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Medicinal Value of Cassia Fistula Linn: A Comprehensive Review

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ABSTRACT

Nepal is the rich source of NTFPs species which are well known for its medicinal properties. The aim of this review is to collect the information of Cassia Fistula Linn and explore its medicinal importance. Only secondary data were used to finalize this paper. The result shows that among the medicinal plants, Cassia fistula Linn is also one of the crucial NTFP plant holding valuable medicinal properties. Cassia fistula Linn is commonly known as Rajbriksha and Bandar ko lathi in Nepali. It is also known as a yellow shower tree due to its beautiful and attractive yellow flowers. All parts such as seeds, flowers, bark, leaves, fruits, roots of this tree possess great importance of medicine. It is considered as one of the important valuable medicinal tree. In traditional medicine, this tree is used to cure various diseases such as fever, bronchitis, leprosy, dry cough, skin disease, heart problem, constipation, diabetes, malaria, stomach disorder, burning sensation. Rajbriksha possess various pharmacological activities such as antiinflammatory, anti-diabetic, antiperiodic, anthelmintic, anti-oxidant, anti-fertility activities. It also possess diuretic, febrifuge, tonic, laxative, cooling, purgative properties. The fruit, bark, leaves, seeds, flowers, roots contain numerous chemical constituents like calcium, iron, potassium, manganese, lipeol, tannins, glucosides, sennosides, rhein, fistulin, alkaloids, acetate, flavonoids. This article aims to provide the review on morphology, distribution, chemical constituent, traditional uses of Cassia fistula Linn.

***Keywords**: Cassia fistula linn, pharmacological, rajbriksha, traditional medicine*

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INTRODUCTION

Nepal, a geographically diverse country that comprises 3.2% of the total flora of the world (GoN, 2014) is the rich source of NTFPs species. There are more than 700 plant species that are recognized as Non-Timber Forest Products (NTFP) out of which 150 species are internationally traded (Shrestha et al.2020). NTFP play an important role in the economy of Nepal. About 80% of the population from rural areas of our country depend on NTFP for living. Out of a total of 15% from forestry sector, NTFPs provide 5% of Nepal's national GDP (Pyakurel & Baniya, 2011).

Many people are turning to medicinal plants in order to pursue the health approaches and remedies that are devoid of negative side effects (Danish et al.2011). In Nepal, the use of medicinal plants have been practiced many years back because of lack of adverse side effect and easy availability (Acharya & Acharya, 2009). Indigenous people from all over the world employ plants as ethnomedicine (Miya et al.2020). NTFPs provide medicines, nutrients, wood, fodder and construction materials for rural people (Shrestha et al.2020) and the collection of NTFP serve as the main source of employment for them (Lamichhane et al.2021). Plants are used in traditional as well as modern medicine and are considered as natural remedies to cure many diseases and illness (Pariyar et al.2021). In Nepal, there are more than 1950 plant species that are used as medicine (Ghimire, 2008). Therefore, NTFPs is considered as the crucial part in the livelihood of people and economy of Nepal. Out of which *cassia fistula Linn* is also one of it.

Cassia fistula Linn, a very common deciduous tree from family Fabacea is commonly known as Rajbriksha in Nepali. It is grown as shade and ornamental trees around the houses. Traditionally, it is also used in the event which is called as "vishukkani" on the day of vishu that is the first day of the Zordiac calendar which means that the first thing seen on the day of vishu after waking up (Kumar et al. 2017). *Cassia fistula linn* is a flowering ornamental tree that can attain height up to 15m (Khatri et al. 2021). Because of its beautiful yellow colored flower, it is also known as Golden shower tree. *C. fistula* is native tree from tropical Asia. It is popularly known as Indian Laburnum in English and is semi wild in nature that has broad range of therapeutic properties. Medicinally, the whole part of this tree has been used as Ayurveda medicine for the treatment of various diseases mainly for pregnant women and children (Ali, 2014) and possess various pharmacological activities and numerous phytochemicals. Different parts of this tree are used in home remedies as well as Ayurveda medicine to treat various disorders (Panda et al.2011). The plant has also been used as decoction, powder or

combined either alone or in conjunction with other therapeutic plants (Pawar et al. 2017). These therapeutic uses, chemical constituent and the medicinal characteristics of *cassia fistula* has proved it as valuable medicinal plant (Danish et al.2011).

DATA AND METHODS

All the information and data in this article are collected using secondary method of data collection. They were based on the articles gathered from internet like Google scholar and Research gate. Altogether, 40 articles were gathered and studied. The keywords such as *cassia fistula linn,* rajbriksha, medicinal plant, phytochemistry, pharmacological were used to search the article. This methodology is demonstrated in depth with the help of Prisma flowchart.

