

# Biofidelic and Analeptic Employ of Cassia Fistula L

Dr. Priyanka Gupta<sup>1</sup>, Dr. Kamaljit Kaur<sup>2</sup>, Saloni Maurya<sup>3</sup>

<sup>1</sup>Assistant Professor, P.G. Department of Biotechnology, Khalsa College

<sup>2,3</sup>P.G. Department of Biotechnology, Khalsa College, Amritsar

## Abstract

Cassia Fistula L. is the flowering plant that belongs to the family of Fabaceae. It is also called Amaltas or Aragvadha that is called “Disease Killer”. Cassia fistula L. contains various bioactive compounds such as Flavanoids, Saponins, Phenolic acids and Tannins, Gallic acids and Anthraquinones like emodin, physcion, chrysophaoletic, steroids like kampesterol and Glycosides, Rhenin, Sennoside A and B, Alkaloids, lepeol are present. These Bioactive chemicals are present in each part of this plant that is used in severe diseases in human. These Bioactive chemicals used in Antiinflammatory, Antidiabetic, Hepatoprotective purposes, Antipyretic, Antifertility, Antimicrobial, HIV, COVID-19, Anticancer characteristics. It contains carbohydrates, arginine, protein, leucine and flavonid-3-ol-subordinates. It also contains fistulic acids and gluten matter. Its seeds are rich in sterulic acid, vernolic oil and malvalic acid is present. In market Cassia fistula L. is generally used in treatment of piles as the name of the product is Pilex. Lupin is used as a regulator of constipation as the name of the product that is Constivac. Similarly it is used in detoxifier and anti ageing purpose as the name of product is Purium. So, in this article, the Ethnopharmacology of this plant is used in various uses of Pharmacognosy that is beneficial in human.

**Keywords:** Bioactive compounds, Pharmacognosy, Ethnopharmacology, Cassia fistulaL.

## 1. Introduction

Cassia fistula L. is belongs to the family of Fabaceae. It is used in Ayurveda, Unani and siddha. In Ayurveda it is used in many purposes like in ringworm infections, in constipation problems, in jaundice, arthritis (Pallab maity et al.,2009;Sharma P.C.2005) In Unani it is used in purgative purpose and in anti inflammatory purpose that is used in throat infection and chest problem. As well as in Siddha, it is used in anti inflammatory purpose and in anti microbial purpose and in Anti pyretic issues. That’s why this plant is generally used in medicines (Jung H.A, Ali M.Y and Choi J.S., 2017).

Cassia fistula L. is also called Golden shower or it is called Pudding pipe tree. This is called Golden shower due to its hanging clusters of yellow colour flowers that bloom in summer season. Cassia fistula L. is the medicinal plant that is found in Asia, South Africa, China, West Indies and Brazil and in Gangetic valley in Central India and in south India ( Prashanth Kumar V, Chauhan NS.,2006;Chatterjee TK.,1996).

## 2. Botanical Profile

Cassia fistula L. is the widely ornamental yellow flowering plant that blooms in late spring season. The

tree is 8-9 m straight and high, its bark is smooth, pale grey. The leaves are deciduous and pinnate in nature with eight pairs of leaflets. The flowers are slender, pubescent and pendulous racemose in nature. The fruit is a legume with a pungent odour and has several seeds. The pods are green in colour that turn into black on ripening after flowers. The pulp is sticky, sweet, mucilaginous odour with dark brown colour. The new leaves are grown in the month of March to July but they ripen in month of December to March and pods ripe in month of May (Pawar AV, Patil SJ., 2017; Anonymous. 2002).

### 3. Phytochemical Contour

*Cassia fistula* L. Has number of bioactive compounds such as flavanoids, alkaloids, tannins, fatty acids, resins, anthraquinone, sesquiterpenes are present. Various primary phytochemicals compounds are present in fruits, leaves, pollens, pods and seeds. There is the presence of proteins, carbohydrates and lipids and free aminoacids are present. Some bioactive compounds such as flavanoids, linoleic acids, oleic acids, tannins, stearic acids and carbohydrate content is plants present (Khushwah AS, Mittal R., 2022; Pawar AV and Killedar SG., 2017).

