is administered in leprosy, jaundice, syphilis and heartdiseases. The leaves extract reduced mutagenecity in *E. coli*. (Danish *et al.* 2011).

The leaves are laxative and used externally as emollient, a poultice is used for chilblains, in insect bites, swelling, rheumatism and facial paralysis. Leaves possess anti periodic and laxative properties, the leaves are used in jaundice, piles, rheumatism ulcers and also externally skin eruptions, ring worms, eczema. The pulp of the fruit around the seeds are a mild purgative. Leaves and flowers are both purgative like the pulp. Ashes from burnt pods mixed with little salt are used with honey taking 3- 4 times to relieve cough. Fruits are used as cathartic and in snake bite. Flowers and pods are used as purgative, febrifugal, biliousness and astringent. The ethanolic 50% extract of pods show antifertility activity in female albino rats. The heated pods are applied to swellings on the neck due to cold. The fruits are reported to be used for asthma. Pulp is given in disorders of liver. The drug is used as analgesic as an antipyretic, it is being medy for malaria and fever. CNS activity of seeds of *C. fistula* was tested for

different pharmacological actions in mice. The extract also influenced behaviour in mice. (Danish *et al.* 2011).

Wound healing activity:

The potential of *Cassia fistula* to treat the infected wound on albino rat model was investigated. The alcohol extract of *C. fistula* leaves was analyzed for antibacterial effect against *Staphylococcus aureus* ATCC 29213 and *Pseudomonas aeruginosa* ATCC 27853. *C. fistula* treated rats showed, better wound closure, improved tissue regeneration at the wound site, and supporting histopathological parameters pertaining to wound healing. (Bhalerao & Kelkar 2012)

Antitumor activity:

The effects of methanolic extract (ME) of *Cassia fistula* seed on the growth of Ehrlich ascites carcinoma (EAC) and on the life span of tumour bearing mice were studied. 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. Cytological changes indicate that ME might be having a direct tumorocidal effect on the tumour cells. (Bhalerao & Kelkar 2012)

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 500mg/kg b.wt./day. The petroleum ether extract of *Cassia fistula* seeds possesses pregnancy terminating effect by virtue of anti-implantation activity. (Bhalerao & Kelkar 2012)

Anti-leishmaniac activity:

The effectiveness of *Cassia fistula* in the treatment of leishmaniasis, the efficacy of concentrated boiled extract and hydroalcoholic extract of *C. fistula* on leishmaniasis was compared with intralesional injection of Glucantime. *C. fistula* fruit gel increases the efficacy of intralesional meglumine antimonate for the treatment of Cutaneous leishmaniasis. Combination therapy with intralesional meglumine antimonate and *C. fistula* fruit gel should be considered for the treatment of acute cutaneous leishmaniasis. (Bhalerao & Kelkar 2012)

Conclusion

Cassia fistula is widely used in traditional medicinal system of India and has been reported to possess hepatoprotective, anti-inflammatory, antitussive, antifungal and also used to check wounds healing and antibacterial properties. *Cassia fistula* is known as a rich source of tannins, flavanoids and glycosides present in might be medicinally important and/or nutritionally valuable. The plant is rich in carbohydrates, Linoleic, Oleic, and Stearic. 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 present review summarizes some important pharmacological studies on *Cassia fistula* and phytochemical investigations and isolated principles from them by many researchers, which can be investigated further to achieve lead molecules in the search of novel herbal drugs.

