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Outline of the Pharmacological and Phytochemical Profile of the Jungle Jalebi (*Pithecellobium dulce*)

Abdul Hameed [a++*], Yash Srivastav [a], Hina Afaq [b], Afreen Hashmi [c] and Mohd. Imtiyaz Ahmad [a]

[a] Azad Institute of Pharmacy & Research, Lucknow, U.P, India.
[b] Jaipur College of Pharmacy, Jaipur, Rajasthan, India.
[c] Babu Banarasi Das (BBD), Lucknow, U.P, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Pithecellobium dulce has numerous utilizations which has flexible jobs in the conventional arrangement of medication. A few investigations are being directed concerning the viability of the entire plant or its parts for the treatment of various sicknesses and ailments. Triterpenoids, sterols, flavonoids, tannins, and phytocompounds like quercetin, kaempferol, and dulcitol were recognized from the different pieces of the plant. In this article, the different remedial properties of *P. dulce* have been shown. *P. dulce is* an evergreen sharp tree; each piece of the plant has huge healthful values. The different parts of plant have been shown to display different pharmacological activities like anti-diabetic, locomotor, immunizing agent venom, free radical searching, protease inhibitor, mitigating, anti-bacterial, anti-mycobacterial, abortifacient, spermicidal, anti-convulsant, anti-ulcer,

[++] Assistant Professor;
**Corresponding author: E-mail: neelashsrv76@gmail.com*

anti-diarrheal, anti-contagious, anti-tubercular, anti-tumor and as well as anti-oxidative properties and safety study like acute and sub-acute toxicity study. Therefore, the current review is cognizant on behalf of pharmacological studies, as well as phytochemicals.

Keywords: Pithecellobium dulce; phytochemistry; traditional uses; antivenom; abortion; spermicidal safety study.

1. INTRODUCTION

The Hindi name of Jungle jalebi is *Pithecellobium dulce* Benth, a woody legume native (northwestern region) of Mexico but now widely distributed all over India, Southeast Asia and can also be found in South Africa and Australia; small to medium-sized. Height is about 18m and is cultivated throughout India. Seeds of *P. dulce* species are traditionally used worldwide for food because they are highly protein in nature and also contain dietary fibers and unsaturated fatty acid contents [1].

Synonyms: *Pithecellobium littorale*, *Pithecellobium dulce* (Roxb.) Benth.

- ✓ **Bark (contain 37 %tannin):** is used for the treatment of astringent in dysentery, dermatitis and inflammation in the eye.
- ✓ **Leaves (contain quercetin, kaempferol, dulcitol and afezilin):** are reported for to have astringent, emollient, abortifacient and antidiabetic properties.
- ✓ **Seeds:** are used as glycosides, glycolipids, polysaccharides, steroids, saponins, lipids and phospholipids [2–4].
- ✓ **Roots:** take over estrogenic activity.

Recently the studies of plant on alkylated resins from seed oil have been reported. Traditionally fruits have been consumed, well known for their edible fruits; linear, and curved; with lengths from 10 to 13 cm. Normally, the single pod contains ten seeds (irregular in shape.

The chemical compounds present in plants are used as antidiabetics, anticancer, antinflammation etc. There are several allopathic medicines used in the treatment of diseases but they also have several side effects and drug interactions, so there is a need for herbal treatments that have lesser or no side effect. Here, the review discusses the protection against various diseases and their pharmacological properties of the *P. dulce* [5,6].

