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GARUGA PINNATA ROXBURGH –AN UPDATE

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ABSTRACT

Garuga pinnata Roxb commonly known as golika, kondavepa or kakad is the deciduous tree belongs to family burseraceae with a unique characteristic of bark peeling off in flakes. Hilly areas and semi evergreen forests are the areas where *G. pinnata* is extremely populated. It grows up to 50 feet or 15 meter in height and it possesses numerous pharmacological properties. The structural elucidation of *G. pinnata* exposed the presence of several triterpenoids, ubiquitous β -sitosterol and 21-hydroxydammar-5, 24-diene-3-one, biphenyl ether and biphenyl types macrocyclic diarylheptanoids. *G. pinnata* is widely used in the treatment of cancer, stomach problems, diabetes mellitus, asthma, obesity, splenomegaly, pulmonary infections, to cure opacities of the conjunctiva and to promote healing of wounds, bone fractures etc. The review is an attempt to make the future scientist conscious of the vital role played by *G. pinnata* in treating various ailments and to discover new compounds which adds tribute to this medicinal plant.

1. INTRODUCTION

Garuga pinnata Roxb. (Burseraceae), a deciduous tree reaching 50 feet in height, with bark peeling off in flakes is inhabited in hilly areas and semi evergreen forests of Bangladesh, India, Malaysia and the Philippines ^[1]. Stem contain amento flavones and the stem juice is usually used as eye drops to treat opacities of the conjunctiva ^[2, 3]. The stem bark of this plant in combination of pepper is used to treat diabetes ^[4].

Stem bark extract gave positive tests for steroids, terpenes, alkaloids, flavonoids and saponins. A euphane triterpene alcohol has been isolated from this plant ^[5]. The leaves of this plant are found to have noticeable amount of phenolic compounds, which may involve in controlling various oxidative and reductive processes. The fruits are stomachic and expectorant; given in diarrhoea. Fruits possess cooling and digestive property. Decoctions of roots are used in pulmonary diseases.

G. pinnata exhibits several medicinal properties and is availed in the treatment of diabetes mellitus ^[6], stomach problems, asthma and to promote healing of bone fractures etc ^[7]. Kathad et al (2010) reported antioxidant activities of *Garuga pinnata* leaves were ethanol extract showed significant inhibition percentage of DPPH (2,2-diphenyl-1-picrylhydrazyl),

hydroxyl radical, nitric oxide and super oxide anion ^[2]. Annie Shirwaikar et al., (2007) also reported significant antidiabetic potentials of stem bark aqueous extract of *G.pinnata* in streptozotocin-nicotinamide induced diabetic rats ^[8]. Prapai Wongsikongman et al., (2002) reported that the methanolic crude extract of *Garuga pinnata* Roxb possessed promising cytotoxic activity against human tumor drug-resistant sublines ^[9].

Botanical Classification of

Garuga pinnata

Kingdom	Plantae
Order	Sapindales
Family	Burseraceae
Genus	<i>Garuga</i>
Species	<i>Pinnata</i>



Golika Tree

Vernacular Names

Assamese	Pama
Bengali	Kapila, Jum
English	Garuga

Gujarati	Kaked
Hindi	Kharpat
Kannada	Aranelli, Kaashthanelli
Malayalam	Kareyam, Kaattanelli
Marathi	Kakad
Nepali	Dabdabe
Sanskrit	Karnikarha
Tamil	Arunelli
Telugu	Konda Vepa

Botanical Description

A tree, with leaves alternate, odd-pinnate, without stipules, bunched on the ends of the branches, with opposite, serrate leaflets. Flowers yellowish-white in panicles, compound, polygamous. Calyx bell-shaped, 5-toothed. Corolla, 5 petals. Stamens 10, free, in 2 series. Ovary inferior, 5-lobuled. Fruit, a globose, greenish-yellow drupe with numerous bony seeds.

Habitat

Everywhere in Luzon, Panay and Balabac.

Distribution

Southern moist mixed deciduous, moist teak bearing and Southern dry mixed deciduous forests.

Soil requirements

Sandy loam soil, medium acidic and high in organic carbon.

2. Pharmacological Properties

Bone Fracture

Suneetha *et al* (2011) in their work on indigenous phytotherapy for bone fracture from Western Ghats, stated the use of *Garuga pinnata* in healing of bone fracture

by plastering crude stem bark paste on the area of bone fracture^[10].

