

**A PHYTOPHARMACOLOGICAL REVIEW OF PLANT- CASSIA
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Corresponding Author*Thorat K. B.****ABSTRACT**

From long period of time Cassia Auriculata is therapeutically used for number of chronic diseases. Current review is to search of literature for the pharmacological activity, phytochemical investigation and safety /toxicity study of cassia auriculata plant extract. Several number of reporter published papers on plant showing various activities based on there phytochemicals evaluation, review concluded safety of whole plant and overall data useful for researchers to focused on priority

areas of research yet to be discovered.

INTRODUCTION

Herbal medicine is still used from ancient years because of better compatibility with the human body and having fewer side effects. However from the last few years there have increased use in developed countries also. Medicinal herbs are easily available, non toxic, easily affordable and play major role in research and development. Indian traditional medicines like Ayurveda, siddha and Unani utilized healing potential of many plants. World Health Organization estimated that about 80% population in Asia and Africa use herbal medicines and about 25 to 50% of pharmaceuticals used around the world are from plant origin. Plants are better source for treatment and prevention of common ailments and various serious conditions. Cassia auriculata Linn also called as 'Avartaki'/Tanners cassia (Caesalpinaceae). It is annual or biennial shrub found in hot region of India in open forests. Plant shows important therapeutic activities because of presence of phytochemical constituents like tannins, Saponin, Alkoloids, Glycosides; volatile oils etc. The leaves of plant are bitter, ophthalmic, diuretic, astringent, acrid, cooling and vulnerary. Plant showing therapeutic activities like anti-microbial, anti-diabetics, hepatoprotective, antiperoxidative, antiviral, antipyretic, the entire plant have medicinal value from tip to root. The flower and

flower buds are used in case of diabetes, leaves are showing the property of constipation and useful in digestion, seed show potent activity in eye infection, bark of plant used in treatment of gout, gonorrhoea, rheumatic pain while roots are important in urinary disorder, fever and other bacterial infections.

Plant description: Cassia Auriculata Linn is commonly called as Tanners senna, Avaram tree. Cassia auriculata is known as Tanner's Cassia belonging to family Caesalpinaceae.

Regional and other names: Tanner's cassia, pitkalika, Tanners senna, Mature tea tree (english), Avartaki, pitkalika, manojyna, pitkala, charmaranga (sanskrit), Tarwar, Awal, Tarval (Hindi), Tangedu, merakatangeedu (Telugu), Arsual, Taravada, Tarwad (marathi).

Taxonomically it is classified as

Kingdom : Plantae
Order : Fabales
Family : Leguminosae
Subfamily : Caesalpinaceae
Genus : Cassia

Geographic region: Cassia auriculata is leguminous tree having family Caesalpinaceae. It is the state flower of Telangana. It occurs in dry region of India, Sri Lanka. It is common along the sea coast and dry zone in Sri Lanka. Plant distributed throughout hot region of India.

Pharmacological properties as per ayurveda

Veerya- Sheet

Rasa- Tikta, Kashay

Guna- Laghu, Ruksha

Vipaka- Katu

Doshghanata- Kapha, Pittaghna

Vyadhi- Sambhan, Krimighna, Mutrasangrahaniy, Shukrastambhan, Kusthaghna, Pramehaghna.

Preparations and Formulations

1. Talapotaka Churna (Vaidya chintamani, Prameha Roga prakarana)
2. Diasulin (Antidiabetic Polyherbal formulation)

3. Avarai panmchaga choornam (Antidiabetic formulation)
4. SUGNIL (Siddha formulation for diabetes mellitus)
5. Aavarai kudineer (Siddha formulation for Diabeties Mellitus)
6. Kalpa herbal tea (Anti diabetic formulation)

Chemical constituent: Pod husk of seed contains nonucosane and nonacosan-6-one, chrysophanol, emodin, rubiadin, β -sitosterol, polysaccharides, flavonoids, anthracene derivatives and have some diametric procyanidins saponins and tannins. Senthilkumar and Reetha (2011) isolated an antibacterial compound found from leaves i.e. Oleanolic acid and it identified by IR spectrum, mass spectrum, HNMR, CNMR. Anandan et al (2011) investigated chemical compounds of leaves like 3-o-Methyl-d-glucose (48.50%), α Tocopherol, β -D mannoside (14.22%), D- Hexadecanoic acid (3.21%), Resorcinol (11.80%), 1,2,3,4 Tetrahydroisoquinolin 6-ol-1-carboxylic acid (1.98%) 13-Octadecenal Z (2.18%) these were identified by GC-MS analysis. Yesu Raj et al (2011) sfound diterpene alcohol, fatty acid esters, fatty acid amide, terpenoids, phytols as major compound analyzed by GC-MS.