Fig. 1. *Pithecellobium dulce* (Jungle jalebi) Plant

2. FAMILY

The plant belongs to family Fabaceae. Most woody species are tropical; herbaceous (i.e., nonwoody) species happen principally in mild districts, belongs to family Orchidaceae and assteraceae as well. It contains about 751 genus and 19000 species [7]. Crotalaria, indigofera, astragalus, acacia, and mimosa are the widespread genus. About 19,000 known vegetable species add up to about 7% of blooming plant species. In tropical rainforests and in dry backwoods in the

Americas and Africa most widely recognized family is Fabaceae. Fabaceae is a single monophyletic family, Recent molecular and morphological evidence supports the fact. Here the conclusion has been given not just by the level of interrelation appeared by changed gatherings inside the family contrasted and that found among the Leguminosae. In addition by all the ongoing phylogenetic examinations dependent on DNA groupings [8,9]. These investigations confirm that the family Fabaceae is a monophyletic bunch that is firmly identified with the families' *polygalaceae*, surianaceae and quillajaceae. A few products of the soil roots, various Leguminosae have human nourishment for centuries and their utilization is firmly identified with human advancement. Generic name is derived from the Greek words *pithekos* which means "ape" or "monkey," and *ellobion*

stands for "earring," which means coiled shape. Genus is commonly known as blackbeads [10].

3. VERNACULAR NAME

Language	Name
Hindi:	Jangle jalebi, Vilayati babul, Vilayati imli
English:	Quamachil, Madras thorn, manila tamarind
Tamil:	Kodukkaapuli
Sanskrit:	Kodukkaapuli
German:	Camambilarinde

Taxonomical Classification	
Domain:	*Eukaryote*
Kingdom:	*Plantae*
Subkingdom:	*Tracheobionta*
Species:	*Pithecellobium dulce* (Roxb.) Benth
Class	*Magnoliopsida*
Subclass	*Rosidae*
Order	*Fabales*
Family	*Fabaceae*
Genus	*Pithecellobium Mart*
Botanical name	*Pithecellobium dulce* [11]

4. BOTANICAL DESCRIPTION

In tropical area the tree grows well at low and medium altitudes. The normal rainfall (low as 140mm and as high as 2,200mm) is tolerated. The plant growths need the average temperature (18 - 27.9 ^{o}C) and also needs a well-drained soil. A pair of straight stout short thorns at the base of the leaf Pinnate leaves with a single pair pinnae, each with a single pair of leaflets often variegated White flowers in globular heads c. 1 cm wide Coiled pinkish pods Shiny black seeds c. 1 cm long, embedded in white pulp. But in favourable soil condition height reach of 10 metres (5 - 6 years). After planting in field other than occasional pruning the tree doesn't need any treatment.

Pithecellobium dulce pod's exterior resembles that of tamarind, but it easily peels away like the thin skin of a green bean. The edible flesh may then be separated from the seeds and eaten out-of-hand or prepared in sweet and savoury dishes. The Madras Thorn is a spiny tree that grows up to 20 meters tall. It has an irregular spreading nature making it ideal for a perimeter hedge or living fence. The curvy and spiralled pods are greenish-brown to red or pinkish colour. It is 10-15 cm long x 1-2 cm wide. They are thin and flattened with approximately 10 seeds per pod.[9] the pink, edible pulp of Madras Thorn is both sweet and savoury, with flavours of chestnut and honey. It is the consistency of sticky popcorn, and mildly sour with a cleansing astringent quality on the palate. Fresh Madras Thorn is highly perishable, and the pinkish-white pulp will quickly oxidize once peeled. At room temperature, the fruits keep for three to four days.

5. GEOGRAPHICAL DISTRIBUTION

This plant originated from different countries is mentioned below:

- ✓ Brazil
- ✓ Argentina
- ✓ Bolivia
- ✓ Colombia

Jungle jalebi is the only specie that is widely spread outside from its origin. Eighteen species belongs to this genus; geographically distributed in many countries:

- ✓ India
- ✓ Huawei
- ✓ Tropical Africa [12].

