

A Review on *Aglaia elaeagnoidea*

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ABSTRACT

Plants are the essential and integral part in complementary and alternative medicine due to the presence of chemical constituents. *Aglaia*-genus plants have been employed in traditional medical practises. Genus *Aglaia* is represented by more than 100 species belonging to the family Meliaceae. *Aglaia elaeagnoidea* (Juss.) Benth is an evergreen tree found in dense and moist forest in Western Ghats and also in drier parts of India. The common names include chokkala and priyangu^[2]. Similar to other *Aglaia* species, this tree's bark and leaves are utilised by rural people. The leaves and stem bark of *Aglaia elaeagnoidea* plant are employed in the treatment of different ailments such as astringent, anti-diarrhoeal, anti-dysenteric, skin diseases, tumors in Indian medicine of Ayurveda^[7]. There are number of reports about the presence of phytoconstituents in the plant extract which offers the scientific support for the anti-tumor, analgesic, anti-hypertensive and anti-inflammatory properties of plant. The phytochemistry and the pharmacological activities of *Aglaia elaeagnoidea* are covered in this review paper.

Key words: *Aglaia elaeagnoidea*, crude extracts, phytoconstituents

I. INTRODUCTION

The greatest source of naturally occurring chemicals, either directly or indirectly, comes from plants. These substances are mostly phytochemicals that plants produce through primary and secondary metabolic pathways for a variety of uses that benefit both humans and domestic animals. The practise of using plants for therapeutic purposes predates the beginning of written history and is the basis for most of modern medicine. Many commonly used medications come from plants^[11]. Herbs and medicinal plants used in the practice of Ayurveda, ethnic and folklore medicines are rich in phytochemicals effective

against a wide range of ailments^[13]. Worldwide demand for phytochemical isolation is rising subsequently of availability, affordability, nontoxicity and biodegradability. Recent study has concentrated on medicinal plants because of the possible therapeutic activity of phytochemicals.

Plant information

Aglaia elaeagnoidea (A. Juss) Benth., is an evergreen tree. Their geographical distribution ranges from Indo-Malaysia to Pacific Islands. In India they are found in many drier areas of the country, wet forests of the Western, Eastern Ghats, Indian states like Andhra Pradesh, Karnataka, Kerala, Bihar, Andaman and Nicobar Islands. It grows up to 10-15 m tall, with grayish brown bark. Leaves are alternate to sub-opposite, elliptic, or compound with 3-7 leaflets. Bark is lenticellate and greyish brown; the blaze is reddish brown. Flowers are round and yellowish, shortly pedicellate, small, 0.2 cm in diameter^[6]. The fruit is an indehiscent berry. It has a buff tint that, when ripe turns orange. The fruit is acidic in taste and edible. It is cooling and astringent and employed in inflammations and febrile complaints. Seed has two locules, is buff and has one seed per locule. The seeds are said to be useful in painful micturition's^[10, 14].

The taxonomic position of *Aglaia elaeagnoidea*

Botanical Name : *Aglaia elaeagnoidea*
Kingdom : Plantae
Division : Magnoliophyta
Class : Magnoliopsida
Order : Sapindales
Family: Meliaceae
Genus: *Aglaia*
Species : *elaeanoidea*
Popular Name : Priyangu
Parts Used : Stem, Leaf, Bark.

Vernacular Names

English — droopy leaf, priyangu, coastal boodyarra

Hindi — priyangu
Bengali --- priyangu
Tamil — chokkala, chokla
Malayalam — nyalei, punniyava, cheeralam

Telugu — yerraadugu, erranduga, kondandugal
Kannada — gadagayya, kempunola, thottilu,
priyangu.
Tulu--- jagma



Tree



Leaf and stem bark



Fruit

Chemical Constituents

Leaf and bark yield carbohydrate, aminoacids, steroids, anthroquinones, saponins, flavonoids, alkaloids, phenols, quinones, coumarins, catechins, rocaglamide, silvestrol, squalene.

The rural community treats a variety of ailments with the leaves and bark of *Aglaia elaeagnoides* including bleeding and discomfort, dysentery, abdominal pain, fever, and chills while cooling. They are suggested for the therapy of inflammations and problems related to fever. The traditional society claims that fruits are an excellent source of vitamins and uses them as a resource of food and energy. Additionally, this is a resource of fermentation starters that traditional healers employ to produce alcohol fermentation products^[5].

High concentrations of various other phytochemicals and phenolic substances that have potent anti-oxidant properties are contained in *Aglaia elaeagnoides* flower extract. Numerous bisamide alkaloids, triterpenoid lignanes, benzofuran derivatives, and cycloartenol derivatives have been isolated from species of *Aglaia* that have been extensively researched for their insecticidal and anti-cancer effects. One of the key sources of medication is the plant. It is regarded as a treatment for leukoderma, dysentery, skin conditions, leprosy, inflammation and abdominal pain. It is claimed to have a cooling effect and help with physical burning sensations. Additionally, numerous tribe members treat their diabetes with *Aglaia* seeds. The anti-tumor, anti-bacterial, anti-inflammatory, anaesthetic and analgesic characteristics of this plant are used therapeutically^[13].