Phytochemistry of cassia auriculata plant parts

A. Phytochemical analysis of ethanolic extract of cassia auriculata Leaves and Flowers

Phytochemical	Leaves	Flowers
Alkaloids	+	+
Phenols	+	+
Glycosides	+	+
Flavonids	+	+
Tannins	+	+
Saponins	+	+
Proteins	+	+
Carbohydrates	+	+

+ = Presence - = Absence

B. Phytochemical analysis of cassia auriculata flower extract.

Test	Methanol	Ethyl Acetate	Hexane
Tannins	+	+	+
Phenols	+	+	-
Flavonoids	+	+	-
Glycosides	-	-	-
Steroids	+	+	-
Terpenoids	-	-	-
Reducing	-	+	+
Anthraquinone	-	-	-

Quinines	+	+	-
Saponins	-	-	-
Coumarins	+	+	-

C. Phytochemical analysis of the methanol, Petroleum ether, Chloroform extract of cassia auriculata leaves.

Test for phytochemical	Methanol	Petroleum ether	Chloroform
1. Alkaloids			
Dragandroff's test	+	-	
Hager's test	+	-	
Wagner's test	+	-	
Mayer's test	+	-	+
2. Carbohydrate			
Anthrone test	+	+	+
Benedict	+	+	
Fehling's test	+	+	
Molisch's test	+	+	
3. Starch Iodine test	-		-
4. Glycoside			
Keddes test	+	-	-
Killer killani test	+	-	-
5. Flavonoids			
Shinoda test	+	-	-
Lead acetate test	+	-	-
Ferric chloride test	+	-	-
6. Triterpenoids			
Libermann Burchard's test	-	-	-
7. Resins			
8. Saponins	+	+	
9. Steroid			
Libermann Burchard's test	-	-	-
Salkowaski reaction	-	-	-
10. Proteins			
Millon test	+	-	-
Biuret test	+	-	-
11. Tannins			
Ferric chloride test	+	-	-

D. Phytochemical analysis of the ethanolic extract of cassia auriculata seed.

phytoconstituent	Inference
Alkaloids	+
Flavonoids	+
Carbohydrates	+
Glycosides	-

Saponins	-
Tannins	+
Phytosterol	+
Triterpenoids	-
Proteins	-
Aminoacids	+
Anthraquinones	+
Phenols	+

Medicinal uses

Cassia auriculata plant show activities like antibacterial, antioxidant, antidiabetic antiperoxidative, hepatoprotective etc. Cassia auriculata has been shows activities like spasmodic and antiviral activity. It also play important role in diarrhea, in worm infection, leprosy, traditionally used for female antifertility. The plant mostly used in rheumatism (Kirtikar and basu, 2006) also used in infection of conjunctiva Pari and lata, 2002). Flowers are used for spermatorrhea. Other parts are used in urinary discharges and cures tumours, skin diseases and asthma.

Literature review

The plant cassia auriculata has been reported to possess antipyretic hepatoprotective, antipyretic antiperoxidative and antihyperglycemic, and microbicidal activity. It has been shown to have antiviral and antispasmodic activity. The plant is used in traditional system of medicine for female antifertility, leprocy worm infection diseases of pittam. The anti inflammatory activity of various extract of leaves was carried out using carragenan induced rat paw edema. Carragenan induced inflammation represents a classical model.

Antibacterial activity

Antibacterial activity of plant is responsible for presence of some phytoconstituents like flavonoids and phenolic compounds mostly gram positive bacteria inhibited by plant than gram negative bacteria. The aqueous extract of plant shoe moderate activity against *S.aureous* (10mm), *B.cereus*, *P.mirabilis*, *P.aeruginosa* *E.coli* at concentration of 100,200,250 µg/ml resp. but do not show antibacterial activity on *B. subtilis* at any respective concentration Methanolic extract was showing effective antibacterial activity against two mico-organism i.e, *S.aureus* and *E.coli* at concentration 64 mg/ml while pet ether did not show any antibacterial activity on above micro organism (C.Anushia, P.Sampathkumar 1990). Cassia Auriculata methanolic root extract show potential antibacterial activity with *S.aureus*, *B.subtilis*, *E.coli*, *S. Typhi* etc (Gaurav.M.Doshi, Gayatri.V.Aggraval, 2011).

