



“A REPORT ON PULP PODS OF CASSIA FISTULA ON DIPHTHERIA”

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ABSTRACT:-

Cassia fistula is a commonly known as Indian shower tree. The cassia fistula trees have fruits which contain pulp inside the pods. The cassia fistula tree as a Indian labrum which is used in treatment of various diseases. Antibacterial, antioxidant and hypoglycemic potentials have reported by some authors.

The antimicrobial property of *cassia fistula* tree depends on the anthraquinone, Rheine and flavonoids contents.

Its show the high phenolic and flavonoids contains. The therapeutic efficacy of the plant origin drug depends on the many aspects of the source of drug. Tu phytochemicals investigation of its importance as an important which was valuable plant. It is also include the rich of tannins glycoside.

The *cassia fistula* pulp which contain anthraquinone which show the property against the bacterial strains. These and rokinon react against the diphtheria disease. Diphtheria is a fatal infection caused by toxigenic bacteria that is corynebacterium diphtheria strains.

The Article aims to provide a comprehensive review of morphology traditional use, phytochemicals constituent and pharmacological activity.

Keywords – Anthraquinone, Bacterial strains , antimicrobial , Diphtheria , *cassia fistula* .

1. INTRODUCTION CASSIA FISTULA:-

Cassia fistula Linn. (Leguminosae) is commonly known as Amaltas, Indian Laburnum or pudding pipe tree and Aragvadha.[10] The plant is found in India, Pakistan, Bangladesh, Tropical Africa, South America and the West Indies. It is native of tropical climatic area and is present all over Asia. It is also present in the western tropical region of America. It grows freely all over India. It is a medium sized deciduous tree that reaches the height of about 25 to 30 feet. The bark is of reddish brown in color.

Leaves are alternative, pinnate, 1 to 1.5 feet elongated and possess couples of four to eight ovate leaflets about 7 to 15 centimeter long and approximately 2, 5 to 3 centimeter broad, this whole petiole is around 3 to 7 millimeter long. It bears yellow colored flowers. That droops down reliant upon the length of the

racemes. The fruit beard by the amaltas tree is pendulous, cylindrical, and brown and separate having a length of 25 to 45 centimeters and takes a diameter of 1 to 3 centimeters. It has within it nearby 30 to 100 seeds, Seeds are lenticular with redbrownish consistency. Tree sheds its leaves in March and April.

Fruits arise by rainy season. Preparation of bark, leaves and flowers are generally used as domestic medication for several aliments. The fruit have a pods inside it and pods contain a black color of pulp. Fruits of cassia fistula contain Rhein glycosides Fistulic acid, sennoside A B, Anthraquinon, Flavonoids-3-ol derivatives.[9]

Taxonomic Classification:

Kingdom – Plantae

Division – Mangoliophyta

Class – Magnoliopsida

Sub class - Rosidae

Order - Fabales

Family - Fabaceae

Genus – Cassia

Species – Fistula

Vernacular names:

Hindi - Sonhali, Amultus

Bengali - Bundaralati, Sonalu, Soondali, Sondal

English - Indian Laburnum, Purging Fistula, Cassia, Golden Shower.

Gujarati – Garmala

Kannad - Kakke mara

Marathi - Bahava

Tamil - Shrakkonnai, Konai, Irjviruttam

Telegu - Kondrakayi, Raelachettu, Aragvadhamu, Koelapenna

Fig 1:-Fruits of *Cassia Fistula*Fig 2:- Pulp in Pods of *Cassia Fistula*

2. CULTIVATION AND COLLECTION:-

C. fistula is widely grown as an ornamental plant in tropical and subtropical areas. It blooms in late spring. Flowering is profuse, with trees being covered with yellow flowers, many times with almost no leaf being seen. It grows well in dry climates. Growth for this tree is best in full sun on well-drained soil; it is relatively drought-tolerant and slightly salt-tolerant. It will tolerate light brief frost, but can get damaged if the cold persists. It can be subject to mildew or leaf spot, especially during the second half of the growing season. The tree blooms better with pronounced differences between summer and winter temperatures.

