



MEDICINAL PROPERTIES OF DIFFERENT PARTS OF *CASSIA FISTULA* L. (FAMILY -CAESALPINACEAE): A REVIEW

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Article Received on 26/06/2022

Article Revised on 16/07/2022

Article Accepted on 06/08/2022

ABSTRACT

C. fistula is small, deciduous, medium sized, ornamental tree in the family Caesalpinaceae. It is fast growing tree having height up to 30 to 40 feet and densely moderate, oval, upright, vase shape crown. *Cassia fistula* is an important medicinal plant. In Ayurvedic medicines *C. fistula* has been used against various disorders such as diabetes, pruritus, haematemesis, leucoderma, and other ailments. The whole plant is used in the treatment of skin diseases, inflammatory diseases, rheumatism, anorexia. In traditional medicine, it has been used to cure disease. The root, stem bark, leaves, flower, pod, seed contain a biologically active compounds. This review provides information about medicinal properties of root, stem bark, leaves, flower, pod, seed of *Cassia fistula*.

KEYWORDS: *Cassia fistula*, anti-inflammatory, hepatoprotective activity, larvicidal activity, medicinal properties, traditional uses.

INTRODUCTION

Cassia fistula is small, deciduous medium sized, ornamental^[1] tree. It is fast growing tree having height up to 30 to 40 feet and densely moderate, oval, upright, vase shape crown. In ancient India, *C. fistula* has been used in the treatment of various ailments, dated back to Sushruta Samhita and Charaka Samhita.^[2] The roots of this plant are brownish yellow, odourless, rough and irregular in shape.^[3] Chauhan *et al.*, (2011)^[4] described that, trunk of *C. fistula* is consisting of hard and heavy reddish wood with rough grayish bark. The leaves of *C. fistula* are alternate, Pinnately compound, entire, deciduous, 4 to 8 inches, elliptic (oval), 8 to 12 pairs and green. Main rachis of leaf is pubescent, stipules minute, petiole 6-10mm long^[5] Chauhan *et al.*, (2011)^[4] reported about inflorescence. It is showy, long, drooping raceme with bright yellow, fragrant flowers^[6] which attract to bees and butterflies. According to Harisha and Palei, (2012)^[7] flowers are pedicellate which is slender, smooth and green in colour, bisexual. Flowers are with oblong, obtuse, pubescent calyx, corolla are up to 3.5 cm in diameter with five subequal, obovate, clawed petals and stamens are 10, upper 3 are with erect filaments up to 0.7 cm long with basifixed anthers. Lower 3 curved filaments and dorsifixed anthers. The median 4 stamens with 1cm long, erect filaments and versatile, curved anthers. Carpel is sessile or stacked, ovary pubescent^[6], style up to 0.5cm long and with terminal stigma.^[8]

Fruit of *C. fistula* is dark-brown, cylindrical, indehiscent^[6], elongated, hanging pod having 12"length

or more and 1" diameter and dry & hard covering. Fruit colour is purple.^[4] Kumar *et al.*, (2012)^[9] showed fiber, mesocarp cells with yellow brownish pigments prismatic and cluster crystals, fragment of lignified fiber, fragment of epicarp containing group of stone cells in fruit of *C. fistula*.

Seeds of *C. fistula* are oval in shape, 8mm long, slightly less in breadth, 5mm thick.^[5] The seeds of *C. fistula* are in cells, each cell contains a single seed, attached with sticky brown pulp and poisonous.^[4] Acid scarification is optimized in breaking seed dormancy of *C. fistula*.^[10]

1. Medicinal properties of Root

Aqueous extract of the root bark of *C. fistula* showed anti-inflammatory activity.^[11] Anonymous (2007)^[12] proved that the roots of *C. fistula* are used in joint pains, blood dysentery chest pains and migraine. The extract of the root lowered the blood sugar level up to 30%. The roots of *C. fistula* is strong purgative and used as a tonic, astringent and febrifuge. The extract of the root bark with alcohol can be used for backward fever. The root is used in cardiac disorders, biliousness, rheumatic condition, haemorrhages, wounds, ulcer, boils and skin diseases.^[13] Panda *et al.*, (2009)^[14] reported that decoction of mixture containing roots of *C. fistula* along with equal quantity of roots of *Stereospermum chelonoides* latex of *Calotropis gigantean* and stem juice of *Musa paradisiaca* are mixed with pepper and is given twice a day for 2-3 days for relief from snakebite. The

root of *C. fistula* is used in fever, heart diseases, retained excretion and biliousness.^[15]

