International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 14, Issue 11, November 2025)

Comprehensive Review Cassia Fistula as a Therapeutic Powerhouse: Uses and Modern Application in Herbal Cream

Mandli Harsiddhi[1], Bhoomi D. Patel[2]

[1,2]*Department of Pharmaceutical Chemistry & Quality Assurance, School of Pharmacy, Rai University, Saroda, Dholka Road, Ahmedabad, Gujarat, India.*

Abstract -- *Cassia fistula*Linn., popularly known as the Indian laburnum or golden shower tree, is a medicinally important species from the Fabaceae family, widely used in Ayurveda and other traditional healing systems. This review presents an in-depth analysis of its phytochemical profile, pharmacological properties, and its relevance in modern herbal formulations, especially those targeting dermatological uses and herbal creams. Different parts of the plant—such as the bark, leaves, pods, seeds, flowers, and fruit pulp—are rich in bioactive constituents like anthraquinones, flavonoids, phenolics, glycosides, and tannins, which are responsible for its broad therapeutic potential. Research findings reveal that *C. fistula* exhibits notable antibacterial, antifungal, antiviral, antiinflammatory, hepatoprotective, antipyretic, antifertility, and wound-healing effects. Its strong antioxidant and tyrosinase-inhibiting activities make it a valuable natural source for skincare and anti-aging products. Furthermore, advancements in extraction and phytochemical standardization techniques have enhanced its suitability for incorporation into contemporary herbal creams aimed at skin repair, protection, and defense against oxidative damage. Overall, this review highlights *Cassia fistula* as a potent medicinal resource that effectively connects traditional knowledge with modern pharmaceutical and cosmeceutical innovations.

I. INTRODUCTION

Cassia fistula, commonly known as the Indian laburnum or golden shower, is a medicinally significant deciduous tree belonging to the Fabaceae (Leguminosae) family, subfamily Caesalpiniodeae. It is widely recognized in traditional medicine, especially Ayurveda, where it is revered as "Aragvadha" a Sanskrit term meaning "disease killer". [1] The medicinal uses of plants are very old. The writings indicate that therapeutic use of plant is being practiced since 5000-4000 B.C. and Chinese used first the natural herbal preparations as medicines.However, the Rig-Veda, which is thought to have been composed between 3500 and 1600 B.C., contains the earliest references to the use of plants as medicine in India.

Later, the properties and therapeutic applications of medicinal plants were thoroughly examined and documented empirically by the ancient physician in Ayurveda, which forms the basis of ancient Indian medical science. [3] Traditional Indian medicine, or Ayurveda, is based on a traditional medical system, in the same way as traditional Chinese medicine, with both being developed in their respective geographic regions. [1-4]

II. HISTORY OF C. FISTULA

Cassia fistula plays a vital role in the preclusion of diseases. Certain components function as antioxidants and antibacterial agents, while other components have therapeutic potential to prevent cancer by altering genetic pathways. Numerous chemicals found in plant parts like seeds, bark, leaves, and flowers are utilized to treat a variety of human diseases. The root is widely recognized for its tonic, febrifuge, astringent, and potent purgative properties. The leaf sup decreased the mutagenicity in Escherichia coli. Backbone discomfort, blood dysentery, and migraines can all benefit from the roots.The root decoction reduced blood sugar levels by up to 30%. Fruits are used as remedies for snake bites. The plant's fruits have demulcent, antipyretic, and other biological qualities that reduce body heat and swelling.

The plants fruits can cure breathing disorders. In albino rats, the floral decoction suppresses ovarian activity while stimulating uterine function. Cassia fistula leaves have laxative and antiperiodic activity. Leaf decoction of the plant used to protect the skin health. The powder or decoction of the stem is taken for curing leprosy, jaundice and heart disorders. It also heals skin disorders as well as anti-dysenteric qualities. C. fistula is used to treat malaria and fever and is also used as analgesic and antipyretic. Stem bark is used to treat inflammation, chest pain, and amenorrhea. [5-7]

International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 14, Issue 11, November 2025)

III. MORPHOLOGY DESCRIPTION

Root	The outer part of the cork is made up of 30–40 rows of tangentially elongated cells with slightly thick walls that are primarily filled with brownish tannin. The wood, which consists of vessels, xylem fibers, wood rays, and xylem parenchyma, occupies the center of the root.
Stem	The outermost layer of the cork is made up of 18–24 rows of tangentially elongated cells with slightly thick walls that are packed with brownish tannin. Fibers have very thick walls, vessels have pits with simple perforations, and the xylem parenchyma is packed with simple and compound starch grains.
Leaf	The leaf has two outer layers called the upper and lower epidermis, with a supportive layer of collenchyma underneath. Inside, there is a ring of strong pericyclic fibers surrounding unusual vascular bundles, along with a small, irregularly shaped central pith. The xylem groups within the vascular bundles are separated from each other by rays that are one or two cells wide
Fruit	The softened fruit material reveals vascular components including tracheids and small ray cells that have simple pits on their walls. It also contains fibers, stone cells of various shapes, and parenchyma cells from the fruit pulp filled with a brownish-black substance