Some compounds are present are anti carcinogenic compounds in flowers that is called Rhein and Lupeol and Anthraquinone derivatives are present such as Sennosides A, BC, D are present.

#### a) Integrant in Leaves

Leaves contains reducing sugars, coumarins, glycosides, Sennosides A and Sennosides B, rhein, Isoflavoneoxalic acids, Oxyanthraquinone derivatives are present in pod region of plant. Among these compounds contains rhein is the only compound that has laxative property. Leaves contains stearic acid, palmitic acid, 8 –diol, Heptacosanyl-5-hydroxypentadec-2-enoate and octacosan-5-oleic acid are present (Saeed M, Naseer S., 2020; Shehu HA, Mukhter AG., 2020; Singh RS, Singh H., 2005).

#### b) Integrant in Bark and Stem

*Cassia fistula* L. bark has beta sitosterol, lupeol, fistucacidin, hexacosanol, leucocyanidin, dihydroxyanthraquinone, oxyanthraquinone and flavonol glycosides are present. In bark and stem contains beta –sitosterol and lupeol content is present that are rich in phytosterols and triterpenoids are present. The flavanoid content helps the efficacy against the Mosaic virus (Tanveer SA, Latif AB, Ashiq KA., 2019; Pawar AV., 2017).

#### c) Integrant in Fruit, Flowers and Seeds

The flowers contain essential oils, kaempferol, glycosides, anthraquinones, bianthraquinones, aurantimide, ceryl alcohol. In flower has oleic acid, linoleic acid, palmitic acid, stearic acid, caprylic acid, myristic acid and fatty acids are present. Similarly in fruit pulp contains kaempferol, rhein, fistulin, 1, 8-dihydroxy-3-anthraquinone derivatives are present. Moreover pulp contains arginine, protein, leucine and carbohydrates are present. In seeds contains vernolic acid, malvanic acid, sterculic acid are present. It also contains seeds gums are also present that is called as kaolin, calomel, and talc is present. The seeds contain 5-(2-hydroxyphenoxy methyl) furfural and Benzyl 2 beta-O-d-glucopyranosyl-3,6-dimethoxybenzoate. It also contains 5-hydroxymethylfurfural, (2'S)-7-hydroxy-2-(2'-hydroxypropyl)-5-methylchromone and two oxyanthraquinone, chrysophanol and chrysophanein is present (Modi MR and Khorana ML., 1952; Kumar A et al., 1966; Sayeed MA et al., 1999; Saeed M et al., 2020).

#### d) Integrant in Roots

Roots contains Oxyanthraquinones, phlobaphenes, tannins and Rhamnetin-3-O-gentiobioside is present (Vaishnav MM et al., 1996).

#### 4. Analeptic Chattels of *Cassia fistula* L.

*Cassia fistula* L. is important traditional medicinal plant that has valuable properties in inflammatory diseases, ulcers, rheumatism, jaundice and anorexia, hypoglycemic conditions, antioxidant activities and antitumour properties. Some parts of this plant such as roots are used in heart related diseases are used, fever, nausea, in cough, snake bites. The fruit pulp is used in analgesic problems in chest and help in relieving in constipation (Pawar AV et al., 2017; Saeed M et al., 2020).

##### a) Antioxidant potential

Antioxidant potential helps in reduce the illness with the help of free radicals to prevent number of diseases because they have medicinal properties due to presence of various elements such as bioflavonoids, tocopherol and polyphenols and essential oils. These types of bioactive chemicals are present in leaves, stem, bark and pulp of *Cassia fistula* L. These bioactive chemicals such as polyphenols facilitate the scavenging free radical they have the ability to decrease the concentration of oxygen to break the peroxides to interact the enzymes with different antioxidants (Srividhya M et al., 2017).

##### b) Antiinflammatory potential

In Antiinflammatory potential we use leaves extracts with standard medicines such as Diclofenac and Indomethacin. They used dextran, carrageenan and histamine that help in anti-inflammatory effects. The phyto chemical analysis of this extract is carbohydrates, proteins and glycosides. Mainly flavanoids has reactive oxygen species are used in pathogenesis such as in aging processes (Ilavarsan et al., 2005; Naseer et al., 2020).

