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REVIEW ARTICLE

ARAGVADHA (CASSIA FISTULA LINN.): A PHYTO-PHARMACOLOGICAL REVIEW

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Abstract:

In recent years interest in medicinal plants has increased considerably. Descriptions of such plants in ancient texts are in meticulous detail, but it is in scattered form. Even though in nighantus, we found limited details. To get knowledge about any medicinal plant, there is a need to go through all available texts of Ayurveda. *Cassia fistula* Linn. has been popular as a common drug of choice for Ayurvedic physicians from ancient time due to its various therapeutic properties like laxative, antibacterial, antipyretic, anti-inflammatory, smooth muscle stimulant, hepato-protective, analgesic, hypoglycemic, anticancer, abortifacient, anticolic, antifertility, estrogenic, etc. useful in the management of diseases like kushtha (skin diseases), hridroga (cardiac problems), vatarakta (gout), raktapitta (blood disorders), madhumeha (diabetes mellitus), visarpa (herpes), jvara (febrile conditions), etc. It is found in over all India, especially in Himalayan tract and outer Himalaya, in Kumaon, abundant in forest tracts throughout upper gangetic plain of Bengal, central India, and deciduous forests of south India. Its extract mainly contains alkaloids, resins, flavonoids, rhein glycoside, fisulic acid. Considering its therapeutic importance, a review has been done under different aspects of aragvadha (*Cassia fistula* Linn.). Beside references from Ayurvedic classical texts, this article includes recent researches carried out regarding this plant for its clinical and pharmacological evaluation.

Key Words: aragvadha, *Cassia fistula* Linn., Ayurveda

Key message(s): *Cassia fistula* Linn. is renowned medicinal plant in almost all Ayurveda texts to cure skin diseases, fever, gout, piles, fistula in ano etc.

Introduction:

Over the last few years, researchers have aimed at identifying and validating plant-derived substances for the treatment of various diseases. Interestingly it is estimated that more than 25% of the modern medicines are directly or indirectly derived from plants. It is worth mentioning that Indian medicinal plants are considered as a vast source of several pharmacologically principles and compounds that are commonly used as home remedies against multiple ailments.¹ Descriptions of such

plants in ancient texts are in meticulous detail, but it is in scattered form. Even though in nighantus (ancient pharmacopeia about medicinal plants), we found limited details. To get knowledge about any medicinal plant, there is a need to go through all available texts of Ayurveda as well as review from modern research. *Cassia fistula* Linn. (aragvadha) which belongs to family *Leguminosae*² is a medium-sized tree and its different parts are used in Ayurvedic medicine as well as home remedies for common ailments. It occurs in throughout

the greater part of India, ascending up to altitude of 1220 m in the sub – Himalayan tract and outer Himalaya, in Kumaon, abundant in forest tracts throughout upper gangetic plain of Bengal, central India, and deciduous forests of south India.³ It has been popular as a common drug of choice for Ayurvedic physicians from ancient time. *Cassia fistula linn.* is used as a component in many Ayurvedic formulations such as aragvadha ghrita,⁴ panchagavya ghritam,⁵ mahakalyanaka guda,⁶ siddharthaka snana,⁷ etc. Even though it is an important drug for Ayurveda physicians, we can't find its collective information under single title. This article aims to provide a comprehensive review on the phytochemical and pharmacological aspects of *Cassia fistula Linn.*

Review of Aragvadha (*Cassia fistula linn.*):

I. Literary review:

Etymology:⁸ Literary aragvadha means which kills diseases. In English, cassia = kasia (Greek) from a Hebrew word – name of plant, fistula = tube, pipe or reed like, (old name = laburnum = aragvadha). Thus, it means a plant having tube like fruit and it has significant therapeutic utility.

Synonyms:

Rajanighantu has summarized 19 synonyms for this plant.⁹ Synonyms are not only for Sanskrit chandashastra which is useful in recitation of verse, but it gives us information about identification, description, properties and therapeutic uses of concerned plant. Some of which are given as:

1. Rajavriksha – a fascinating tree
2. Shampaka – a boon
3. Chaturangula – its sections are of 4 fingers
4. Pragraha – it's easy to hold
5. Kritamala – flourished with flowers
6. Karnikara – petals of flowers are like champa

Classification in different Ayurveda texts

7. Vyadhighata – wards of diseases
8. Avaghataka – evacuates mala
9. Arogyshimbi – fruit of health
10. Svarnat – golden shower
11. Dirghaphala – has elongated pods
12. Arevat – has laxative property
13. Suvarnaka – golden tinge
14. Kandughna – pacifies itching

Taxonomic Classification:¹⁰

Kingdom - Plantae
 Subkingdom – Tracheobionota
 Super Division - Spermatophyta
 Division - Mangoliophyta
 Class – Magnoliopsida
 Sub Class - Rosidae
 Order - Fabales
 Family - Fabaceae
 Genus - Cassia
 Species – fistula