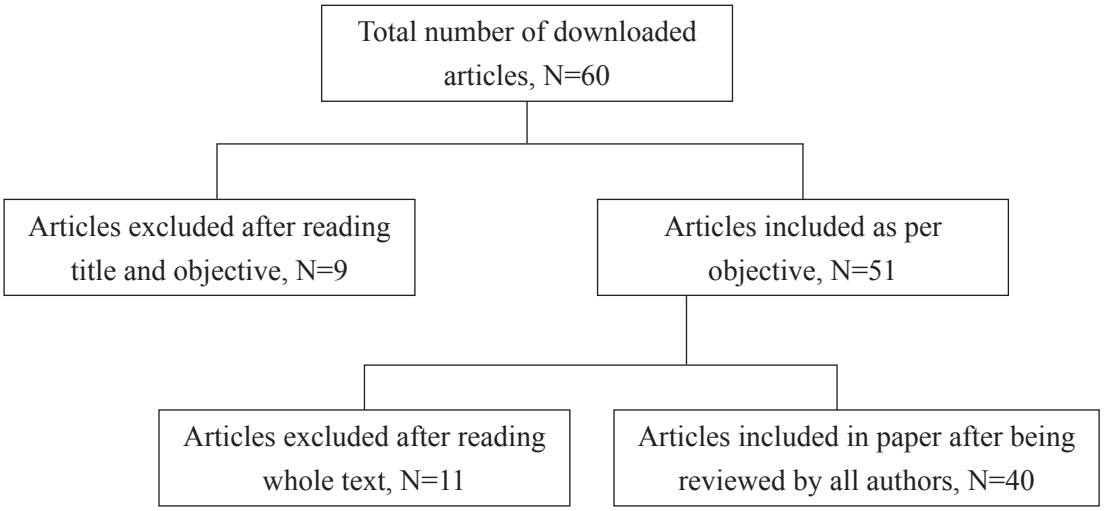

Fig 1: Prisma flowchart for the study of medicinal values of Cassia Fistula Linn.

RESULTS AND DISCUSSION

Table 1

Taxonomic Classification of Cassia Fistula Linn (Rahmani, 2015)

Kingdom:	Plantae
Sub kingdom:	Tracheobinota
Super division:	Spermatophyta
Division:	Magnoliophyta
Class:	Magnoliopsida
Sub class:	Rosidae

Order:	Fabales
Family:	Fabaceae
Genus:	*Cassia*
Species:	*Fistula*

Table 2

Local Names of Cassia Fistula Linn (Khatri et al.2021)

Nepali:	Raj briksha, Badar ko lathi
Chepang:	Briksha
Tharu:	Airoks kathwa, Ahirodha
Tamang:	Gle Mhendo
Raute:	Rajbrik
Sanskrit:	Saraphala,Argwadha, Rajtaru
English names:	Indian laburnum, Golden shower, Pudding pipe tree
Trade name:	Indian laburnum

Distribution: *Cassia fistula linn* is native to Nepal, Malaysia, Burma and East India (Satyal et al.2012). It is considered that *cassia fistula* have been originated from South East Asia and was distributed throughout the tropics. In Nepal, it is distributed between (100-900) m elevations. It is extended to the greater part of India up to the altitude of 1300 meter in the outer Himalayan part in mixed monsoon and deciduous forests (Bhalerao and Kelkar, 2012). It is distributed throughout Asia, china, Brazil, south Africa and West Indies and is usually found throughout gangetic valley (Pawar et al. 2017). It prefer dry climate and open slope. Fruiting of rajbriksha takes place in the month of October and flowers in between the month of May and August (Khatri et al.2012). It can grow on granite, stone and trap soil as well as on shallow and poor soil but perform well in well-drained soil with full exposure of sun (Gupta, 2021).

Description: *Cassia fistula* is the fast growing moderate sized tree which can attain 30-40 feet height. It comprises of composite (4-8 pairs) leaves up to (5- 12) cm length. The bark of this tree is pale gray in color and smooth when young and dark brown and rough when old. It is semi wild in nature consisting bright yellow flowers. The fruit of Rajbriksha is 30-60 cm long cylindrical pod which is 20-27 mm in diameter. The pods are straight or are slightly curved, cylindrical, and pendulous and are shiny. They are smooth but are finely striated which consists of many black seeds (25-100 in each) and sweet pulp which is separated into segments transversely. Each compartment is filled with sweet black pulp and one seed. Seeds are flat, reddish brown, oval with well-marked raphe which are 8mm long and 5mm thick. Seeds are embedded in dark colored sweet pulp. Pulp is sweet in taste, have sharp odor, sticky with gelatinous consistency which is dark brown or black in color. The long pod are green in color

when they are unripe and turn on to black on ripening. Root is rough and reddish brown in color which consists many horizontal lenticels. Flowers are yellow in colour which is (30-50) cm long racemes, pubescent, obtuse, long and slender (Gupta, 2021; Bhalerao and Kelkar., 2012; Danish et al., 2011).