Botanical source

Scientific name **–** Cassia fistula
Family – Fabaceae
Subfamily – Caesalpinioideae
Geographical source – Myanmar, Southeast Asia, Malaysia, Indonesia, Thailand, India, Sri Lanka

Taxonomy

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

International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 14, Issue 11, November 2025)

Vernacular name

Sanskrit - Oriya Sunaari
Bengali - Bundaralati, Sonalu, Soondali, Sondal
English - Indian Laburnum, Purging Fistula, Cassia, Golden Shower
Guajarati - Garmala
Hindi - Sonhali, Amultus
Kannad - Kakkemara
Marathi - Bahava
Tamil - Shrakkonnai, Konai, Irjviruttam
Telegu - Kondrakayi, Raelachettu, Aragvadhamu, Koelapenna Nripadruma
Arab - Khayarsambhar
Punjabi - Amaltaas, Kaniyaar, Girdnalee

Different species of c. fistula Cassia bonplandiana DC.

Cassia excelsa Kunth
Cassia fistuloides Collad.
Cassia rhombifolia Roxb.
Cathartocarpus excelsus G.Don (a synonym related to some Cassia species)
Cathartocarpus fistula Pers. (synonym for Cassia fistula)
Cathartocarpus fistuloides (Collad.) G.Don

Bioactive compound of C. fistula

NO.	Part	Chemical constituents
1.	Bark and heart wood	Barbaloin and rhein, fistucacidin
2.	Leaves	Rhein and its glycoside sennosides A and B
3.	Stem bark	Lupeol, B-sitosterol, hexacosanol tannin
4.	Pod	Rhein, glycoside, fistulicacid, Ceryl alcohol, anthraquinone and tannin
5.	Flowers	Ceryl alcohol, fistulin, rhein, dianthroquinone, glucoside
6.	Fruit pulp	Proteins, carbohydrates, arginine, leucine, methionine, phenylalanine
7.	Seeds	Galactomannam composed of D-galactose and D – mannose
8.	Plant	Seven bioflavonoid and two tri flavonoids

International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 14, Issue 11, November 2025)

Therapeutic use

a) External uses – Anti-inflammatory, analgesic, Skin disease, itching.
b) Internal uses – Anti purgative, Cardioprotective, Anti diabetic, Antipyretic, etc

IV. Introduction Of Topical Application

In order to create a local therapeutic impact, topical application refers to the direct distribution of a chemical onto a particular location of the body, typically the skin or mucous membranes. Creams, ointments, lotions, gels, foams, patches, and drops are examples of topical treatments that are administered to the skin, eyes, or mucous membranes.

Assessing the bioavailability of drug molecules at the site of action provides better insight into the efficiency of a dosage form. In fact, topical formulations could be used to treat superficial skin conditions like fungal infections. There are numerous dermatological formulations that are intended to act locally in the afflicted skin rather than permeating into the skin's deeper layers. [8-11]

Topical application in Ayurveda

Ayurveda has a number of dosage form classes, including Ahara kalpana and Aushadha kalpana. Primary and Secondary Kalpana are two further classifications for Aushadha Kalpana. These categories, which include plant, animal, and mineral sources, are based on where the ingredients come from. Dosage forms, such as liquid, semi-solid, and solid forms, can also be categorized according to their physical state. Additionally, dosage forms, such as Bahya and Abhyantara kalpana, can be grouped based on how they are intended to be used. In Ayurveda, using a variety of dose forms is crucial for improving patient compatibility, palatability, and shelf life. The topical dose form (Bahya Kalpana), which includes formulations such as Lepa

Kalpana, Malhara Kalpana, and Upnaha Kalpana, is one important Ayurvedic classification. [12]

Review of Literature Phytochemical from Leaves

Many people have long utilized Cassia fistula, sometimes known as the golden shower tree, as a decoction made from its leaves to treat a variety of illnesses. The purpose of this study was to assess the antibacterial activity and look into the phytochemical characteristics of Cassia fistula plant leaves.

Cassia fistula leaf extracts (hot, cold, and ethanol) were tested against medically important bacteria using the agar disc diffusion method and varying extract concentrations.There was a remarkable inhibition of the bacterial growth. Phytochemical analysis was carried out to determine the phytochemical constituents present in the leaf. Phytochemical screening revealed the presence of capric acid, palmitic acid, oleic acid, 1, E11, Z-13-octadriene, 9-octadecenal, brassidic acid. The result from this study is an indication that Cassia fistula leaf is effective against these pathogens and can be further exploited for the development of new antimicrobials. [13] The current study focuses on the qualitative and quantitative pharmacognostic evaluation of Cassia fistula leaf material, as well as the establishment of quality measures such as pharmacognostic and phytochemical evaluation. [14] Qualitative analysis was conducted on numerous phytoconstituents, including alkaloids, tannins, saponins, anthraquinones, anthocyanosides, phenolic flavonoids, flavonoids, carbohydrates, and proteins. steroids, terpenoids, cardiac glycosides and phlobatannins. [15]

