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Review Article

A review on phytochemical and pharmacological potential of Prosopis cineraria

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Abstract

In the present review, an attempt has been made to congregate the traditional, phytochemical and pharmacological studies done on important medicinal plant *Prosopis cineraria*, (Family Fabaceae). Fatty acids, tannins, alkaloids, flavonoids and glycosides were the major phytochemical compounds studied from this medicinal plant. The plant possesses the major pharmacological activities which includes analgesic, anthyperlipidemic, antipyretic and antimicrobial activity. This review encompasses the potential application of the above plant in the pharmaceutical field due to its wide pharmacological activities.

Keywords: *Prosopis cineraria*, Phytoconstituents, Pharmacological activities.

Introduction

Plants and its products are used as medicine from the ancient time[1]. Recently there has been a shift in universal trend from synthetic to herbal medicine[2]. It is estimated by the World Health Organization that approximately 75-80% of the world's population uses plant medicines either partly or entirely as medicine. Interest in plant derived drug increases mainly due to the increasing use, and misuse, of existing synthetic drugs. This poses the need for search and development of new drugs to cure diseases[1].

The chemical substances of the medicinal plants which have the capacity of exerting a physiologic action on the human body are the primary features. The bioactive compounds of plants such as alkaloids, flavonoids, tannins and phenolic compounds are considered to be most important. The phytochemical research that has been done based on the ethno-pharmacological information forms the effective approach in the discovery of new medicinal agents from higher plants[3]

Prosopis cineraria (L.) (Family Fabaceaea) is a promising multipurpose tree species. The tree,

locally called as Jandi or Khejri holds an important place in the rural economy in the northwest region of Indian subcontinent. The genus *Prosopis* comprises about 44 species distributed mainly in dry regions of Southwest Asia, Africa and, predominantly America from western North America to Patagonia[4].There are various common names for the plant. In Hindi and Sanskrit it is known as Khejri and in Rajasthan known as Janti/Loong tree. In Punjab it is known by the name of Jand and in Gujarat is known as Sami, Sumri. Tamil and Jammi and Vanni in Telugu. In Sind it is known as Kandi[5]. It is also known as "wonder tree" and "king of desert" as all the parts of tree are useful. It is a small thorny, irregularly branched tree, 5-10 in high. It has thick, rough gray bark with deep fissures. Roots are very deep; the tap root of *P. cineraria* may penetrate vertically up to 20 m or more[6].The leaves form good fodder for camels, goats and donkeys. The pods are used as a vegetable. The flowers are useful for honey production. Khejri is also used for soil improvement and sand dune stabilization. The wood is ideal for domestic heating. The bark of the tree has abortifacient and laxative properties. Khejri is reputed for the treatment of asthma and worm[7].

Plant Description

Prosopis cineraria is a tree to 6.5 m high with cinereous cortex with intermodal prickles. It produces new flush leaves before summer. The flowers are small in size and yellow or creamy white in colour; appear from March to May after the new flush of leaves. The pods are formed soon thereafter and grow rapidly in size attaining full size in about two months time. *Prosopis cineraria* is a tree to 6.5 m high with cinereous cortex with intermodal prickles, scattered, straight and somewhat macroscopic and with conical broad bases.

Root: Root is a taproot more than 3 m long.

Leaves: Leaves are 1-3-jugate, glabrous or puberulous; petiole and rachis is 0.5-4 cm long, the pinnae is 2-7 cm long; leaflets are 7-14-jugate, ovate, straight to subfalcate, without nerves (or 2-4-nerved at base, the midrib excentric), mucronate, 4-15 mm long x 2-4.5 mm broad, grayish when dry; stipules foliaceous, deciduous.

Flower: Flowers are yellow, glabrous; calyx truncate, 0.8-1.2 mm long; corolla 3.5 mm long, glabrous, the petals rolled back in age; anthers 0.8-1 mm long; pistil glabrous.

Fruit: Fruit is slender, elongate, 8-19 cm long (including the stipe 0.8-2 cm), subcylindric-torulose, 4-7 mm in diameter, glabrous; pericarp is thin, brittle; endocarp segments are thin, longitudinal, little developed.