Fig 2: Tree, Flowers and Leaves of Cassia Fistula Linn

Chemical constituent: Different parts of Rajbriksha contains various amounts chemical constituents. There are two kinds of metabolic composition of *c. fistula* extracts they are primary metabolic composition and secondary metabolic composition (Bhalero and Kelkar, 2012). Seeds, pods, leaves and fruit are the major source of primary metabolites whereas the organs of c. fistula (vegetative and reproductive) are of secondary metabolites. Chrysophanol, malvalic acid, amino acids, volatile oil, waxy and resinous derivatives are found in seeds (Mwangi et al.2021). A stem bark powdered is rich in hexacosanol, lupeol, B- sitosterol and tannins (Sen & Shukla, 1968). The edible fruits are rich in calcium, potassium, iron and manganese than other fruits like orange, peach, apple and apricot (Barthakur et al. 1995). Glucosides, free rhein, sennosides A and B are found in leaves (Mahesh et al., 1984; Kaji et al., 1968) and flowers include alkaloids, fistulin, triterpenes and acetate. Root of cassia fistula is rich in Rhamnetin-3-0-gentiobioside. Vegetative organs such as young leaves, twigs, old leaves and bark and reproductive organ such as flowers, flower bud and pod is rich in proanthocyanidins, flavonoids (Luximon-Ramma et al. 2002).

PHARMACOLOGICAL ACTIVITY

Anti-wound Healing Activity

Cassia fistula is used to heal the infected wound. The extraction from leaves is considered

to have anti-bacterial effect against Pseudomonas aeruginosa and Staphylococcus aureus. It was tasted in albino rat which shows the better wound closure and better tissue regeneration (Kumar et al.2006).

Central Nervous System Activity

The methanol extraction from seed was experimented upon mice. This extraction increased the sedative action of diazepam, chlorpromazine, meprobamate and sodium pentobarbitone and also increased analgesia caused by pethidine and morphine. This also cause change in behavior of mice (Bhalero et al.2012).

Anti-diabetic Activity

Anti-diabetic potentiality of total alcoholic extracts and ethyl acetate from bark was studied in rat. It shows depletion in blood glucose level compare to alcoholic extracts (Malpani and Manjunath, 2010) and the extraction from its pod showed anti-hyperglycemic activity which is used in treating diabetes mellitus (Jangir and Jain, 2017).

The anti-diabetic efficacy of fruit was studied in rat using petroleum ether extract (Akhila & Aleykutty, 2015) and root was examined by using glucose diffusion assay and alpha amylase inhibition (Balraj et al. 2016).

Anti-pyretic Activity

The methanol extraction from pod is found to have antipyretic activity. It was found higher due to individual action or combined action of extracts of amino acids, flavonoids, steroids and glycosides (Singh et al.2012).

Anti-oxidant Activity

90% ethanol extracts from leaves and 90% methanol extracts from stem bark, flowers and pulp possess antioxidant properties. These showed dose-dependent protective effect in kidney and liver against free radical and lipid peroxidation (Siddhuraju et al.2002) and this property of *C.Fistula* have mutual connection with phenolic content of extraction of methanol (Irshad et al.2012).

Anti-inflammatory Activity

The methanolic extraction from bark of *C.Fistla* was found to possess anti-inflammatory activity in both chronic and acute model (Ilavarasan et al.2005).

Anti-microbial Activity

Extractions from leaves was found to have anti-fungal activity and root extraction and stem bark was found to have antibacterial activity. In comparison to drugs, the hydro alcoholic extract from this tree are found to be more effective in fungi and microorganism and can treat many infectious disorders caused by microbes (Bhalodia & Sukhla, 2011).

Anti-itching Activity

It is found that the extractions from this have significant use in treatment of eczema which is chronic skin disease.

Anti-tumor Activity

The methanolic extractions from seeds was tested on mice and Ehrlich ascites carcinoma. It showed increment in life span of mice and lessen of tumor volume (Gupta et al. 2000). Extractions from this tree also improve red blood cell, bone marrow, hemoglobin content.