2. Medicinal properties of stem bark

The stem bark of *C. fistula* is laxative, antitubercular, anthelmintic, emetic, febrifuge, diuretic, constipation, fever, diabetic, and cardiac problem.^[16] The stem bark of *C. fistula* used against amenorrhoea, chest pain and swelling.^[17] The bark of *C. fistula* extract possesses significant anti-inflammatory effect.^[18]

Nirmala *et al.*, (2008)^[19] suggested that in bark of *C. fistula* antioxidant and polyphenol present which contribute to the antihyperglycemic and antilipidemic properties. It is useful in the diabetes treatment and to prevent and manage of coronary artery disease. According to Erik *et al.*, (2009)^[13] the bark of *C. fistula* possesses tonic and anti-dysentric properties. It is also used for skin complaints. According to Ashwani kumar (2009)^[20] the stem bark is to be eaten raw for stomachache. The powder of the bark is used in jaundice, leprosy, heart diseases and syphilis. Bark extract of *C. fistula* showed hepatoprotective activity.^[21-22] Bark of *C. fistula* possess significant analgesic activity.^[23] Methanolic extract of *C. fistula* bark has cardioprotective effect.^[24] Bark of *C. fistula* used in leprosy.^[25] Panda *et al.*, (2009)^[14] states that, the simlipal tribes applied the bark paste of *C. fistula* on the bitten area, for 2-3 times a day at regular interval for 3 days and half teaspoon juice extract is taken orally thrice a day to cure from jaundice.

Ramesh *et al.*, (2010) leprosy^[26] showed that, methanolic extract and the aqueous extract of *C. fistula* bark having good anti-urolithiatic and diuretic activity. Daisy and Saipriya (2012)^[27] reported that stem bark of *C. fistula* was used for the preparation of aqueous extract and synthesis of gold nanoparticles to evaluate the hypoglycemic effect. Methanolic extract of *C. fistula* bark shows anti-hyperglycemic action.^[28] Linu and Shankar, (2012)^[29] tested methanolic extract of stem bark of *C. fistula* for cytotoxicity as well as for their chemopreventive potential in two-stages murine skin chemical carcinogenesis. *C. fistula* stem bark ethanolic extract possesses analgesic and antihyperglycemic properties.^[30] Bark of *C. fistula* used as an antidiabetic.^[31]

3. Medicinal properties of leaves-

Leaves of *C. fistula* are purgative.^[32] According to Bhakta *et al.*, (1998)^[33] the leaf extract of *C. fistula* has anti-tussive, wound healing properties.^[34] Extract of *C. fistula* leaf showed significant hepatoprotective activity^[35] and hence used in the treatment of jaundice. Leaves of *C. fistula* used as alternative source of sennoside.^[36] Leaf extract of *C. fistula* showed anti-inflammatory activity.^[35] The leaves of *C. fistula* reduced mutagenicity in *E. coli*.^[17] The methanolic leaf extract of *C. fistula* had ovicidal and larvicidal effect.^[37] According to Bhakta *et al.*, (2001)^[38] in traditional medicine, leaf extract of *C. fistula* is used in the treatment of

hematemesis, pruritis, intestinal disorder, leucoderma, diabetes and as antipyretic, analgesic and laxative.

Kirtikar and Basu, (2006)^[5] reported that leaves of *C. fistula* possesses laxative and anti-periodic properties. The leaves are used in piles, jaundice, rheumatism ulcers and also externally for ring worms eczema, skin eruption. The leaves and bark mixed with oil are used to insect bites, pustules. Kannampalli *et al.*, (2007)^[39] observed that ethanolic leaf extract of *C. fistula* protects the liver against DEN (diethylnitrosamine) induced hepatic injury in rat.