Vernacular names:

It is commonly known as 'aragvadha' in India and other vernacular names are as follows¹¹ –

1. Hindi - amalatas, bandarlauri, sonhali, girimala
2. Bengali - amaltas, bandarlati, sundali, sonali
3. Gujarati – garmala
4. Kannada – kakke, kakke mara
5. Malyalama - konna, kanikkonna
6. Marathi - bahava, boya, bava, chimkani
7. Punjabi - alash, ali, karangal, kiar, kaniar
8. Telagu - konnai, arakkuvadam, sarakonnai, aragvadamu
9. Assam – sunaru
10. Arab - khiyar-shanpur, katha-ul-hind
11. Urdu – amalatas
12. English - fistula, Indian laburnum, purging fistula, riding pipe, golden shower, drumstick, purging cassia, pudding pipe tree

| Samhita | Varga | according to karma |
|------------------------------|---|---------------------------------|
| Charaka samhita | kushthaghna, ¹² kandughna, ¹³ phalini -virechana ¹⁵ | virechana ¹⁴ |
| Sushruta samhita | samshamana, ¹⁶ aragvadhadi, ¹⁷ shyamadi ¹⁹ | adhobhagahara ¹⁸ |
| Ashtanga sangraha samhita | aragvadhadi, ²⁰ shyamadi, ²² tiktaskandha ²³ | virechana upayogi ²¹ |
| Ashtanga hridaya samhita | aragvadhadi, ²⁴ shyamadi ²⁶ | virechanakara ²⁵ |
| Bhavaprakasha samhita | haritakyadi varga ²⁷ | |
| Rajanighantu | prabhadradi varga ²⁸ | |
| Dhanvantari nighantu | guduchyadi varga ²⁹ | |
| Kaiyadeva nighantu | aushadhi varga ³⁰ | |

Table 1: Classification in different Ayurveda texts

II. Pharmacognostical review:³¹

a) Macroscopic: A moderate sized handsome deciduous tree, 8 to 15 m in height with greenish grey smooth bark when young and rough when old, exfoliates in hard scales. Leaves innately compound, leaflets 4 to 8 pairs, ovate, acute, bright green, glabrous above, paler and silvery pubescent beneath when young, main nerves numerous. Flowers bright yellow in axillary lax

pendulous racemes. Pods cylindrical, pendulous, smooth, dark brown or black, 30 to 60 cm long. Seeds biconcave, broadly ovate, light brown, horizontally immersed in dark coloured sweetish pulp.

b) Microscopic characters: Various parts of plant studied microscopically and found to have characteristics as depicted in Table 2.

| Part | Characters |
|-------|---|
| Root | Outer region of cork consisting of 30-40 rows of slightly thick walled tangentially elongated cells, mostly filled with brownish tannin. Centre of the root is occupied by the wood which is composed of vessels, xylem fibers, wood rays and xylem parenchyma. |
| Stem | Outermost layer of cork consisting of 18-24 rows of slightly thick walled tangentially elongated cells, filled with brownish tannin. Vessels are pitted with simple perforations, fibers highly thick walled, xylem parenchyma filled with simple and compound starch grains. |
| Leaf | An upper and lower epidermis, cholenchyma and a ring of pericyclic fibers enclosing a peculiarity arranged vascular bundle and small central pith, which is irregular shaped. Each xylem group is separated from adjoining one by rays which are unit – to biseriate. |
| Fruit | The macerated material of fruit shows vascular elements composed of tracheids, small ray cells with simple pits on walls, fibers, stone cells of varying shapes and parenchymatous cells of fruit pulp filled with a brownish black content. |

Table 2: Microscopic characters of different parts of *Cassia fistula* linn.

III. Phytochemistry:³²

Various parts of this plant found large number of chemical constituents which are tabulated below

—

| Part | Chemical constituents |
|---------------------|---|
| Bark and heart wood | Barbaloin and rhein, fistucacidin |
| Sap wood | Leucoanthicyanidin – 5, 4' - dihydroxy flavan |
| Leaves | Rhein and its glycoside sennosides A and B |
| Stem bark | Lupeol, B-sitosterol, hexacosanol tannin |
| Pod | Rhein glycoside and fistulic acid |
| Flowers | Ceryl alcohol, fistulin, rhein dianthroquinone glucoside |
| Fruit pulp | Proteins, carbohydrates, arginine, leucine, methionine, phenylalanine |
| Seeds | Galactomannam composed of D- galactose and D – mannose |
| Plant | Seven bioflavonoid and two triflavonoids |

Table 3: Chemical constituents

IV. Analytical review:³³

1. Root bark – Total ash – 5.356%, water soluble ash – 13.3%, moisture content – 22.06%, alcohol soluble extractive – 5.417%, water soluble extractive – 15.84%
2. Fruit – Foreign matter – not more than 2 %, total ash – not more than 6%, acid soluble ash – not more than 1%, alcohol soluble

extractive – not less than 15%, water soluble extractive – not less than 46%.