Phytochemical from Flower

Cassia fistula flower extracts are commonly prepared using solvents like methanol, ethyl alcohol, and hot water. Several components, including terpenoids and phenolics, lipids and waxes, alkaloids, quaternary alkaloids, and N-oxides, were extracted from fresh Cassia fistula flowers. The butanolic extraction of *C. fistula* flowers was completed and the active compounds were classified. The cytotoxicity of fibroblasts was evaluated by SRB assay for the purposes of selecting non-toxic doses for further experiments. The collagen and hyaluronic acid (HA) synthesis was then measured using the collagen kit and ELISA, respectively. [16]

Seeds extraction

In the practice of traditional medicine, cassia fistula seeds have numerous therapeutic applications. The current study was conducted to use transmission electron microscopy (TEM) and scanning electron microscopy (SEM) observations to show the anticandidal activity of the C. fistula seed extract at the ultra-structural level. [17] Anthraquinone derivatives, carbohydrates, proteins, amino acids, resinous and waxy derivatives, volatile oil, stetculic and malvalic acids. [18]

International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 14, Issue 11, November 2025)

Phytochemical from Pods

The ripe pod pulp of Cassia fistula Linn. (Fabaceace) has long been used as a traditional laxative drug due to anthraquinone glycosides constituent. The main anthraquinone found in pod pulp is rhein. In this work, the physical and chemical characteristics of extracts from ripe Cassia fistula pod pulp that were gathered from ten different Thai regions were standardized. The pod pulp extracts' total anthraquinone concentration, measured in terms of rhein, was more than 0.10% w/w (average 0.1365 ± 0.001% w/w) and total anthraquinone glycosides were more than 0.03% w/w (average 0.0445 ± 0.002% w/w), according to UV-vis spectrophotometric measurement. [19]

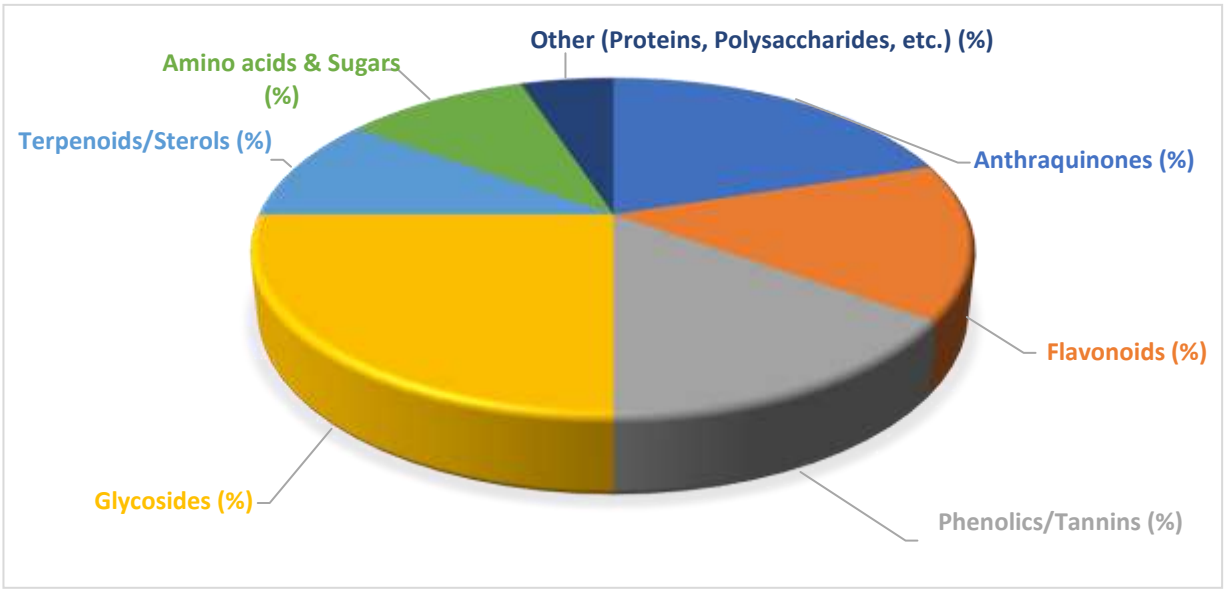
Phytochemical from Fruit Pulp

The present study is aimed to investigate antioxidant activity of the extracts of *Cassia fistula* Linn. (*Leguminosae*) fruit pulp. Fruit pulp hydroalcoholic extract was used for the primary phytochemical analysis and the in vitro antioxidant testing.