Antioxidant activity

Various extract of cassia auriculata leaves were evaluated for antioxidant activity by hydrogen peroxide scavenging method, reducing power method, nitric oxide scavenging activity and DPPH method (Medapati vijaya vara prasad et al. 2013). The antioxidant activity was determined by an improved assay based on the decolorization of the radical monocation of 2,2-azinobis-(3- ethylbenzoline-6-sulfonic acid) and 1,1-diphenyl-2-picrylhydrazyl(DPPH) radical scavenging method. The ethanolic and methanolic extract of cassia auriculata flower show antioxidant property in both assays A. Kumar. R.joel karunakaran 2006). G. Sriram Prasath, C. Aravind, S. Subramanian was evaluate antioxidant activity of cassia auriculata flower extract (1000 µg/ml)significantly scavenged 82% of DPPH radicals with an IC50 of 724.44 µg/ml and 83.5% ABTS radicals with an IC50 of 700 µg/ml. There was 76% inhibition of hydroxyl radicals (IC=711.90 µg), and 79% hydrogen peroxide radicals (IC50:735.17 µg) indicating the antioxidant nature of cassia auriculata flower extract.

Anti-inflammatory activity

C.auriculata was found to contain a flavonol glycoside 5-O-methylquercetin 7-O-glycoside.The 50% acetone extract of the flower of C.auriculata showed marked anti inflammatory activity (56%) in carrageenin induced oedema in rats (S.Manogaran and N.Sulochna). The anti-inflammatory activity was evaluated using albumin denaturation assay, proteinase inhibitory activity and membrane stabilization at different concentration. The acetone flower extract of C.auriculata possess anti inflammatory activity. These activites may be due to the strong occurrence of polyphenolic compounds such as alkaloids, flavonids, tannins, steroids and phenols. Protective effect on heat and hypotonic saline, induced erythrocyte lyses' is known to be a good index of anti inflammatory activity of any agent. Since the membrane of RBC is structurally similar to the lysosomal membrane the effect of any substance on stabilization of lysosomal membrane (Anita Rani et al, 2014).

Antimutagenic activity/Anticancer activity

Supriya. S.Deshpande, Shailesh.M.Kewatkar, and Vivek.V. Paithankar (2013) was observed that ethyl acetate extract of C.auriculata Linn possess significant anti mutagenic potential against CP induced chromosomal aberration. Chromosomes of bone marrow cell of animals treated with cyclo phosphamide CP, break was $31.33 \pm 3.01\%$, which was significantly higher ($P < 0.05$)as compared to vehicle treated animals in which it was $3.83 \pm 1.72\%$. in vehicle treated animals the extent of fragment was $2.83 \pm 1.47\%$.which was found to be significantly

higher than that of the CP treated animal in which the extend was 24.17 ± 2.56 . Prior treatment of extracts at 100 mg/kg and 200mg /kg significantly lowered ($P < 0.05$) the presence of break up to $9.5 \pm 2.16\%$ and $6.33 \pm 2.16\%$ respectively. Fragment was also significantly less ($P < 0.05$) in extract treated animal with 100mg/kg and 200 mg/kg. in vehicle treated animals none of the metaphase were found to be having polyploidy, pulverized or, ring type of aberration and on the other hand in animal treated with CP, these aberration increased significantly ($P < 0.05$). Treatment of animals with extract at 100 mg/kg and 200 mg/kg provided significant protection against CP induced polyploidy, pulverized or ring type of chromosomal aberration. Total aberration in CP treated animal was $42.33 \pm 3.50\%$, Which was found to be $12.16 \pm 4.16\%$ in 100 mg/kg treated animals and 7.33 ± 1.63 in 200 mg/kg treated animals, which were significantly less ($P < 0.05$) as compared to vehicle treated animals.

Antidiabetic activity

Hypoglycemic properties of ethanol extract of cassia auriculata leaves and flowers was reported in alloxan-induced diabetic rat at doses of 120 mg/kg for 15 days. The results of the experiment showed that both the extracts significantly reduced the blood glucose level, may be attributed to stimulated insulin secretion from the β cells or regenerate the β cells (Kalavani et al, 2008). Methanolic extract of flowers showed significant reduction of blood glucose response towards maltose ingestion and concurrently suppress insulin activity in Sprague Dawley rats (Abesundara et al. 2004). The safety evident and steady state serum level on concurrent administration of herbal tea prepared from floers and aerial parts of *Cardiospermum halicacabum* and Carbamazepine were investigated by Thabrew et.al (2004) in male albino Wistar rats. They demonstrated enhancement of bioavailability by 47.1%, when compared with the blood levels of animal receiving only carbamazepine, with no apparent changes in toxicity.