Antioxidant Activity

Leaves, fruit and stem bark of *Garuga pinnata* was collected and evaluated for its antioxidant activity by determining DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging activity, hydroxyl radical activity, nitric oxide scavenging activity, super oxide radical scavenging activity and scavenging of hydroxyl peroxide with different concentrations of methanolic extract (50,100 and 250 µg/ml)^[11]. It was concluded that the high presence of polyphenols in stem bark rather than leaves and fruit accounts for good antioxidant activity which is in good agreement with Shahidi *et al* (1997) were it was said that it is known fact that flavonoids and phenolic compounds are effective hydrogen donors which inhibits the lipid peroxidation and chelating metal ions making them good antioxidants and involve in protecting us from serious diseases such as stroke, heart attack and cancer^[12].

Antidiabetic Activity

The antidiabetic efficacy of *Garuga pinnata* Roxburgh was evaluated by Thupurani *et al* (2013)^[13] were they used methanol and aqueous extract of *Garuga pinnata* stem bark, in streptozotocin (oral administration) induced diabetic rats.

Initially, glucose levels of animals were found to be increased till the 7th day after streptozotocin administration and thereafter, from 12th day, there was a drastic decrease in blood glucose levels of these animals treated with methanol extract at 2000 mg/kg body weight. Their findings, directly indicate that methanol extract of stem bark possess antidiabetic compounds which resulted in reduction of blood glucose level. Reduction in the glucose levels after 7 day onwards may be because of regeneration of β -cells of the pancreas when treated with *Garuga pinnata* stem bark methanolic extract, which were destroyed by streptozotocin.

Antiulcer Activity

The anti-ulcer activity of *Garuga pinnata* Roxb was studied by Chitra *et al* (2013). They used alcoholic extract of *Garuga pinnata* leaves against indomethacin induced albino wistar rats ^[14].

An attempt was further made by Kapil *et al* in 2014 to study the anti-ulcer activity of hydroalcoholic stem bark extract of *Garuga pinnata*. It was used in two doses 200mg/kg and 400mg/kg. They used pylorus ligation model for their studies where cimetidine was used as the standard. Pylorus ligation-induced ulcers are thought to be caused due to increased presence of acid and pepsin in the stomach. Hydroalcoholic stem bark extract of

Garuga pinnata Roxburgh at dose of 400mg/kg tended to decrease the acid and pepsin secretion in the stomach, which indicates the notable antiulcer activity of this plant ^[15].

Anticancer Activity

Methanolic extract of leaf, stem, fruit and stem bark of *Garuga pinnata* was studied for the evaluation of anticancer activity. The methanolic extract of *Garuga pinnata* stem bark have been noticed with significant anticancer activity on MCF-7 human breast cancer cell lines ^[16].

Antibacterial activity

Thupurani *et al* in 2013 ^[16] assayed the antibacterial activity of *Garuga pinnata* against *Staphylococcus aureus* ATCC 96, *Bacillus subtilis* MTCC 441, *Bacillus cereus*, *Klebsiella pneumonia* MTCC 109, *Escherichia coli* ATCC 8739, *Salmonella typhi* ATCC 4420 and *Bacillus cereus* ATCC 9372 were methanolic extracts of leaf, stem bark, fruit and stem was used. Significant zone of inhibitions against various tested organisms was reported. The results were shown as the inhibition of zone diameter. Among, plant extracts tested, stem bark extract reported highest antibacterial activity against various gram positive and gram negative bacterial strains. This may be due to Garuganin-I and II a known diaryl heptanoids isolated from stem bark of this plant which exhibits

structural similarity with rifamycin SV, a typical ansamycin antibiotic suggest an analogous mechanism for antibacterial action.

Anthelmintic Activity

In 2013, a randomized survey of medicinal plants used as natural remedies by the local people of Manikganj district of Bangladesh to treat intestinal worms was made by Eneh *et al.*, They came to know the usage of juice from tip and tea made from leaves of *G. pinnata* for treating helminthes ^[17].

Wound Healing

The wound healing potential of *Garuga pinnata* was first attempted by Janhavi and Ashok in 2013 ^[18]. They used dried alcoholic extract of *G. pinnta* bark at the concentration of 50mg/ml saline and it was assessed on excision and dead space wound models using Swiss albino mice. The experimental animals, treated with the extract, showed 72% healing on 12th day of application as compared to 11% healing of the control. The hydroxyproline content of healed area of the treated and the control mice was estimated to assess the strength of healed wound.

3. CONCLUSION

Garuga pinnata Roxb is a versatile tree with enormous medicinal value. Leaves, barks, stems, fruits etc. have been used for different human ailments.

Pharmacologically reported property includes anti-bacterial, anti- cancer, antioxidant, anti-ulcer, and wound healing activity etc. This review summarizes only some pharmacological activities of *G. pinnata* which can be investigated further to separate active compounds for new herbal medicine.

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