REVIEW ON: PHYTOCHEMICAL AND PHARMACOLOGICAL ACTIVITIES OF PONGAMIA PINNATA (L) PIERRE

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ABSTRACT

The tree is known as pongamia pinnata in science. The name ‘Pongamia’ has derived from the Tamil name ‘Pinnata’ that refers to the pinnate leaves. The tree is member of Leguminosae family. [1] It is a medium size glabrous tree popularly known as Karaj in Hindi, Indian beach in English and Pongam in Tamil. It contains several phytoconstituents such as alkaloids, tannins, steroids, glycosides, demethoxy-kanugin, glabrin, kanugin, karangin, flavonoids and fixed oils. Extract of the plant possess significant anti-diarrhoeal, anti-fungul, anti-plasmodial, anti-ulcerogenic, anti-inflammatory, anti-nociceptive, and anti-hyperglycemic, anti-lipoxidative, anti-hyperammonic, anti-oxidant and analgesic activities. Roots are used for cleaning gums, teeth and ulcers.[2] This analysis examines existing knowledge of common uses, phytochemistry and biological activities, as well as a limitation that requires future study. Medicinal plants plays an important role in both herbal medicines and modern pharmaceuticals. Pongamia pinnata (P.pinnata) has been recognized in different schemes of herbal medication for the treatment of a variety of diseases and ailments in human.[3]

KEYWORDS: Pongamia pinnata (L) Pierre, Phytochemical profile, Pharmacological activities, Traditional uses.

INTRODUCTION

Pongamia pinnata is a medium size tree is indigenous to Indian subcontinent and south-east Asia, and has been successfully introduce to humid tropical regions of the world as well as parts of Australia, New Zealand, China and the USA.[4] Pongamia pinnata (L) Pierre is one of many plants with different medicinal properties where all its components have been used in the treatment and prevention of many forms of ailments in many countries as traditional
medicine.\textsuperscript{[5]} The seed powder of the plant is given as expectorant in the treatment of bronchitis. An infusion of pongamia leaves is used to relieve rheumatism. In the treatment of dyspepsia the Pongamia seed oil is given as stomachic and cholagogue. By the process of trans-esterification the seed oil of pongamia pinnata can be converted to Biodiesel.\textsuperscript{[6]}

Traditionally different parts of P. pinnata such as bark, leaves, seeds, roots, flowers and stem have been utilized in the native medicine system of different civilizations. The flowers of this plant have been found to possess anti-hyperglycemic and anti-lipid peroxidation properties.\textsuperscript{[7]}

**Plant profile**

Pongamia pinnata (L) Pierre:
The name of plant: Pongamia pinnata (L) Pierre.
Common name: karanj, karanji.
English name of the plant: Indian Beach.
Traditional or Ayurveda name: karanj, Pongam, Pongamia pinnata.
Biological source of the plant: It contains dry fruits, leaf and bark of pongamia pinnata (L) Pierre and plant belongs in family ‘Leguminosae’.

**Botanical description**

Pongamia pinnata is a medium sized evergreen or briefly deciduous, glabrous shrub or tree 15-25 m high, with straight or crooked trunk 50-8 cm or more in diameter and broad crown of spreading or drooping branches. Bark grey-brown, smooth or faintly vertically fissured. Branchlets hairless with pale stipule scars. Leaves alternate, imparipinnate with long slender leafstalk, hairless pinkish-red when young, glossy dark green above and dull green with prominent veins beneath when mature.\textsuperscript{[8]}

Taxonomical description:
Kingdom: Plantae.
Division: Millettia.
Class: Dicotyledonae.
Order: Fabales.
Genous: Millettia.
Species: M. Pinnata.

**Geographical location**
The plant Pongamia Pinnata is distributed in tropical and temperate Asia from Indian ocean, island, southeast and northeastern Australia and locally distributed throughout the state of
Maharashtra along banks rivers; very common near the sea coast in tidal beach forest in konkan; along decan rivers.[9]

**Morphology**

The plant pongamia pinnata distributed in tropical and temperate Asia from Indian Ocean, islands, southeast and northeastern Australia.

Leaf: alternate, odd pinnately compound, 2 to 4 inches, evergreen, hairless.

Flowers: Lavender, pink: white, 2-4 together, short-stalked, pea shaped, 15-18 mm long.

Pods: 3-6cm long and 2-3cm wide, smooth, brown, thick-walked, hard, indehiscent.

Fruits: compressed ovoid or elliptical, bean like, 10-15 cm long, dark Braun, oily.

Root: Taproot is thick and long, lateral roots are numerous and well developed.