Seeds: Seeds are distant, longitudinal, ovate, 6 mm long, the tegument with open horse-shoe fissural line on faces, 10-15 in a pod, brown[8].

Phytochemical Review

Literature survey of *Prosopis cineraria* revealed the presence of alkaloids, fatty acids, glycosides and sterols whereas glucosides are reported from flowers and flavones from seeds[9-10].

Phytochemical investigations on the leaves of the plant showed the presence of hydrocarbons and phenolic acid derivatives[11, 12]. The leaves also showed the presence of large proportion of unsaturated fatty acids, with linoleic acid and oleic acid[13].

Phytochemical screening of the dried unripe pods of *Prosopis cineraria* showed the presence tannins, alkaloids, flavonoids and glycosides in the dried unripe pods[14].

Numerous bioactive compounds such as flavonoids, alkaloids, diketones, phenolic contents, free amino acids, patulitrin, spicigerin, prosogerin A,B,C,D, lipids, b-sitosterol, sugars and vitamins have been isolated from various parts of the plant[15,16]. The constituents and the part of the plant in which they are present have been shown in table No 1.

Table No 1

Part of the Plant	Chemical Constituent
Whole Plant	Alkaloids, fatty acids, glycosides and sterols
Leaves	Phenolic Acid derivatives, unsaturated fatty acids, linoleic acid and oleic acid.
Pods	Tannins, alkaloids, flavonoids and glycosides.
Flowers	Glucosides
Seeds	Flavones

Pharmacological Review

Ancient literature has reported the use of *P. cineraria* as folk medicine for various ailments. Its flowers mixed with sugar when administered orally prevent miscarriage[17]. With twig, the flowers are also known as an anti-diabetic agent. Dry pods of the plant help in preventing protein calorie malnutrition and iron calcium deficiency in blood. Smoke of leaves is used to cure eye infections[18]. Bark of the tree is used in the treatment of asthma, bronchitis, dysentery, leucoderma, leprosy, muscle tremors and piles[19, 20]. Pharmacological activities like analgesic, antipyretic, antihyperglycemic, antioxidant, antihypercholesterolemic, antitumor, nootropic have been reported from different plant extracts.

Analgesic and antipyretic activity

The Petroleum ether extract of stem bark exhibited a significant antipyretic activity using Brewer's yeast induced hyperpyrexia model in experimental rats. The ethanolic extract of root was evaluated by using tail immersion and hot plate method and showed significant results. The aqueous extract of leaves was evaluated for analgesic activity by using acetic acid induced writhing test model. The Analgesic activity exhibited in Swiss Albino mice was significant as compared to control. The extract also exhibited a significant antipyretic activity at same dose using Brewer's yeast induced hyperpyrexia model[21].

Anti hyperglycemic and antioxidant activity

The stem bark was evaluated for anti hyperglycemic activity using Alloxan induced Hyperglycemia Model. Declined activity of antioxidant enzymes and concentration of non-enzymatic antioxidants were also normalized by drug treatment, thereby reducing the oxidative damage in the tissues of diabetic animals and hence indicating anti-diabetic and antioxidant efficacy of the extract[22].

Antitumor activity

Hydro alcoholic extract of Leaves and bark were evaluated for antitumor activity against Ehrlich ascites carcinoma tumor model. Both the extracts showed significant antitumor activity[23]. Methanolic extract of leaves was evaluated for protective action against induced experimental liver tumors in male Wistar rats. The levels of mitochondrial lipid peroxidation (LPO) and liver weight were found to be decreased by the administration of extract (200 and 400 mg/kg) in dose dependent manner. The extract also increased the levels of mitochondrial enzymatic antioxidants[23].

Respiratory and gastrointestinal activity

Methanolic extract from the stem bark was tested for spasmolytic, bronchodilator, and vasodilator activities. The observations confirmed the bronchodilator and vasodilator activities which were possibly mediated through blockade of Ca^{2+}channels[23].

Anticonvulsant activity

Methanolic extract of stem barks was studied for anticonvulsant activity against maximal electro shock (MES) and Pentylenetetrazole (PTZ) induced convulsions in mice. Methanolic extract of stem

barks showed significant anticonvulsant effect in both models[23].

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