Decoction extract of *C. fistula* leaves contained anthraquinone glycosides which is used as an alternative source of raw material for various laxative preparation.^[40] Leaves of *C. fistula* are laxative and used as emollient, a poultice is used for chilblains, in insect bites, swelling, rheumatism and facial paralysis.^[15,41] Leaves of *C. fistula* possess significant analgesic activity.^[23] Gobianand *et al.*, (2010)^[42] showed that ethanolic leaf extract (ELE) of *C. fistula* had anti-inflammatory and antipyretic activity. Ethanolic leaf extract of *C. fistula* showed anti-ulcer activity.^[43] Jehangir *et al.*, (2010)^[44] showed that high dose of *C. fistula* ethanolic leaves (500mg/kg) had hepatoprotection against INH (isoniazid)/RIF (rifampicin) induces hepatitis in rat. According to Danish *et al.*, (2011)^[45] juice of leaves of *C. fistula* are used as dressing for ringworm, relieving irritation and relief of dropsical swelling. Methanolic extract of dried leaves of *C. fistula* significantly and effectively reduce the body weight and weight of parametrial fat in mice.^[46]

From the chloroform extract of the leaves of *C. fistula* phytol, iutein and di-lineolylgalactopyranosyl-glycerol were isolated which showed antiplasmodial activity.^[47] Leaves of *C. fistula* are crushed to prepare a thick paste and mixed with coconut oil which is useful on burnt skin. Alcoholic extract of *C. fistula* leaves showed wound healing property.^[48] Methanolic extract of *C. fistula* leaf shows anti-hyperglycemic action.^[28]

4. Medicinal properties of flower-

The flowers are eaten raw. They possess astringent^[5,38], febrifugal^[32] and anti-bilious properties.^[49] The decoctions of the flowers used in stomach troubles febrifugal.^[20] Flowers are used in rheumatic pain.^[50] Kumar *et al.*, (2011)^[51] reported that Dongaria Kandha of Niyagiri hill in Odisha (India) utilize *C. fistula* (*Sonari*) flowers for worship. Duraipandiyani *et al.*, (2011)^[52] showed antifeedant and larvicidal activities in ethyl acetate extract of flowers of *C. fistula*. Rhein from ethyl acetate extract of *C. fistula* flower used in the treatment of cancer.

5. Medicinal properties of pod

The fruit of *C. fistula* is a good source of Fe and Mn. It gives nutrients and energy to humans.^[53] Methanol extract of *C. fistula* fruit had leukotriene inhibition

activity.^[54] Gupta *et al.*, (2000)^[55] showed antileishmanial activity of dichloromethane extract of *C. fistula* fruit. They isolate the active isoflavone biochanin A. In Ayurvedic pharmacopoeia of India (2001)^[17] mentioned that the fruit pulp of *C. fistula* is used for constipation, colic, chlorosis and urinary disorders. Akanmu *et al.*, (2004)^[56] concluded that *C. fistula* pod used as laxative drug and used as a substitute for the official Senna. They also showed the Pods of *C. fistula* 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.^[5,12] The pulp of *C. fistula* fruit is a purgative.^[32] Kirtikar and Basu, (2006)^[5] reported that fruits of *C. fistula* are used in the treatment of abortifacient, antipyretic, demulcent, and heat of the body. It is useful in lessens inflammation, chest complaints, asthma, throat troubles, liver complaints, disease of eye and gripping.^[57] Anonymous, (2007)^[12] reported that pulp of *C. fistula* pod is given in liver disorders. The drug is used as analgesic as an antipyretic. It is a remedy for malaria and fever. It is also used in anthrax, blood poisoning, antidiabetic antidysentric, leprosy and for the removal of abdominal obstruction. According to Khare, (2007)^[1] the fruit pulp of *C. fistula* is used for constipation, colic, chlorosis and urinary disorders.

Ripe fruit of *C. fistula* possesses hepatoprotective effect.^[58] Sartorelli *et al.*, (2007)^[59] showed the fractionation through bioguided antileishmanial activity of the dichloromethane extract of pod of *C. fistula*. Ali *et al.*, (2008)^[60] showed immunomodulatory effect of fruit of *C. fistula* and its synergistic antimicrobial combination with amoxicillin Amoxy-*Cassia*. They also showed that amoxy-*Cassia* and water extract of fruit of *C. fistula* stimulates immune system by activating large number of anti RBC producing cells in the spleen. Gupta and Jain, (2009)^[61] reported the hypolipidemic effect of *C. fistula* legume extract (50%) in hypercholesterolemic rats. They also reported that pod of *C. fistula* is rich in anthroquinone and used as purgative. Fruit soup of *C. fistula* is liver disorder.^[62]

Ashwani Kumar (2009)^[20] reported that pods of *C. fistula* is laxative. In Europe pod is used in the preparation of tobacco for smoking. The fruit of *C. fistula* is used for asthma in Andhra Pradesh. The pulp of *C. fistula* is purgative and used for children and pregnant women. It is used in disorder of liver, in biliousness, in blood poisoning, in anthrax, leprosy and in diabetes. The decoction of pod is used in Pnemonia and common fever. According to Jadhav, (2009)^[63] fruit of *C. fistula* used among children to cure cough.