Bark: thin grey to grayish brown and yellow on the inside, care and pruning all parts of the plant are toxic and will induce nausea and vomiting.[10]

**Phytochemistry**

The pongamia pinnata seed have yielding karangin, pongaplabrone, pongapin, pinnatin, and kanjone, flavones and chalcone drove for instance Galbone, pongone, pongagalone A and B are found in the plant stems and leaves. Pongamia pinnata fruits contain 3 novel pongamosides A-C, furanoflavanoid and glucosides, as well as pongamoside D, a new flavanol glucoside. Spectroscopic experiments were used to determine the structure of these compounds. Furanoflavone glucosides have been discovered for the first time in naturally occurring compounds. The root extract of P.Pinnata contains anticancer compounds such as paclitaxel, fluophenylalanine, vinblastine, vincristine, teniposide, fluoxetine, and etoposide derivative.[11]

**Traditional uses**

Whole part used in snakebite treatment of tumors, piles, skin diseases, wounds and ulcers. Root is used in wound, gastric treatment, gonorrhea, cleaning gums or teeth, ulcers, and is used in vaginal and skin diseases. Leaf is used in rheumatism, gonorrhea, skin diseases, genitalia, fever, piles, scabies, anthelmintic, diarrhea, dyspepsia, flatulence, glycosuria, antiseptic, blood purifier, and wound treatment. Seed/ seed oil is used in keratitis, urinary discharges, piles, ulcer, chronic leprosy, bronchitis, whooping cough, chronic skin disease, wound treatment, chronic fever, Flowers are used in diabetes. Stem/ bark is used in Diabetes, malaria, bleeding piles, beriberi, anthelmintic, haemorrhoids, ophthalmopathy, vaginopathy, skin diseases, genitalia sinus, stomach pain , intestinal disorder, and wound treatment.[12]
Pharmacological activity

1) Anti-diabetic activity
Several authors reported flavonoids, sterols, alkaloids and polyphenols as bioactive antidiabetic principles. The phytochemical screening of P. pinnata revealed the presence of various flavonoids, furoflavones, triterpenoids, carbohydrates, tannins, phytosterols and other polyphenolic compounds. Hence, the antidiabetic activity of the above-mentioned PPAE and PPEE is probably due to the presence of several bioactive antidiabetic principles and their synergistic properties.\[13\]

2) Antiviral activity
Viral inhibition studies with the extract of Pongamia pinnata seeds against HSV-1 and HSV-2 were evaluated in vitro. The most striking observation was the total inhibition of growth of HSV-1 and HSV-2 at concentrations of 1mg/ml and 20mg/ml w/v respectively, whereas even at the highest concentrations the extract was not toxic for Vero cells 29. Acute and Chronic toxicological studies conducted in Swiss albino rats showed the safety of the Pongamia pinnata seed extract.

3) Anti-inflammatory activity
It has been reported that the 70% ethanolic extract of Pongamia pinnata leaves has potent anti-inflammatory activity against different phases (acute, sub- acute and chronic) of inflammation without side effect on gastric mucosa. They also observed significant antipyretic action of the extract against Brewer’s yeastinduced pyrexia.

4) Anti-bacterial activity
It is reported that the leaves of Pongamia pinnata show antibacterial effect. It is clear that the extracts have great potential as antibacterial compounds against enteric pathogens and that they can be used in the treatment of enteric infectious 31. This plant can be used to discover bioactive natural products that may serve as leads for the development of new pharmaceuticals that address hither to unmet therapeutic needs. It is hoped that this study would lead to the establishment of some compounds that used to formulate new and more potent antimicrobial drugs of natural origin.\[2][14\]

5) Antifungal and Antibacterial activity
Evaluation of antifungal and antibacterial activity of different concentration of oil obtained from Pongamia pinnata against Aspergillus niger, A. fumigatus, Staphylococcus aureus and
Pseudomonas aeruginosa was carried out by Wagh et al.\[28\] employing Minimum Inhibitory Concentration (MIC) determination and dry-weight method. Chemical analysis of oil performed by gas chromatography (GC) and gas chromatography/mass spectrometry (GC-MS) showed the presence of fatty acid. They suggested the use of fatty oil of this plant for developing plant-derived antimicrobial drugs.

6) **Antiviral activity**

White Spot Syndrome Virus (WSSV) is an extremely virulent, contagious, causative agent of the White spot syndrome of shrimp and causes high mortality and affects most of the commercially important cultured marine crustacean species globally. Rameshthangam and Ramasamy evaluated the antiviral activity of bis (2-methylheptyl) phthalate isolated from Pongamia pinnata leaves against White Spot Syndrome Virus of Penaeus monodon Fabricius. Oral administration of ethanolic extract and purified compound from the leaves of Pongamia pinnata has increased the survival of WSSV infected Penaeus monodon.

7) **Ulceroprotective activity**

The aqueous extract of Pongamia pinnata root induced a significant decrease in volume of gastric juice, acid output and peptic activity without any effect on mucin activity in acetylsalicylic acid (ASA)-ulcerated rats. Moreover, it decreased the ulcer index significantly. Ulcer protective effect of methanol extract of Pongamia pinnata roots was attributed to the augmentation of mucosal defensive factors like mucin secretion, life span of mucosal cells, mucosal cell glycoproteins, cell proliferation and prevention of lipid peroxidation rather than on the offensive acid-pepsin secretion. A qualitative change in hexose and fructose contents of carbohydrates was also found, however mucin activity remained unchanged.\[15\]

**CONCLUSION**

The review is all about the plant profile, medicinal uses, therapeutic uses, and effect of pongamia pinnata in different pharmacological activities. The pongamia pinnata has been increase the demand in pharmaceutics and in neutraceuticals all over the world because of allopathic drugs has more side effects. Pongamia pinnata is an old ayurvedic medicinal plant it does not have any side effects to the body.

**REFERENCE**


3. *Pongamia pinnata: an updated review on its phytochemistry and pharmacological uses.*