Ovicidal and Iarvicidal Activity

The methanolic leaf extraction of this tree was tasted for ovicidal and larvicidal activity which showed it is the ovidical and larvicidal agent against Anopheles stephensi and culex quinquefasciatus (Govindarajan et al.2008).

Anti-ulcer Activity

The ethanol extraction from leaf was found to have antiulcer activity against gastric ulcer (karthikeyan & Gobianand, 2010).

Anti-fertility Activity

The petroleum ether from seeds was tested for anti-fertility activity in female albino rat. It showed that it comprises pregnancy terminating effect (Yadav & Jain, 1999).

Anti-leishmanial Activity

Hexane extracted from fruits showed antileishmanial activity against promastigote form of leishmania (Sartorelli et al. 2007).

Fig 3: Pods, seeds, pulp and fruit of cassia fistula linn

Local medicinal uses: In ayurbedic medicine, rajbriksha is also known as disease killer. Rajbriksha has many medicinal uses such as laxative, purgative, cooling, anti-flammatory, anthelmintic, antiperiodic, febrifuge, diuretic and tonic. It is used in various medicinal treatments like skin diseases, ringworm affections, dry cough, cardiac problems, diabetes, constipation, bronchitis, fever, stomach disorder, malaria, leprosy, burning sensation etc.

For medicinal purposes, all parts of cassia fistula (roots, leaves, fruits and bark) are used. Seeds and fruits are used to cure skin diseases, chest diseases, abdominal pain, jaundice, swollen throat, kidney stones, bronchitis, ulcer, tuberculosis, leprosy, whooping cough, fever and urinary problem. They are slightly sweet in taste and possess antipyretic, laxative, carminative, emetic and cooling properties. They are used for the treatment of urinary problems, hotness of body, diarrhea, gastric, neural disorder and insomnia. Juice of seeds helps to regulate stopped urine and also used to cure snake bite. The fruit pulp helps to treat constipation in human as well as in cattle and black wart fever. The paste of fruit is eaten twice a day to cure whooping cough, diarrhea, jaundice, headache, fever, inflammation in urine, bronchitis and so on. Seed powder is helpful in inducing vomiting and used in ameobiasis. Leaves of cassia fistula are laxative, tonic, febrifuge, antiperiodic and emollient in nature. It is used to get relief from pain and inflammation such as rheumatism and gout. Leaf juice is useful for the treatment of facial paralysis. Leaf paste is beneficial in curing skin problems such as scabies and reduce the burning sensation. It can be applied to treat ringworm, colic, flatulence and helps to heal the wound. The bark and roots of Rajbriksha shows the antiflammatory properties. Both chronic and acute swellings can be treated from extracts of this tree. They are highly antioxidants which helps to increase the immune system. Roots are tonic, febrifuge, astringent and strong purgative in nature. The roots have antifungal, antiviral and antibacterial

properties which helps to cure the wound and provide protection against infection. Root juice helps in treatment of fever, malaria, asthma, swellings, dropsy and respiratory disorder. It is used in joint pain, chest pain, blood dysentery migraine, cardiovascular disarrangement and nausea. The bark of cassia fistula possess anti-dysenteric and tonic properties. It is used in leprosy, syphilis, jaundice, swelling and chest pain. It is also used against amenorrhea and skin disorder (Khatri et al., 2021; Pawar et al., 2017; Ali, 2014).

Other uses: *Cassia fistula* is cultivated as shade trees and an ornamental trees around houses and road sides in many countries like Nepal, China, India, Bangladesh, and Pakistan. Seeds are fed to chickens and hens to cure cattle disease. The pulp is used in tobacco and extracts from this plant helps to control pests and disease. It is also used as fuel wood and produce charcoal of good quality. The wood is durable and hard and produce good timber which is used for a wide range of construction such as furniture, cabinet work, wheels, bridges, farm tools and so on (Khatri et al.2021).

CONCLUSION

From this review, it has been concluded that *Cassia Fistula* is one of the valuable medicinal tree. It is an ornamental tree with yellow flowers, brownish red roots, green pods, and dark brown stem. It has been reported to have various pharmacological properties such as anti-inflammatory, hepatoprotective, anti-fungal, anti-bacterial and so on. This tree is rich in many chemical constituents such as flavonoids, tannins, glycosides, oleic, linoleic, carbohydrate, stearic, rhein and many more. Because of these properties, *Cassia Fistula* is used to treat numerous diseases. It is used to cure fever, cough, stomach disorder, skin problems, constipation etc. It is one of the important therapeutic tree.

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