##### c) Laxative potential

Basically in laxative property there is the use of seeds. In seeds there is the presence of anthraquinones that helps to stimulate the bowel movement by peristalsis that is the muscle contraction of the intestine (Chaoudhay MI. 2010).

##### d) Immunomodulatory potential

*Cassia fistula* L. improves the response of infection. Basically triterpene is present in the form of Lupeol that help in wound healing purposes. Lupeol inhibits the immune response with their phagocytic activity of macrophages and cytokines production by CD4+ T helper cells. CD4+T helper cells reduce the level of cell count and cytokines such as IL-2, interferon gamma and IL-4(Th2).

##### e) Hepatoprotective potential

*Cassia fistula* L. helps to protect the liver damage that is done by hepatoprotective agent from te leaves of the *Cassia fistula* L. That is done by using the extract of leaves of *Cassia fistula* L. by using n-heptane and by using paracetamol is used in rats. This shows that decreasing the level of alkaline phosphatase that is called ALP, Serum glutamic oxaloacetic transaminase that is called SGPT. They improve the oxidative stress and hepatic toxicity level. It also seems that decrease the level of alkaline phosphatase, SGOT, SGPT, bilirubin, aspartate transaminase, alanine aminotransferase and proteins level (Paudel P., Jung., 2018; HA, Ali M Y et al., 2018; Parthasarathy G et al., 2009; Pradeep K et al., 2005).

##### f) Antidiabetic potential

*Cassia fistula* L. Stem and bark extract is mostly used in cure the diabetes. They have the ability to decrease the glucose level. Hypoglycemic and hypocholesterolemic activity of this extract is prepared in hexane and induced with streptozotocin shows the level of anti diabetic properties shows the relevant effects of decreasing the level of glucose in serum (Pitchai D et al., 2012; Jarald EE et al., 2013).

##### g) Antipyretic potential

*Cassia fistula* L. buds are used in antipyretic properties as well as used in pyrexia when it is given with

paracetamol(Kainsa S et al.,2012;Pitchai D .,2012).

#### **h) Neuroprotective potential**

*C. fistula* L. helps in nervous system against neurological diseases like Parkinson's and Alzheimer's disease to inhibit the acetylcholinesterase (AChE) and generates the polyQ40 aggregates that linked to the Huntington disease and protein related disorders (Kaur S et al., 2019).

#### **i) Antiobesity potential**

*C. fistula* L. helps to reduce the obesity and decrease the level of LDL and enhance the hepatic LDL receptor and increase the HDL level to increase the activity of lecithin-cholesterol acyltransferase helps the level of cholesterol level transport in endothelium protection(Kaur S et al.,2019).

#### **j) Antiparasitic potential**

*C. fistula* L. helps against the protozoan activity such as *Plasmodium falciparum* and *Entamoeba histolytica*. *C. fistula* L. helps to identify the bioactive compound against *Leishmania* (L.) *chagasi*. (Sartorelli P et al., 2009).

#### **k) Antibacterial potential**

*C.fistula* L. shows anti bacterial property against the strains such as *Bacillus cereus*, *Staphylococcus epidermidis* , *B. megaterium*, *B.subtilis*, *S.sonnei* ,*S. aureus*, *E. coli* , *Klebsiella pneumonia*, *S.pyrogenes*, *Streptococcus haemolyticus*, *Sarcina lutea*, *S. dysenteriae*, *S.typhii*, *P.aeruginosa*. These fractions were tested on bacterial strains against pathogenic to human. We use chloroform, petroleum ether, ethanol, water and methanol extracts were used. These types of five extracts are used against antibacterial efficacy against antibacterial strains. Similarly *C.fistula* L. seeds has high amount of phenolic content is present that contains bioactive compounds that is responsible to the antibacterial activity. These seeds contains lectins that has CSL-1, 2, 3 that has the ability of inhibition of human pathogenic bacteria species against these species of bacteria ( Bhalodia N et al.,2012).

#### **l) Antifungal Potential**

*C. fistula* L. extracts are used such as Diethyl ether, acetone and methanol against *C. albicans*. They showed the inhibition zone compared to clotrimazole, some extracts shows the presence of Rhein. In antifungal property we use the flower extracts of this plant is used. Some extracts of flower used against the fungal strains such as *Trichophyton mentagrophytes*, *Epidermophyton floccosum*. Similarly *C. fistula* L. there is the efficacy shown in fruit extracts on *Alternaria solani* fungus (Sony P et al., 2018).