3. PHYTOCHEMICALS: -

Sr. No	Plant Parts	Phytochemicals	References
1	Root	Tannins, phlobaphenes and oxyanthraquinone, Rhamnetin-3-O-gentiobioside	20,21,22
2	Bark	Flavonol glycosides, 5,7,3',4'tetrahydroxy-6, 8-dimethoxy	23
3	Pods	flavone-3-O-arabinopyranoside	20,24
4	Leaves	Anthraquinone glycosides, sennosides A & B, rhein, glucoside, barbaloin, aloin, formic acid, butyric acid and their ethyl esters and oxalic acid, presence of pectin and tannin .	22,25
5	Flowers	Anthraquinone, Hentriacontanoic, triacontanoic, nonacosanoic and heptacosanoic acids. The seed oil	24,26

		contains cyclopropenoid fatty acids, viz, vernolic, malvalic and stetculic acids.	
6	Fruit	Ceryl alcohol, kaempferol, rhein and a bianthraquinone glycoside, fistulin, rhein, glycosides-sennosides A & B, anthraquinone, tannin, oxyanthraquinone, rhein and volatile oil.	22,25
7	Seeds	Epiafzelechin, (+), catechin, kaempferol, dihydrokaempferol and 1,8-dihydroxy-3 methylanthraquinone. Rhein Glycosides Fistulic Acids, Sennosides A B, Anthraquinones, Flavanoid-3-ol-derivatives. Proteins (19.94%) and carbohydrates (26.30%); amino acids, dimeric proanthocyanidin, volatile oil, waxy and resinous, derivatives.	23,20

Table No. 1: Phytochemicals of Cassia fistula plant parts

4. MEDICINAL BEHAVIOR OF CASSIA FISTULA PLANT:-

1. Antitumor activity
2. Antifungal activity
3. Antiviral activity
4. Antibacterial activity

5. Laxative activity
6. Antioxidant activity
7. Anti-Inflammatory
8. Antipyretic activity
9. Wound healing activity
10. Ant parasitic activity
11. Antidiabetic activity
12. Hepatoprotective activity
13. Antifertility activity



14. Antibacterial Activity:- Extraction of cassia fistula leaves was carried out using solvents viz. petroleum ether, chloroform, ethanol, methanol and water. Leaves of the plant were investigated for preliminary antibacterial property. A result of this study shows that all the extracts had good inhibitory activity against Gram-positive test organism. Although all five extracts showed promising antibacterial activity against test bacterial species, but maximum activity was observed in ethanol extract. The minimum inhibitory concentration ranged in between 94 to 1500 µg/ml. These entire findings exhibit that the leaf extracts have broad-spectrum activity and suggest its possible use in treatment of infectious diseases. According to Patel and Patel, 1956 the dealcoholized extract of the pulp showed greater effect on gram-positive bacteria than the aqueous extract, while in the case of gram negative bacteria both kind of extract showes similar effect. Aqueous, diethyl ether, ethyl acetate, dichloromethane and methanol extract of leaves are reported to have significant zone of inhibition against Escherichia Coli, Klebsella aerogenes, Protious vulgaris, and Pseudomonas aerogense bacteria in concentration dependent manner. However aqueous extract of seed was only effective against C. diphtheria and S. typhi.

5. INTODUCTION OF DISEASE

Diphtheria is a communicable disease origin by the *Bacterium *Corynebacterium diphtheriae*. It is a gram positive bacillus and it secretes a powerful exotoxin which is chief factor of the pathogenicity.

Diphtheria is commonly spread among societies by direct interaction or over and done with the air; it may similarly spread by adulterated things. Various people bring the Bacterium without having symptoms, but can still spread the disease to others. Symptoms might differ from mild to severe and commonly start two to five days after Exposure. Symptoms often come on equally gradually beginning with sore throat and fever.