The presence of phenolic substances, fatty acids, flavonoids, tannins, and glycosides has been revealed by phytochemical screening of the plant. The Folin-Ciocalteu reagent was used to measure the phenolic content, which was then converted to gallic acid equivalents. Using the DPPH (2,2-diphenyl-1picrylhydrazyl) test, the antiradical activity of the hydroalcoholic extract was assessed and contrasted with that of ascorbic acid. [20-21]

Phytochemical from Bark

C. fistula bark extract had the highest total phenolic content and free radical scavenging activity, with IC50 values of 7.90±0.10 µg/mL and 22.35±1.38 mgGAE/g. C. fistula bark extract inhibited tyrosinase with an IC50 value of 1.71×103±0.01 µg/mL, making it an active ingredient in oil-in-water emulsions. At 4±2 °C storage, the formulation including C. fistula extract from bark demonstrated the maximum stability without changing the color, flavor, or homogeneity, whereas pH and viscosity were marginally altered shown in Figure 1. [22]



International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 14, Issue 11, November 2025)

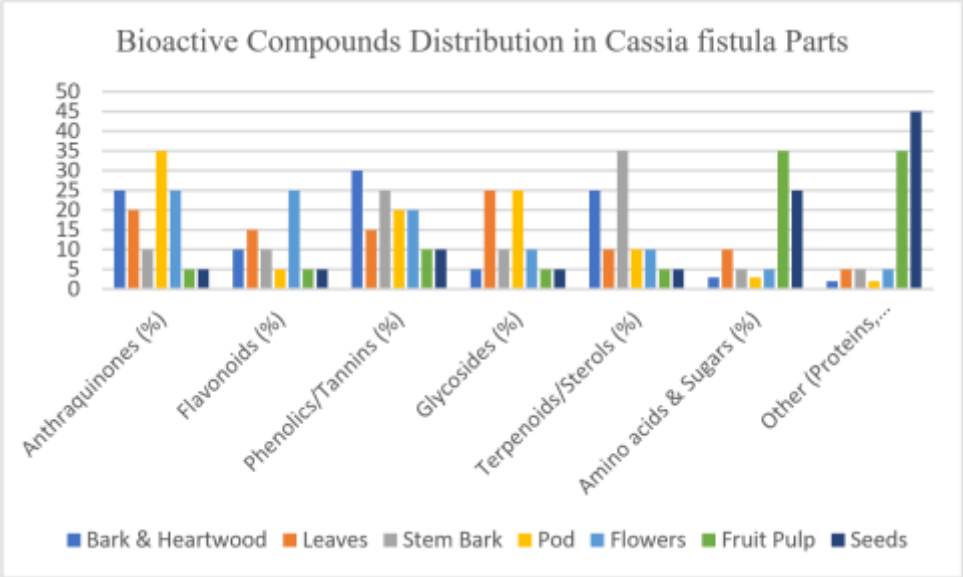


Figure 1. : Bioactive Compounds Distribution in Cassia fistula Parts

V. As Per Therapeutic Effect

Antibacterial activity

C. Fistula parts are rich in a wide variety of secondary metabolites such as tannins, terpenoids, alkaloids, flavonoids, glycosides etc. which have been found in vitro to have antibacterial properties. Numerous studies from all around the world have examined how plant extract affects bacteria.

C. fistula were most effective against bacterial strain B. subtilis and P. aeruginosa than that of S. aureus and S. typhimurium over the control. Additionally, it was shown that all amounts of ethanolic extracts from one-month and four-month pods were most successful in inhibiting the growth of four distinct pathogenic bacteria. The four tested bacterial pathogens were successfully inhibited by the amounts of pulp and young bark ethanolic extract. The growth of two Gram positive and two Gram negative bacteria was effectively inhibited by the ethanolic extracts of old bark. Among all extracts, the ethanolic extracts showed maximum antibacterial activity over the standard streptomycin. [23-24] The methanolic and ethanolic extracts can be proper candidates of antibacterial substance against pathogenic bacterial species especially S. aureus, E. coli, K. pneumoniae and S. epidermidis. [25]

Antimicrobial activity

Among other traditional medical systems, Ayurveda and Chinese traditional medicine also use the important medicinal plant Cassia fistula. It is a tiny, evergreen tree known as the "yellow shower" because to its bright yellow blossoms and long, rod-like fruit that contains pulp. The goal of the current study was to investigate the phytochemical and antibacterial properties of Cassia fistula leaves in relation to foot ulcer activity. After being gathered, the leaves were dried and crushed. Solvent extraction based on polarity was performed with the goal of conducting phytochemical research. MIC and MBC tests were used to further investigate the extracts' antibacterial activity against particular bacterial species. Ethanol extract outperformed the other extract in inhibiting bacterial growth, with minimum inhibitory concentrations (MIC) ranging from 0.15 to 5 mg/ml. The two primary peaks in the HPLC profile confirmed that alkaloids and flavonoids are still the most important class of compounds. Because of its antibacterial properties, the plant may have the ability to treat diabetic wounds. However, before standardizing the use of these antimicrobial medications as a successful treatment, more investigation is needed into digestibility, liver toxicity tests, and in vivo models. [26]