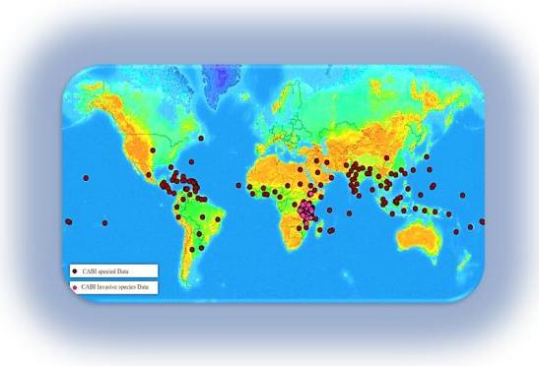

Fig. 2. Worldwide Distribution of *Pithecellobium dulce*. (Jungle jalebi)

6. TRADITIONAL USES

- ➢ Astringent, homeostasis (bark, pulp of fruit)
- ➢ Antipyretic
- ➢ Eye inflammation (eye infections and swelling of the eyelids)
- ➢ To treat gum ailments,
- ➢ Toothache
- ➢ Anticancer

- Bile (leaves, also prevent abortions)
- Antiulcer(Seed)
- Haemorrhages
- Chronic diarrhoea
- Tuberculosis.

7. PHYTOCHEMISTRY

Table 1. Plant parts used for the study and their chemical name

S. No.	Part used	Chemical Name
1.	Bark	Catechol
2.	Wood	Campesterol
3.	Wood	Melacacidin
4.	Seeds	Hederagenin
5.	Seeds	Pitheduloside A
6.	Seeds	Pitheduloside B
7.	Seeds	Pitheduloside D
8.	Seeds	Pitheduloside F
9.	Seeds	Pitheduloside H
10.	Seeds	Pitheduloside I
11.	Seeds	Pitheduloside K
12.	Leaves	Octacosanol
13.	Leaves	Kaempferol
14.	Seeds	Pithogenin
15.	Fruits	Ellagic acid
16.	Fruits	Gallic acid
17.	Fruits	Mandelic acid
18.	Fruits	Ferulic acid
19.	Fruits	Vanillic acid
20.	Fruits	Coumaric acid
21.	Fruits	Rutin
22.	Fruits	Naringin
23.	Peel, leaves	Quercetin
24.	Peel, seeds	Stigmasterol
25.	Fruits, peel	Pinitol
26.	Seeds	Oleanolic acid
27.	Seeds	Echinocystic acid
28.	Leaves	Dulcitol
29.	Stem	Prenylapigenine
30.	Fruits	Daidzein

8. RESULTS AND DICSUSSION

◆ Abortion Activity

The isoflavonoid isolated from root remove, took a stab in female rodents, demonstrated segment subordinate estrogenic development and extending dode weight 15.5±0.25 mg in control group to 34.2±068 mg in orally treated rodents dosing (1.25 mg/kg/day for 4 days).

◆ Antivenom Activity

Polyphenols from water concentrate of *P. dulce* was tried for their inhibitory exercises against Naja kaouthia (NK) venom by In-vitro balance technique.

◆ Spermicidal Activity

The saponins of P. *dulce* were besides introduced to tests for the spermicidal property by exhibited to activity in the debilitating against human semen.

◆ Antiinflammatory Activity

The saponin (containing two genin acids, echinocystic corrosive and oleanolic destructive with xylose, arabinose and glucose as sugar moieties) procured from results of P.*dulce* has been concentrated against the exudative and proliferative time of provocative reaction in pale cleaned individual rodents by using carrageenan induced oedema and formaldehyde started joint pain models.

◆ Antitubercular Activity

leaves extraction (by hexane, chloroform and alcoholic) was read for their anti-mycobacterial action by BACTEC460TB-Radiospirometric framework. The concentrates of the leaves were perused for their anti-mycobacterial activity by BACTEC460TB-Radiospirometric structure. Alcoholic aggregate 20mg/ml the conc. exhibited most raised activity when essentially indistinguishable with standard meds for ex. rifampicin, streptomycin, ethambutol, pyrazinamide and isoniazid [13,14].