In few cases, a grey and white patches grows in throat, this can block airway band generate barking cough as in croup. The neck may swell in part due to distended lymph nodes. A form of Diphtheria which includes the skin, eyes or genitals also exist. Difficulties may contain myocarditis irritation of nerves, kidney problems and hemorrhage complications due to low level of platelets. Myocarditis may result in an irregular heart rate and the inflammation of the nerves may results in paralysis.

The development period of diphtheria is usually 2–5 days (range: 1–10 days). Diphtheria can comprise nearly any mucous membrane. For clinical purposes, it is suitable to categorize diphtheria into category of manifestation, liable on the site of disease:

*Respiratory diphtheria

- Nasal diphtheria
- Pharyngeal and tonsillar diphtheria
- Laryngeal diphtheria

*Cutaneous diphtheria

Respiratory diphtheria has a gradual onset and is characterized by:

- Mild fever
- Sore throat
- Difficulty swallowing
- Malaise
- Loss of appetite
- Hoarseness (if the larynx is involved)

The hallmark of respiratory diphtheria is a pseudo membrane that looks within 2–3 days of infection over the mucous lining of the tonsils, pharynx, larynx, or nares and that can spread into the trachea. Fatal airway block can result if the pseudo membrane extends into the larynx or trachea or if a piece of it turns into dislodged.

Cutaneous diphtheria may present as a scaling rash or as ulcers with clearly demarcated edges and membrane, but any chronic skin lesion may harbor *C. diphtheriae* along with other organisms. The systemic complications from cutaneous diphtheria with toxigenic strains appear to be less than from other sites.

Ethiopia is the top country by Diphtheria cases in the world.

As of 2020, Diphtheria cases in Ethiopia was 5,267 that account for 52.11% of the world Diphtheria cases. The top countries (other are India, Indonesia, Viet Nam and Yemen) account for the 93.53% of it. The world total Diphtheria cases were estimated at 10,107 in 2020.

In 2020, Diphtheria cases for India were 3,485. Through India Diphtheria fluctuated substantially in recent years, it tended to increase through 2001-2020 period ending at 3,485 in 2020.

6. HISTORY OF DISEASE

Diphtheria once was a major cause of illness and death among children. The United States recorded 206,000 cases of diphtheria in 1921, resulting in 15,520 deaths. Diphtheria death rates range from about 20% for those under ages five and over age 40, to 5-10% for those aged 5-40 years. Death rates were likely higher before the 20th century. Diphtheria was the third leading cause of death in children in England and Wales in the 1930s.

Since the introduction of effective immunization, starting in the 1920s, diphtheria rates have dropped dramatically in the United States and other countries that vaccinate widely. Between 2004 and 2008, no cases of diphtheria were recorded in the United States. However, the disease continues to play a role globally. In 2007, 4,190 cases of diphtheria were reported, which is likely an underestimate of the actual number of cases.

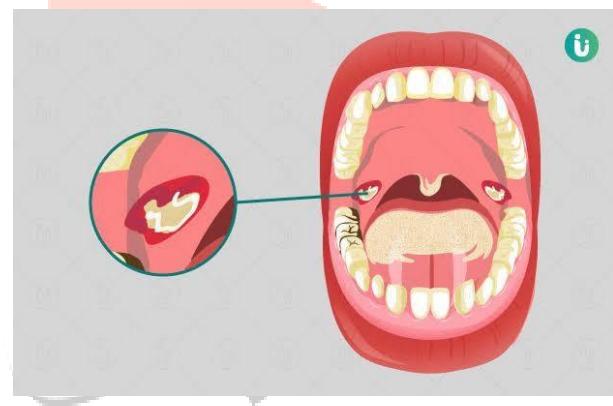


Fig 3: - Figure show Diphtheria

Transmission and Symptoms -

Diphtheria is transmitted from person to person, usually via respiratory droplets. The infection is caused by bacteria called *Corynebacterium diphtheriae*. An infected person, unless treated with antibiotics, is infectious for two to three weeks. Symptoms include sore throat, loss of appetite, and fever. The most notable feature of diphtheria infection, however, is the formation of a thick gray substance called a pseudo membrane over the nasal tissues, tonsils, larynx, and/or pharynx.