International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 14, Issue 11, November 2025)

Antiviral activity

Cassia fistula L. has been used medicinally. Anthraquinones are found to be abundant in its pod. Anthraquinone molecules have immune-modulating and antiviral properties. Treatment of viral illnesses may benefit from modification of IFIT1 protein expression. The current study's objective is to discover Cassia fistula pods that are high in anthraquinones in order to trigger the antiviral protein IFIT1. Consequently, the Soxhlet extraction method is used to extract Cassia fistula. The findings demonstrated that Cassia fistula extract markedly increased the expression of the IFIT1 antiviral protein, indicating anthraquinones as possible agonistic substances for stimulating the innate immune system to cure viral infections. [27-28]

Antifungal activity

Hexane, chloroform,ethyl acetate, methanol and water extracts from the flower of Cassia fistula were tested against bacteria and fungi.It exhibitedantifungal activityagainstTrichophyton mentagrophytes(MIC 0.5 mg/ml) andEpidermophyton floccosum(MIC 0.5 mg/ml). [29]This study concludes that methanolic extract of C. fistula possess selective antifungal activity. Compounds such as hexadecanoic acid, 15- methyl-, methyl ester and trifluoroacetoxy hexadecane might be responsible for antifungal activity of flower extract. [30]

Anti-inflammatory activity

In Indian system of medicine, certain herbs are claimed to provide relief of pain and inflammation. The bark extracts of Cassia fistula possess significant anti-inflammatory effect in the acute and chronic anti-inflammatory model of inflammation in rats. Carageenan induced inflammation is a useful model to detect oral action of anti-inflammatory agents. The present results indicate the efficacy of Cassia fistula bark as an efficient therapeutic agent in acute antiinflammatory conditions.[31] We found that our plant species contains many effective compounds like flavonoids, alkaloids, tannin, anthraquinone, etc. Further, we analyzed our samples using GC and MS. Based on the GC-MS results obtained we conclude that Cassia fistula has anti-inflammatory activity has more. [30-32]

Hepatoprotective

The hepatoprotective efficacy of the n-heptane extract of Cassia fistula leaves was tested in rats by producing hepatotoxicity with carbon tetrachloride and liquid paraffin (1:1). The extract has been demonstrated to have a strong protective impact, reducing serum levels of transminases (SGOT and SGPT), bilirubin, and alkaline phosphatase. The extract of C. fistula at a dose of 400 mg/kg demonstrated considerable hepatoprotective effect comparable to that of a conventional hepatoprotective drug. [33]

Antipyretic activity

The test was performed in rats by injecting 10 ml/kg s.c. of 15% aqueous solution of Brewer's yeast to induce pyrexia. Rectal temperature of each animal was taken before and 24h after the yeast injection using digital clinical thermometer. Animal that did not show a minimum increase of 0.7 C in temperature 24 hrs after yeast injection were discarded. The selected animals were divided in to 4 groups and treated.The antipyretic properties of methanolic extracts of Cassia fistula were assessed using an artificially produced laboratory paradigm. In rats with yeast-induced pyrexia, the extract improved hypothermal activity.

Yeast is injected subcutaneously to increase prostaglandin synthesis, which causes pyrexia and is used to screen agents for antipyretic effects. [34-35]

Antifertility activity

At doses of 100, 200, and 500 mg/kg b.wt./day, a petroleum ether extract of Cassia fistula seeds was tested for antifertility efficacy in female albino rats that had been shown to be fertile. [36]

Wound healing activity

The leaves of C. fistula, which are used in Indian traditional medicine to treat ringworm, as a purgative, and for numerous other ailments, were gathered from Agartala, Tripura. In two different wound models in rats—the excision wound model and the incision wound model— the methanol extract of C. fistula leaves was tested for its ability to heal wounds when applied as an ointment. In both of the studied wound models, the leaf extract ointment at two different doses (5 and 10% w/w ointment of leaves extract in simple ointment base) showed a substantial response.

International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 14, Issue 11, November 2025)

In terms of wound contraction ability, epithelization duration, tensile strength, and tissue regeneration at the wound site, the outcomes were also similar to those of the conventional medication, nitrofurazone. [37]

Skin disease

Cassia fistula a flowering plant in the family of Caesalpinaceae (fabaceae), is used in traditional medicine for several indications. Nevertheless, too little is known about its effects on skin conditions and skin aging. [40] According to reports, the blooms of Cassia fistula L., a member of the Fabaceae family, offer anti-oxidant qualities and have been used as a traditional remedy for wounds and skin conditions. On human skin fibroblasts, the anti-aging properties of C. fistula flower extract were examined.The floral extract was found to have no effect on the proliferation of skin fibroblast cells (IC50 > 200 µg/mL). Additionally, the tyrosinase activity that results in hyperpigmentation and aging of the skin may be inhibited by this flower extract. [38-41]