Dried pulp of *C. fistula* showed maximum anti-inflammatory activity at 500mg/kg dose.^[64] Irshad *et al.*, (2010)^[65] showed anthelmintic activity of *C. fistula* fruit pulp. Gupta, (2010)^[41] reported that ashes of burnt pods of *C. fistula* mixed with honey taking 3-4 times relieves

cough. According to Sumi and Saj, (2012)^[66] water extract from pod of *C. fistula* showed anthelmintic activity. Kalantari *et al.*, (2011)^[67] demonstrated the protective effect of *C. fistula* fruit extract in nephrotoxicity and concluded that the *C. fistula* fruit extract has significant hepatoprotective effect in murine model. Fruit pulp extract of *C. fistula* possessed anticandidal property. The pulp of *C. fistula* is purgative.^[68]

Aqueous extract of *C. fistula* pulp increase the sleeping time and decrease level of anxiety.^[69] Methanolic extract of pod of *C. fistula* showed antipyretic activity.^[70] Fruit extract of *C. fistula* showed antihyperglycemic activity.^[71] Hot aqueous extract of *C. fistula* pod shows dose dependent anti IBR virus activity.^[72]

6. Medicinal properties of seed

Methanolic extract of *C. fistula* seed had the sedative action of the sodium pentobarbitone, diazepam, meprobamate and chlorpromazine and analgesia induced by morphine and pethidine in a dose dependent manner.^[73] Abo *et al.*, (1999)^[74] showed antitumor activity in methanolic extract of *C. fistula* seed. Seeds of *C. fistula* have antibacterial^[75], antitumour^[55] and antifertility^[76] effect. Petroleum ether extract of *C. fistula* seed contains pregnancy terminating effect by virtue of anti-implantation activity.^[77] Seeds are emetic and used in constipation having cathartic properties. The seeds possess laxative, carminative, cooling, improves appetite^[5,12] and antipyretic activity.

Anonymous (2007)^[12] reported that the seeds of *C. fistula* has antipyretic and hypoglycaemic activity and are used in piousness, jaundice, skin disease, in swollen throat. According to Khare, (2007)^[1] seed extract of *C. fistula* showed laxative, carminative, cooling and antipyretic properties. Seed extract of *C. fistula* possess anticandidal property.^[19] The powder of *C. fistula* seeds are used in Raktapradara by Bhil tribals in Southern Rajasthan^[20] Seed of *C. fistula* used in jaundice.^[62]

Akinyede and Amoo, (2009)^[78] showed that *C. fistula* seed flour is a potential source of dietary protein and mineral. It is used in food and feed formulation. Ashwani Kumar (2009)^[20] reported that seeds of *C. fistula* are sweet in taste. It is laxative, carminative, cooling having anti-pyretic properties. It is useful in jaundice, biliousness, skin diseases and in swollen. Chaudhari *et al.*, (2009)^[79] showed hepatoprotective activity in *C. fistula* seeds. Irshad *et al.*, (2010)^[65] had studied anthelmintic activity in seeds of *C. fistula*. Irshad *et al.*, (2011)^[68] concluded that seed extract of *C. fistula* possess anticandidal activity. Seeds of *C. fistula* used in jaundice, biliousness, skin diseases and swollen throat.^[45] According to Bhalerao and Kelkar, (2012),^[48] dried seeds shows hypoglycemic activity and seed powder used in amoebiasis. Petroleum ether extract of seed of *C. fistula* possess antiestrogenic property which is responsible for the anticonceptive effect.^[80]

CONCLUSION

The whole plant is used in the treatment of skin diseases, inflammatory diseases rheumatism, anorexia.^[81,82] This paper highlights different medicinal properties of root, stem bark, leaves, flower, pod, seed of *Cassia fistula*.

ACKNOWLEDGEMENT

I am very much thankful to our Former Principal Dr. A.L. Deshmukh and Former head Dr. Kutwal D.N. Department of Botany Shankarrao Mohite Mahavidyalaya, Akulj for their valuable co-operation and guidance.

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