References

- Abu *et al.*, MS Studies on the characterization and glyceride composition of *Cassia fistula* seed oil, Bangladesh J. Sci. Indust. Res., 34, 144-148 (1999)
- Agarwal and Paridhavi, Clinically useful herbal drugs, Ahuja Publishing House, 281-282 (2005)
- Anonymous Ayurvedic Pharmacopoeia of India, Part 1, Vol.5, New Delhi, Government of India Publication, 8-9 (2001)
- Anonymous, The Wealth of India, First Supplement Series (Raw Materials), National Institute of Science Communication and Information Resources, CSIR, 3 (Ca-Ci), 340-342 (2007)
- Aweng *et al.*, Antioxidant activity and phenolic compounds of *Vitex trifolia* Var, *simplicifolia* associated with anticancer, ISCA J. Biological Sci. 1(3), 65-68 (2012)
- Barthakur *et al.* The Indian Labernum (*Cassia fistula* L.) fruit: an analysis of its chemical constituents, Plant Foods Human Nutr., 47, 55- 62 (1995)
- Ben *et al.*. Medicinal Plants of the World, Briza Publications, 403 (2009)
- Bhalerao S.A. and Kelkar T.S. Traditional Medicinal Uses, Phytochemical Profile and Pharmacological Activities of *Cassia fistula* Linn. International Research Journal of Biological Sciences. 1(5): 79-84. (2012)
- Chopra *et al.* Glossary of Indian Medicinal Plants, National Institute of Science Communication and Information Resources, 54 (2006)
- Danish *et al.* *Cassia fistula* Linn. (Amulthus)- An Important Medicinal Plant: A Review of Its Traditional Uses, Phytochemistry and Pharmacological Properties, J. Nat. Prod. Plant Resour, 1(1), 101-118 (2011)
- Gupta *et al.*, Quality Standards of Indian Medicinal Plants, Medicinal Plants Unit, Indian Council of Medical Research, 2, 47-53 (2008)
- Gupta M., A study of *Cassia fistula* pulp, Indian J. Pharm., 4, 61-63 (2000)
- Gupta R.K., Medicinal and Aromatic plants, CBS publishers & distributors, 1st edition, 116-117 (2010)
- Hegde *et al.* Evaluation of Antimicrobial properties, phytochemical contents and antioxidant capacities of leaf extracts of *Punica grantum* L., ISCA J. Biological Sci., 1(2), 32-37 (2012)
- Indian Herbal Pharmacopoeia revised new edition Indian Drug Manufacturers Association Mumbai, 106-113 (2002)
- Kashiwada *et al.*, Tannins and related compounds, XCIII, Occurrence of enantiomeric proanthocyanidins in the Leguminosae plants, *Cassia fistula* L.; *Cassia javanica* L. Chem. Pharm. Bull., 38, 888-893 (1996)
- Khare C.P., Indian medicinal plants, Springer, 128 (2007)
- Kirtikar and Basu Indian Medicinal Plants, International book distributors, 2, 856-860 (2006)
- Kumar *et al.*, Chemical examination of *Cassia fistula* flowers, Indian J. Chem., 4, 460 (1966)
- Kumar *et al.*, Search for antibacterial antifungal agents from selected Indian medicinal plants, J. Ethnopharmacol, 107, 182-188 (2006)
- Luximon-Ramma *et al.*, Antioxidant activities of phenolic, proanthocyanidins, and flavonoid components in extracts of *Cassia fistula*, J. Agric. Food Chem., 50, 5042-5047 (2002)
- Markouk *et al.* Evaluation of some Moroccan medicinal plant extracts for larvicidal activity, J. Ethnopharmacol, 73, 293-297 (2000)
- Mishra *et al.* Chemical constituents of hexane fraction of *Cassia fistula* pods, Fitoterapia L, XVII (57), 173-174 (1996)
- Mondal *et al.*, Biochemical analysis of four species of *Cassia* L. pollen, Aerobiologia, 14, 45-50 (1998)
- Nadkarni K.M., Indian Materia Medica, Bombay Popular Prakashan, 1, 285-286 (2009)
- Patil and Patil, Ethnomedicinal herbal recopies from Satpura hill ranges of Shirpur Tahsil, Dhule, Maharashtra, India, Res. J Recent Sci., 1, 333-336 (2012)
- Patil H.M., Ethnobotanical notes on Satpura hills of Nandurbar district, Maharashtra, India, Res. J Recent Sci. 1, 326-328 (2012)
- Satyavati and Sharma Medicinal Plant in India, ICMR: New Delhi, India 112 - 113 (1989)
- Sen A.B. and Shukia Y.N., Chemical examination of *Cassia fistula*, J. Indian Chem. Soc., 45, 744 (1968)
- Siddhuraju *et al.* Food Chemistry, 79(1), 61-67 (2002)