According to the Ayurvedic formulation for healing wounds

According to Sushruta Samhitha's Shashti Upakramas, the investigations comprised a combination of drugs and drug formulations as well as other methods. Lepa (topical application), Avachoornana (sprinkling of medicated powder), Raktamokshana (bloodletting), such as Jalauokavacharana (medicinal leech application), and Kshalana (therapeutic procedure in which the wounds are cleansed with medicated liquids) were all cross-reviewed from a variety of research works.[42] Ayurveda describes a variety of minerals, fats, oils, and plants that have anti-aging and wound-healing qualities. Skin undergoes a number of changes as it ages, such as a decline in tissue cell regeneration, a reduction in collagen composition, and a loss of mechanical strength and elasticity. We examined parameters such as wound contraction, collagen content, and skin breaking strength, which are indicative of the tissue cell regeneration capacity, collagenation capacity, and mechanical strength of skin. [43]

Herbal cream formulation

Plants or chemical entities derived from plants need to be identified and formulated for treatment and management of wounds. In this direction, a number of herbal products are being investigated at present. Obtained findings collectively demonstrated that formulated herbal cream possesses wound healing activity and this justifies its use for treatment of wounds. The prepared herbal cream was judged to be acceptable within all bounds after being assessed using a number of standard criteria. It was discovered to have a greenish brown color, a semisolid consistency, good extrudability, and ease of washing. The prepared herbal cream's pH, viscosity, and spreadability were determined to be 6.10, 5905, and 7.8, respectively. The developed formulation does not exhibit microbiological growth or oil separation. Every result was published. [44]

Table 1.
Findings of pharmacological evaluation of formulated herbal cream [44]

Groups	Epithelialization Period (In Days)	Hydroxyproline Content (mg/g tissue)	Tensile Strength(g/mm^2)
G-I (Control)	22	18.12 ± 0.021*	385.023 ± 2.167*
G-II (Standard)	10	70.25 ± 0.014*	610.15 ± 2.717*
G-III (Herbal Cream)	11	68.26 ± 0.002*	442.72 ± 2.124*

n= 6 albino rats per group, values are represents mean± SEM *P< 0.01(comparison of I & II with III)

VI. CONCLUSION

Cassia fistula Linn. is a versatile medicinal plant with remarkable pharmacological potential, validated through both traditional practices and contemporary scientific studies. Its diverse phytochemical constituents—including anthraquinones, flavonoids, phenolic compounds, and glycosides—contribute to its wide spectrum of therapeutic actions. The plant's notable antimicrobial, antioxidant, anti-inflammatory, and wound-healing effects make it an excellent candidate for formulating natural skincare and herbal cream products. Moreover, its ability to stimulate collagen production, suppress melanin synthesis, and guard against oxidative stress highlights its promise as a key ingredient in anti-aging and skin-repair formulations. Although substantial progress has been made, further investigations are essential to refine extraction techniques, confirm clinical safety, and enhance formulation stability for broader pharmaceutical and cosmetic use. In essence, *Cassia fistula* exemplifies how traditional botanical wisdom can be harmoniously combined with modern scientific advancements to promote human health and dermatological care.

REFERENCES

[1] Siddiqua Dr Aisha. The Traditional Uses, Phytochemistry and Pharmacological Properties of Cassia fistula. Journal of pharmacy and pharmacology research. 2018; doi:10.26502/JPPR.0006.

[2] Bhalerao SA, Kelkar TS. Traditional medicinal uses, phytochemical profile and pharmacological activities of Cassia fistula Linn. Int Res J Biol Sci. 2012 Sep;1(5):79-84.

[3] Kumar S, Jena PK, Sabnam S, Kumari M, Tripathy PK. Study of plants used against the skin diseases with special reference to Cassia fistula L. among the king (Dongaria Kandha) of Niyamgiri: A primitive tribe of Odisha, India. International Journal of Drug Development and Research. 2012 Apr;4(2):256-64.

[4] Kumar S, Dobos GJ, Rampp T. The significance of ayurvedic medicinal plants. Journal of evidence-based complementary & alternative medicine. 2017 Jul;22(3):494-501.

[5] Desai CP, Chaudhary AB, Patel BD. Development and validation of RP-HPLC method for simultaneous estimation of saxagliptin and dapagliflozin. World Journal of Pharmacy and Pharmaceutical Sciences. 2018 Feb 20;7(5):803-12.

[6] Singh H, Kumar S, Arya A. Ethno-dermatological relevance of medicinal plants from the Indian Himalayan region and its implications on cosmeceuticals: A review. Journal of Drug Research in Ayurvedic Sciences. 2023 Apr 1;8(2):97-112.

[7] Konar A, Ghosh P, Chatterjee S, Lake S, Sector V, India KW. Cassia fistula is a miraculous medicinal plant: A brief Review. Journal of Plant and Agronomy. 2023 Jun 25;1(1):25-31.