◆ Activity of Protease Inhibitor

A seed of P. dulce is isolation and characterizations of a protease inhibitor are seemed.

◆ Antimicrobial Activity

The methanolic and aq. concentrate of P. dulce seeds have indicated fungistatic and have fungicidal impacts against plant pathogens like Fusarium oxysporum, Botrytis cinerea, Penicillium digitatum, and rhizopus stolonifer. A couple triterpene saponins, pitheduloside A, B, E, F and I frustrated in vitro mycelial progression of Rhizopus stolonifer and Colletotrichum gloeosporioides. The plant concentrate of the less-polar hexane and polar methanol attempted against different microorganisms and parasites were in the like way observed as incredible [15,16].

◆ **Anti-Ulcer genic Activity**

Anti-ulcer activity is the ulcer control rodents. The activities of H (+), K (+) - ATPase and myeloperoxidase, seen as essentially raised up and saw as lessened in cure pre-treated rodents. Acute gastric ulcer controlling liquor, acetylsalicylic destructive, or hypothermic impediment stress to rodents pre-treated with HAEPD (200 mg/kg body weight for multi day). The effects of P. *dulce* difference standard prescription with omeprazole.

◆ **Activity of Locomotor**

Locomotor activity is called CNS depressant activity. It is watery and alcoholic of leaf of P. *dulce* was evaluated using actophotometer in pale skinned person rodents. In light of addition in the centralization of GABA as a primary concern it shows a CNS depressant movement. The power of alcoholic and watery concentrates of leaf contrasted and chlorpromazine [17,18].

9. SAFETY STUDY

❑ **Acute toxicity study**

The rodents were fasted for whole with water at free access. For the intense danger, they were randomly partitioned in two gatherings of males, each successively dosed at interims of 48 hour. The controlled group got orally refined water; experimental group was orally treated with stem bark hydroethanolic concentrate of *P. dulce* with extraordinary dose of 5 g/kg. Animals were watched for general behavioral and body weight changes, hazardous manifestations and mortality inside a time of four hr. for guaranteed indications of harmfulness and in any event once every day for 14 days for postponed indications of poisonous quality. After sedation by inward breath with ether, the spinal-rope of rodents was dis-joined by extending [19].

❑ **Sub-acute toxicity study**

Repeated dose of orally toxicity study was done by OECD rule 407 [20] with slight adjustment without EDTA were centrifuged. The animals were partitioned into three groups of 6animals each (3 males and 3 females). First group got 10 mL/kg body weight of distilled water and kept as control. Second and third group got extracted portions of 0.5 and 1 g/kg body then weight individually. For twenty eight days the extract were given and at a similar time and saw in any event twice day by day for bleakness and mortality, the animals (B.W.) were evaluated daily. On day 29, after an overnight fast the rodents were anesthetized with ether and blood tests were acquired by retro-orbital cut, utilizing fine cylinders for hematological and biochemical investigations with and without EDTA [20].

10. CONCLUSION

In the present review we have made an attempt to congregate the taxonomical, botanical and Pharmacological information on *Pithecellobium dulce*, a medicinal plant used in the Ayurveda. *Pithecellobium dulce* has a solid intense in wellbeing advancing, illness forestalling and life delaying properties which has been depicted, explored and checked by current specialists. In any case, the inherently dynamic mixes and the substance dependable have been resolved at this point, and a few components of the activity of *Pithecellobium dulce* are as yet obscure. Along these lines, bioassay-guided separation and distinguishing proof of the bioactive parts must be created to uncover the structure-movement relationship of these dynamic segments. Anyway more examinations are required to investigate the utilization of the plant for commercialization of dynamic elements of organic and home grown medication applications.

INFORMED CONSENT

Using websites, review articles, and other sources to produce research content.

ETHICAL STATEMENT

A pharmacist works to advance each patient's well-being in a discreet, kind, and caring way.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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