V. Pharmacological review:

In modern pharmacology, action of drug depends upon active principal where as in Ayurveda the mode of action of the drug depends upon five principles known as 'rasapanchaka'.³⁴

| rasa | Guna | virya | Vipaka |
|---------|-----------------------|-------|---------|
| madhura | guru, snigdha, mrudu, | shita | Madhura |

Table 4: Ayurvedic properties³⁵

Due to these properties, aragvadha is described as useful in diseases like vatarakta (gout), amavata (rheumatoid arthritis), kushtha (skin

diseases), kandu (purities), kamala (jaundice), hridroga (cardiac diseases), raktapitta (blood disorders), and mutrakrucho (dysuria), etc.³⁶

| Action ³⁷ | Efficacy | Effect on dosha |
|---------------------------|---------------------------|----------------------------|
| Shothara | kushthaghna ³⁸ | pittashamaka ⁴⁹ |
| vedanasthapana | hridroga ³⁹ | kaphashamaka ⁵⁰ |
| Anulomana | jvaraghna ⁴⁰ | anilashamaka ⁵¹ |
| shreshtha mrudu virechaka | upadansha ⁴¹ | |
| raktashodhaka | aamavata ⁴² | |
| kapha nissaraka | udavarta ⁴³ | |
| mutra janana | shula ⁴⁴ | |
| ama sanshodhana | pramehaghna ⁴⁵ | |
| daha prashamana | udara ⁴⁶ | |
| | visarpa ⁴⁷ | |
| | vatarakta ⁴⁸ | |

Table 5: Action of *Cassia fistula linn.* emphasized in Ayurveda classics

VI. Pharmacological activities:

1. Antifungal activity: *Cassia fistula* leaf extract was exhibited antifungal action.⁵²

Extracts of the leaves of *Cassia fistula* were showed highest activity.⁵³

2. Antibacterial activity: Three lectins from the *Cassia fistula* seeds possess antibacterial activities against various pathogenic bacteria.⁵⁴ The antibacterial activity of the aqueous and alcoholic extract of stem bark of *Cassia fistula* was highly effective.⁵⁵

2. Anti-inflammatory activity: The extract of leaves of *Cassia fistula* was suggested for anti-inflammatory effects.⁵⁶ The anti-inflammatory and antioxidant activities of the *Cassia fistula* bark were found significant.⁵⁷

4. Hepato- protective activity: *Cassia fistula linn.* has improved in the markers of hepatic toxicity and oxidative stress.⁵⁸ The hepato-protective activity of *Cassia fistula* leaves has proved protective effect is analogous to that of a standard hepatoprotective agent.⁵⁹

5. Effect on chikungunya: The crude extract of *Cassia fistula Linn.* served as a potential larvicidal, ovicidal and repellent agent against chikungunya vector mosquito.⁶⁰

6. Anti-oxidant activity: Aqueous extract of *Cassia fistula (Linn.)* flowers (ACF) has got promising antioxidative activity in alloxan diabetic rats.⁶¹

7. Anti-tussive activity: The methanol extract of leaves of *C. fistula* has exhibited significant anti-tussive agent.⁶²

8. Effect on fistula -in-ano: Role of aragvadhadi sutra in the management of fistula in ano is found effective.⁶³

9. Laxative activity: In-vitro effect of *Cassia fistula* infusion on isolated guinea-pig ileum study concluded that *C. fistula* pod infusion possess significant dose dependent laxative activity.⁶⁴

10. Effect on skin diseases: On the basis of the results of this study it may be concluded that, the *Cassia fistula* is having significant effect in

ameliorating the skin diseases due to pitta origin and is safe drug of choice of purgation therapy.⁶⁵

11. Nutritional values:

The nutritive value of the forage is per 100 g dry matter: crude protein 18 g, crude fiber 30 g, ash 8 g, crude fat 8 g, N-free extract 37 g, Ca 3.3 g, P 0.3 g.⁶⁶

Conclusion:

Cassia fistula Linn. has been used since ancient time in Ayurvedic system of medicine. It is known as a rich source of tannins, flavanoids and glycosides present in *Cassia fistula Linn.* might be medicinally important and/or nutritionally valuable. It possesses therapeutic potential in diseases like kushtha (skin diseases), hridroga (cardiac problems), vatarakta (gout), raktapitta (blood disorders), madhumeha (diabetes mellitus), visarpa (herpes), jvara (febrile conditions), etc. Though there are certain properties which are still to be screened out, almost all these utility have been revalidated through relevant experimental models in recent past. Various parts of plant are found hypoglycemic, laxative, antibacterial, antipyretic, anti-inflammatory, smooth muscle stimulant, hepatoprotective, analgesic, anticancer, abortifacient, anti-colic, anti-fertility, estrogenic, anti-inflammatory, anti-tussive, antifungal and also used to check wounds healing and antibacterial properties etc. shows us diverse veracity of the plant.

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