[8] Patel BK, Chaudhary AB, Bhadani SM, Patel BD. Development and validation of stability indicating RP-HPLC method for simultaneous estimation of aceclofenac and cyclobenzaprine hydrochloride in pharmaceutical dosage form. drugs. 2018 Feb 24;5:7.

[9] pwkb. Species .11434, Plantwise Plus Knowledge Bank, doi:10.1079/pwkb.species.11434, CABI International, Cassia fistula (Indian laburnum), (2022).

[10] Chauhan P, Tiwari RC, Bhutiani R, Ahamad F. Study of Aragvadha (Cassia fistula Linn.) with special reference to phyto-pharmacological properties: An overview. Environment Conservation Journal. 2019 Jun 20;20(1&2):133-8.

[11] Patel DM, Chaudhary AB and Patel BD. Development and validation of RP-HPLC method for simultaneous estimation Beclomethasone Dipropionate, Phenylephrine Hydrochloride and Lignocaine Hydrochloride in cream. World Journal of Pharmacy and Pharmaceutical Sciences. 7 (2018) (5): 829-841. DOI: 10.47583/ijpsrr.2021.v69i02.019.

[12] Patel BD, Vekaria HJ. Central Composite Design Expert-Supported RP-HPLC Optimization and Quantitative Evaluation of Efonidipine Hydrochloride Ethanolate & Chlorthalidone in Tablet. Journal of Chromatographic Science, 1 (2023) 8. DOI: https://doi.org/10.1093/chromsci/bmad077.

[13] B.D.Patel, S.G.Rathi, A.M.Suthar, P.V.Dobariya. RSM-CCD coupled RP-HPLC optimization and quantitative evaluation of antihypertensive drugs in tablet. Azerbaijan chemical journal. 2024, 2, 26-35. DOI: doi.org/10.32737/0005-25312024-2-26-35.

[14] Patel BD and Vekaria HJ. Quality by Design based method development and its validation for simultaneous estimation of Montelukast sodium and Bilastine in tablet dosage form. International Journal of Biology, Pharmacy and Allied Sciences. 11 (2022) (11) 5506-5516. DOI: https://doi.org/10.31032/IJBPAS/2022/11.11.6608.

[15] V.R. Ravikkumar, Bhoomi D. Patel, Sanjesh Rathi, S. Parthiban, Mohini C. Upadhye, Apexa M. Shah, Shaheen, Sayan Samanata, Shubham Singh. Formulation and Evaluation of Drumstick Leaves Tablet as an Immunomodulator, Chinese Journal of Applied Physiology, June 2024: e20240004, 1-8, DOI: 10.62958/j.cjap.2024.004.

[16] Patel B., Vekaria H. 2^3 Factorial design for optimization of HPLC-PDA method for the simultaneous estimation of Efonidipine Hydrochloride Ethanolate and Telmisartan in Tablet Dosage Form. Journal for Basic Sciences. 22 (2022) (12): 1383-1392. DOI:10.37896/JBSV22.12/1673

[17] Jothy SL, Zakariah Z, Chen Y, Sasidharan S. In vitro, in situ and in vivo studies on the anticandidal activity of Cassia fistula seed extract. Molecules. 2012 Jun 7;17(6):6997-7009.

[18] Deshpande HA, Bhalsing SR. Recent advances in the phytochemistry of some medicinally important Cassia species: A review. International journal of pharma medicine and biological sciences. 2013;2(3):60-78.

[19] Sakulpanich A, Chewchinda S, Sithisarn P, Gritsanapan W. Standardization and toxicity evaluation of Cassia fistula pod pulp extract for alternative source of herbal laxative drug. Pharmacognosy Journal. 2012 Mar 1;4(28):6-12.

[20] Sakulpanich A, Gritsanapan W. Extraction method for high content of anthraquinones from Cassia fistula pods. J Health Res. 2008 Oct 1;22(4):167-72.

[21] Bhalodia NR, Nariya PB, Acharya RN, Shukla VJ. In vitro antioxidant activity of hydro alcoholic extract from the fruit pulp of Cassia fistula Linn. AYU (An international quarterly Journal of Research in Ayurveda). 2013 Apr 1;34(2):209-14.

[22] Mungmai L, Preedalikit W, Rungsang T, Sainakham M. Bioactivity determination and development of oil in water emulsion containing Cassia fistula bark extract.

[23] Walailak Journal of Science and Technology (WJST). 2021 Mar 1;18(5):8943-10.

[24] Meena AK, Ilavarasan R, Perumal A, Singh R, Ojha V, Srikanth N, Dhiman KS. Evaluation for substitution of stem bark with small branches of Cassia fistula Linn for traditional medicinal uses: A comparative chemical profiling studies by HPLC, LC-MS, GC-MS. Heliyon. 2022 Aug 1;8(8).

[25] Satpute SM, Bhamburdekar SB, Kutwal DN, Waghmare SR, Gaikwad DK. Evaluation of antibacterial potential of Cassia fistula L. World J. Pharm. Pharm. Sci. 2014 Nov 23;4(2):635-40.