Hepatoprotective activity

Aqueous extract of cassia auriculata leaves was evaluated for hepatoprotective activity against alcohol intoxication at doses of 250 and 500 mg/kg body wt. orally once daily for 30 days. They reported tissue lipid lowering effect comparable to control group with a reversal of steatosis in liver and spongiosis in the brain. The treatment with extract also show significant improvement in body weight (kumar et al.2002).At doses of 250 and 500 mg/kg body weight. Aqueous extract showed hepatoprotective activity for 30 days against ethanol induced hepatotoxicity. They concluded that significant reduction in the level of hepatic

marker enzymes along with elevated activities of superoxide dismutase and catalase enzymes in liver with restoration of serum vit A and C level (Rajagopal et al.2003).

Anthelmintic activity

The anthelmintic activity of aqueous extract of cassia auriculata leaves (Awali), Erythrina Variegata leaves (Pangora) and Dioscorea bulbifera bulbs (Kand) against earthworms (*Eisenia fetida*), tapeworms (*Raillietina spiralis*) and round worm (*Ascaridia galli*) at 10-50 mg/ml dose of each plant extract. They concluded that plant extract exhibited significant anthelmintic activity at highest concentration of 50 mg/ml (Kosalge and Fursule, 2009).

Nephroprotective activity: Nephroprotective activity of ethanol extract of cassia auriculata roots at doses of 300 and 600 mg/kg body weight in cisplatin and gentamicin induced renal injury in animals. Significant reduction in elevated blood urea, serum creatinine and normalization of histopathological changes in the curative regimen were observed (Annie et al.2005).

Immunoprotective activity: The Immunomodulatory activity of methanol extract in rats was evaluated by administered doses of 100 and 200 mg/kg orally. The extract showed a significant stimulation of the cell mediated immunity in immune responses with the antigenic challenge by sheep RBCs, a significant increase in neutrophil adhesion and delayed type hypersensitivity response and no effects on the humeral immunity. Cassia auriculata significantly potentiated the cellular immunity by facilitating the foot pad thickness responses to the sheep RBCs in sensitized rats with a dose of 50 and 100 mg/kg the DTH response (Chakraborty. 2009).

Herbal formulation: The antihyperglycemic effect of Diamed, a herbal formulation (aqueous extracts of *Azadirachta indica*, *Cassia auriculata* and *Momordica charantia*) were investigated in alloxan-induced diabetic rats at doses of 1.39 (0.25g), 1.67 (0.30g) or 1.94 (0.35g) ml/kg for 30 days resulted in a significant reduction in blood glucose, glycosylated hemoglobin with an increase in plasma insulin and total haemoglobin. At dose of the 1.94ml formulation showed comparable antihyperglycemic effect as with 600 µg/kg glibenclamide (Pari et al.2001). Diasulin, a polyherbal prepared from *Cassia auriculata*, *Coccinia indica*, *Curcuma longa*, *Embelica officinalis*, *Gymnema sylvestre*, *Momordica Charantia*, *Scoparia dulcis*, *Syzygium cumini*, *Tinospora cordifolia* and *Atrigonella fornum* were evaluated for antihyperlipidemic and antiperoxidative effect. It showed significant ($P < 0.05$) reduction in

blood glucose, cholesterol, triglycerides, free fatty acids, phospholipids and increment in plasma insulin level at dose 200 mg/kg in alloxan induced diabetic rats. When administered for 30 days and found to be comparable with glibenclamide (Pari and Ramalingam, 2006). Diakur, a polyherbal formulation composed of standardized aqueous extract of *Cassia auriculata*, *Salacia reticulata*, *gymnema sylvestre*, *Mucuna pruriens*, *Syzygium jambolanum* and *terminia arjuna* have hypoglycemic and anti-lipid peroxidative effect at dose of 1600 mg/kg. When administered for 28 days in alloxan induced diabetic rats and rabbits (Joshi et al. 2007).

CONCLUSION

From the present review, the plant was found to contain various medicinal properties. It has been proved to be effective as anti-cancer, immunomodulatory, anti-bacterial, antimicrobial, anti-oxidant and anti-diabetic activities, there is a need to explore its maximum potential in the field of medicinal and pharmaceutical sciences for novel and fruitful application.

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