#### **m) Anti-HIV potential**

In anti- HIV plant lectins are used. D-mannose is specifically used to inhibit the HIV. Mainly we use fruit extract of *C. fistula* L. is used. It regulated the HIV-1 protease activity that is used in Thai medicine. Some compounds are used from *C. fistula* L. Is used such as piceatannol, chrysophanol, resveratrol, emodin, rhein is used in anti- HIV1 protease. It is seemed that rhein inhibits the angiogenesis and survival of hormone dependent and independent cancer cells in hypoxic and normoxic conditions that shows potent anti-cancer ability (Upadhyay et al., 2020).

#### **n) Anti-COVID -19 potential**

Mostly lectins have the potential of anti-infectivity ability of various RNA viruses included such as SARS-CoV-2. They have the set of carbohydrates attached proteins are used to attach with oligo and monosaccharides. Where they replicate easily. They have the ability to neutralize the encapsulated viruses in Corona virus. Antiviral lectins bind the spike proteins of SARS- Co V such as mannose, NAG, glucose to enter the SARS-CoV and corona virus (Kumaki, et al., 2011).

### o) Anti cancer potential

C. fistula L. has fruit extract is mainly used in cervical cancer, breast cancer. In cervical cancer there is the leakage of urinary, fecal discharge through the vagina, bleeding, fever and pain, there is the endothelial apoptosis develop the complex wounds. C. fistula fruit extract is used to cure these types of abnormalities in cervical cancer.

The fruit extract of C. fistula use in breast cancer that is MCF-7 cell lines there terpenoids, isoprenoids are used that is derived from naturally occurring free acids, esters or glucosides that is called saponins. In breast cancer Paclitaxel is used to treat the drugs from breast cancer. C. fistula L. triterpenoids of C. fistula L. is used as molecular docking process (Kashyap D., 2022).

### 5. References

1. Pallab maity et al., 2009. Indian Journal of Experimental Biology, 47; 849-861.
2. P.C Sharma et al., 2005. Database on medicinal plants used in Ayurveda, Vol. 2, C.C.R.A.S., 29.
3. Jung HA, Ali MY, Choi JS. 2017. Promising inhibitory effects of anthraquinones, naphthopyrone and naphthalene glycosides from *Cassia obtusifolia* on alpha glucosidase and human protein tyrosine phosphatases 1B. 22(1). 28-43.
4. Prashanth kumar V, Chauhan NS .2006. Search for antibacterial, antifungal agents from selected Indian Medicinal plants. J. Ethnopharmacol. 107:182-188.
5. Chatterjee TK. 1996. Herbal options. Eastern traders, Calcutta, 29:171.
6. Pawar AV, Patil SJ, Killeadr SG. 2017. Uses if *Cassia fistula* Linn as a medicinal plant. International Journal of Advanced Development, 2(3), 85-91.
7. Anonymous .2002. Ayurvedic Pharmacopoeia of India, Government of India Publication., Newdelhi, 8-9.
8. Saeed M, Naseer S, Hussain S, Iqbal M. 2020. Phytochemical composition and Pharmacological effect of *Cassia fistula* L. Science Inq Rev, 4(1):59-69.
9. Shenu HA, Mukhtar AG .2020. Phytochemical screening and antibacterial activities of *Cassia fistula* L. leaf extracts on some selected pathogens. Journal of Pharmacognosy and Phytochemistry, 9(3). 1154-1159.
10. Singh RS, Singh H, Pandey HS, , Pandey Rp. 2005. Two new aliphatic compounds from *Cassia fistula* L. Indian J. Chemistry, 44:2372-2374.
11. Tanveer SA, Latif AB, Ashiq KA, Qayyum ME. 2019. :A comprehensive review on pharmacological and phytochemical potential of *Cassia fistula* L.:A magical herb". International journal of biology and pharmacy allied science. 8:1134-1157.
12. Pawar AV, Patil SJ. 2017. Uses of *Cassia fistula* Linn. As a medicinal plant. International Journal for Advance research and Development, 2(3), 85-91.
13. Modi MR and Khorana MI. 1952. A study of *Cassia fistula* pulp. Indian Journal of pharmacy, 4, 61-63.
14. Kumar A., Pande CS, Kaul RK. 1966. Chemical examination of *Cassia fistula* L. flowers. Indian J. Chem. 4:460.
15. Abu Sayeed M, Abbas Ali M. 1999. Studies on the characterization and glyceride composition of *Cassia fistula* L. seed oil. Bangladesh J. sci. Indust. Res. 34:144-148.
16. Vaishnav MM, Gupta KR. 1996. Rhamnetin 3-O-getiobioside from *Cassia fistula* L. roots, Fitoterapia LXVII: 78-79.