The pseudo membrane is formed from waste products and proteins caused by the toxin secreted by the bacteria. The pseudo membrane sticks to tissues and may obstruct breathing.

The toxin itself may travel to the heart, muscle, kidneys, and liver, where it may temporarily or permanently damage these organs.

Complications

Complications from diphtheria may include myocarditis (damage to the heart muscle), neuritis (inflammation of nerves, which may contribute to nerve damage, paralysis, respiratory failure, and pneumonia), airway obstruction, and ear infection.

7. MECHANISM OF DIPHTHERIA:-

The symptoms of diphtheria are caused by a toxin that is released by the bacteria that cause the condition. Two types of bacteria can cause diphtheria and these include:

- 1) *Corynebacterium diphtheriae*
- 2) *Corynebacterium ulcerans*

Infection with *C. diphtheriae* occurs through inhalation of saliva droplets that contain the bacteria, while *C. ulcerans* can be picked up through contact with cattle that carry the bacteria in their nose and throat. Drinking unpasteurized milk or eating dairy goods made with unpasteurized milk can also lead to transmission of the infection.

Once infected, the bacteria quickly multiply within the body and spread through the inner

Lining of the throat, mouth and nose. The bacteria produce a toxin that kills cells in the throat. These cells then join to form the grey-white membrane that is typically seen in cases of diphtheria. The toxin can also spread via the bloodstream and cause damage to the nervous system and heart.

Not all diphtheria bacteria produce the diphtheria toxin. Only those that are infected with a bacteriophage can produce the toxin. The bacteriophage transfers the genetic material that codes for the toxin into the bacterial DNA. The diphtheria toxin is a single polypeptide made up of fragment A and fragment B which are connected by a disulfide bond. Fragment B binds to the EGF-like domain of the heparin-binding EGF-like growth factor (HB-EGF) present on the surface of cells. This causes the cell to engulf the toxin inside an endosome, where it is divided into its two fragments.

The acidic environment of the endosome triggers fragment B to make holes in the membrane of the endosome. This allows fragment A to be released, which moves into the cell's cytoplasm where it prevents the formation of new proteins by interrupting an essential step in protein synthesis.

8. OBJECTIVES:-

- 1) The pulp in pods of *cassia fistula* has a long been used to traditional therapeutic drug due to anthraquinone, Rheine, Flavonoids-3-ol, etc. constituents.

In which the anthraquinone show the various activities including Anti-bacterial and antimicrobial.[13]

- 2) The aim of the study is to assess the antimicrobial activity and it must be determine the zone of inhibition of bacterial strains.

Diphtheria is a highly communicable disease caused by toxin producing strains of *corynebacterium Diphtheriae*.

- 5) Major functional group presents in pulp of the *cassia fistula* show the characteristics of inhibition of bacterial strains.
- 6) The present study of the *cassia fistula* pulp suspension revealed the presence of bioactive components of which Anthraquinone, Flavonoids-3-ol, and Rheine.
- 7) The anthraquinone are reported to be associated with antibacterial, antimicrobial, antioxidant, laxative, purgative etc. action in biological systems

9. CONCLUSION:-

In the present study of Cassia fistula it concludes that it is a significant potential medicinal plant. It shows anti-bacterial activities of the pod and pulp extracts. The in vitro study parameters like pH, sedimentation volume, viscosity, degree of flocculation point towards good anti-oxidant and anti-microbial potentials of C. fistula. The antioxidant properties of different parts depend on total phenolic component present in these extract, hence the plant seems to have a lot of potential to be exploited as possible therapeutic agent in diphtheria. [13]

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