[26] Seyyednejad SM, Motamedi H, Vafei M, Bakhtiari A. The antibacterial activity of Cassia fistula organic extracts. Jundishapur Journal of Microbiology. 2014 Jan 1;7(1): e8921.

[27] Thenmozhi N, Chitra M, Anitha A, Jeyaprakash MR. Phytochemical Screening, Chemical Profiling and Antimicrobial activity of Cassia fistula. Biochemical & Cellular Archives. 2024 Apr 1;24(1).

[28] Patel BD, Nayak TA, Hussain SA. Development of RP-HPLC Method of Tizanidine HCL with Some Validation Parameter. Chinese Journal of Applied Physiology. 2024 Jul 9:e20240007.

[29] Naresh D, Bharne D, Saikia P, Vindal V. Anthraquinone rich Cassia fistula pod extract induces IFIT1, antiviral protein. Indian J Tradit Knowl. 2018 Jul 1;17: 474-9.

[30] Duraipandiyan V, Ignacimuthu S. Antibacterial and antifungal activity of Cassia fistula L.: An ethnomedicinal plant. Journal of ethnopharmacology. 2007 Jul 25;112(3):590-4.

[31] Ferdosi MF, Ahmed H, Khan IH, Javaid A. Fungicidal potential of flower extract of Cassia fistula against Macrophomina phaseolina and Sclerotium rolfsii. J. Anim. Plant Sci. 2022 Aug 1;32(4):1028-34.

[32] Ilavarasan R, Malika M, Venkataraman S. Anti-inflammatory and antioxidant activities of Cassia fistula Linn bark extracts. African journal of traditional, complementary and alternative medicines. 2005;2(1):70-85.

[33] Anitha J, Miruthula S. Anti-inflammatory and phytochemicals analysis of Cassia fistula Linn. fruit pulp extracts. Int J Pharmscog. 2014;1(3):207-15.

[34] Bhakta T, Mukherjee PK, Mukherjee K, Banerjee S, Mandal SC, Maity TK, Pal M, Saha BP. Evaluation of hepatoprotective activity of Cassia fistula leaf extract. Journal of ethnopharmacology. 1999 Sep 1;66(3):277-82.

[35] NB C, Chittam KP, Patil VR. Hepatoprotective activity of Cassia fistula seeds against paracetamol-induced hepatic injury in rats. Arch Pharm Sci & Res. 2009; 2:218-21.

[36] Singh MP, Singh A, Alam G, Patel R, Datt N. Antipyretic activity of Cassia fistula Linn. pods. J Pharm Res. 2012 May; 5:2593-4.

[37] Patel BD, Mishra A, Chaudhary A. RP-HPLC Method Development and Validation for Simultaneous Estimation of Pyrantel Pamoate, Praziquantel, Febantel in Tablet. Research Journal of Pharmacy and Technology. 2022;15(8):3535-9.

[38] Dave J, Tirgar P, Patel B. A Pharmacological Analysis of Sodium-Glucose Cotransporter-2 Inhibitors for the Treatment of Diabetes and the Complications Associated. Research Journal of Pharmacy and Technology. 2024;17(8):3625-32.

[39] Kumar MS, Sripriya R, Raghavan HV, Sehgal PK. Wound healing potential of Cassia fistula on infected albino rat model. Journal of Surgical Research. 2006 Apr 1;131(2):283-9.

[40] Lattupally V, Balaji K, Sangeetha A, Naganjaneyulu R, Zuberi MS. A Review: Some Cassia And Ficus Species Used In Dermatological Diseases. 2024 sep 24; 13(22):269,273.

[41] Khan BA, Akhtar N, Menaa A, Menaa F. A novel Cassia fistula (L.)-based emulsion elicits skin anti-aging benefits in humans. Cosmetics. 2015 Nov 6;2(4):368-83.

[42] Limtrakul, P., Yodkeeree, S., Thippraphan, P. et al. Anti-aging and tyrosinase inhibition effects of Cassia fistula flower butanolic extract. BMC Complement Altern Med 16, 497 (2016).

[43] Dudhamal TS. Review of grey literature on Ayurveda wound healing formulations and procedures-A systematic review. Journal of Ayurveda and integrative medicine. 2023 Jul 1;14(4):100779.

[44] Datta HS, Mitra SK, Patwardhan B. Wound healing activity of topical application forms based on ayurveda. Evidence- based Complementary and Alternative Medicine. 2011;2011(1):134378.

[45] Shivhare Y, Jain AP. Potential Emphasis of Formulated Herbal Cream on Wound Healing. Asian J Pharm Res Dev [Internet]. 2020 Feb. 15 [cited 2025 Nov. 9];8(1):73-7.

***Author for correspondence**

Mandli Harsiddhi

Student , Department of Pharmaceutical Chemistry & Quality Assurance, School of Pharmacy, Rai University, Saroda, Dholka Road, Ahmedabad, Gujarat, INDIA.
Email: harsiddhiprajapati9@gmail.com