17. Srividhya M, Hrudya H.2017. Bioactive amento flavones isolated from Cassia fistula L. leaves exhibits therapeutic efficacy. 7(1), 1-5.
18. Ilavarasan R, Mallika M. 2005. A study on the anti-inflammatory and antioxidant activities of a Cassia fistula L. bark extracts, 2(1), 70-78.
19. Naseer M Aslam U, Khalid B, Chen B.2020. Green route to synthesize zinc oxide nanoparticles using leaf extracts of Cassia fistula and Meliaazadarach and their antibacterial potential. Sci Rep 10:1038:65949-65943.
20. Chaoudhay MI.2010. Pharmacological evaluation of Cassias fistulaL.pods. Journal of Ethnopharmacology.
21. Pudel P, Jung HA.2018.Anthraquinone and naphthopyrone glycosides from Cassia seeds mediate hepatoprotection via Nrf2-mediated HO-1 activation and MAPK modulation. Arch. Pharm. Res 41(6):677-689.
22. Ali MY,Jannat S, Choi JS.2018.Hepatoprotective effect of Cassia seed extract and constituents against oxidative damage induced by tert-butyl hydroperoxide in human HepG2 cells. J .food Biochem. 42(1):1-12.
23. Parthasarathy G.Prasanth VV.2009.Hepatoprotective activity of a Cassia fistula L. bark extracts carbon tetra chloride induced liver toxicity in rats, International. J. Pharmacolohgy. 6(2):67-70.
24. Pradeep K, Karthikeyan S.2005.Effect of pretreatment of Cassia fistula L. leaf extract against subacute Carbon tetra chloride induced hepatotoxicity in rats. Indian J. Exp.Biol. 43(6):526-530.
25. Pitchai D .2012. Hypoglycemic and insulin mimetic impact of catechin isolated from Cassia fistula L.:A substance in silico approach through docking analysis. Med Chem. Res. 21(9):2238-2250.
26. Jarald EE, Joshi SB.2013. Biochemical evaluation of the hypoglycemic effects of extract and fraction of Cassia fistula L. in alloxan-indiced diabetes rats. Indian J. Pharm. Sci 75(4):427-434.
27. Kainsa S, Kumar P.2012.Pharmacological potentials of Cassia fistula L. plants: A review Pak. J. Biol. Sci. PJBS 15(9):408-417.
28. Kaur S, Sharma D, Singh AP.2019.Amelioration of hepatic function, oxidative stress, and histopathologic damages by Cassia fistula L. fraction in thio acetamide induced liver toxicity. Envt. Sci. Pollution Research, 26: 29930-29945.
29. Sartorelli P, Carvalho S.2009.Parasitology Research: 21(7):644-647.
30. Bhalodia N., Acharya R.2012.In vitro antibacterial and antifungal activities of Cassia fistula L. fruit pulp extracts AYU.33(1):123-130.
31. Sony P,Kalyani M.In vitro antifungal activity of Cassia fistula L. extracts against fluconazole resistant strains of Candida species from HIV patients. J. Myco. Med. 28(1):193-200.
32. Upadhyay RK.202-.Pharmaceutical insecticidal, therapeutic potential of Amaltash. IAnt. J. Green. Pharm. 14(3).
33. Kumaki M.2011. Inhibition of severe acute trespriatory syndrome coronavirus replication in a lethal SARS-COV BALB/c mouse model by stinging nettle lectin, Urtica dioica agglutinin. Antiviral research 90.1:22-32.
34. Kashyap D.2022. BioMed Research International.18.