Various extracts of *Aglaia elaeagnoides* contained alkaloids, saponins, phenol, glycosides,

steroids, flavonoids, amino acids, anthroquinones, catechin, coumarins, quinones and carbohydrates, according to preliminary phytochemical investigation. The potential bioactive components of parts like stem bark and leaf of *Aglaia elaeagnoides* were investigated. Scientific evidence for the plant's anti-tumor, analgesic, anti-hypertensive and anti-inflammatory qualities comes given the existence of those components in the plant extract^[5].

Pharmacognostical studies

Bangajavalli S et al. (2015) evaluate the pharmacognostical features of stem and leaf of this species. Simple measurements were made for macroscopic research such as shape, size, color, smell, margin and apex. The stem and leaf specimens were fixed in FAA and microtome slides were prepared and stained. Photomicrographs of different magnifications were taken with Nikon Labphot 2 microscopic unit. Physicochemical variables such as total ash value, water and acid, soluble and insoluble ash value and moisture content were determined. Fluorescence Analysis of leaf and Bark powder were done. Preliminary phytochemicals analysis of various extracts of *Aglaia elaeagnoides* shown that there was alkaloid, saponins, phenol, glycosides, steroids, flavonoids, amino acids, anthroquinones, catechin, coumarins, quinones and carbohydrates. The concentration of secondary metabolites was strong in ethanol extract of stem than the leaf. The Pharmacognostical and phytochemical assessment of *Aglaia elaeagnoides* leaves and bark provide useful information for verification of identity and authenticity of plant. This study yielded a set of parameters which could serve as important source of information to

ascertain the identity and determination of quality and purity of plant material for future studies.

Bioactive components of *Aglaia elaeagnoidea* (juss.) benth- GC-MS study

Bangajavalli S et al. (2015) investigated bioactive components employing the *Aglaia elaeagnoidea* bark and leaves by GC-MS analysis. The components present in the ethanol extract of *Aglaia elaeagnoidea* leaf and stem bark were identified by GC-MS analysis. The molecular formula of the active principles, their retention times, molecular weight (MV) and concentration (%) in the ethanol extracts of leaf and bark of *Aglaia elaeagnoidea* were found out. Twenty four compounds were found in ethanol extract of leaf and sixteen compounds were detected in ethanol extract of *Aglaia elaeagnoidea* bark. Among the various compounds, caryophyllene and squalene are the major compounds and reported to be antioxidant, anti-tumorous, anti-inflammatory, analgesic, antibacterial, sedative, fungicides, cancer preventive, immunostimulant, chemo preventive and pesticide. Thus the ethanol extract of *Aglaia elaeagnoidea*'s bark and leaf may also be treated as natural source of caryophyllene and squalene, bioactive substance with therapeutic value. Thus it could be concluded that *Aglaia elaeagnoidea* plant is of phyto-pharmaceutical significance.

Bioefficacy and mode of action of rocaglamide from *Aglaia elaeagnoidea*

Koul O et al. (2003) isolated the primary active component of *Aglaia elaeagnoidea* has been discovered as rocaglamide, a highly substituted benzofuran for gram pod borer *Helicoverpa armigera*. Neonatal larvae's growth was significantly slowed when rocaglamide was added to a synthetic meal. In comparison to azadirachtin, these values were favourable. There was a concentration-dependent reduction in growth of larvae and with the increase in concentration, increase in the mortality of the larvae was observed. The centrally mediated effect, this might be brought on by cytotoxicity that was produced at non-specific cellular levels.

Pharmacological activities

Phytochemical screening and their effectiveness as an antioxidant and antimicrobial

G. Manjari et al. (2017) reported *Aglaia*'s phytochemical screening and their impact on antioxidant and antimicrobial activity. Screening of all crude extracts for phytochemical in different solvents of leaf and bark of *Aglaia elaeagnoidea*

showed the occurrence of alkaloids, flavonoids, tannins, steroids, coumarins, quinones, xanthoproteins, terpenoids, carbohydrates, fatty acids, leucoanthocyanins, saponins and emodins. Total phenolic compounds were estimated. Antioxidant activity of bark and leaf bark extract studied by DPPH assay method. With increasing crude extract content, a rise in the percentage of inhibition was seen. Stem bark ethanolic extract and leaf showed maximum scavenging activity followed by aqueous extract and petroleum ether extract. By agar well diffusion method antibacterial activity was done. Inhibition zone that was mild to moderate, reported against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Vibrio vulnificus* and *Candida albicans*. It is evident that when compared to leaf extracts, the antioxidant and antibacterial characteristics of various stem bark crude extracts are more effective.

Pharmacognosy, nutrient content and antioxidant activity

Laxmi Bidari et al. (2017) studied features of pharmacognosy, nutritional value and antioxidant activity of fruit of *Aglaia elaeagnoidea*. The tan-colored, aromatic, acidic fruits under the macro-microscopic observations were found to have a thick pericarp with lignified trichomes, a dense mesocarp packed with sclerides and stone cells and a mucilaginous endosperm. Drug standards are marked by physico-chemical standards and HPTLC, whereas fruits have terpenoids and carbohydrates. Wild edible fruits proved presence of nutritional factors, carbohydrates (57.10%), proteins (52.78%) and combined with fat (0.80%) with significant antioxidant property when analysed through DPPH method using vitamin C as standard. Percentage inhibition of fresh juice of *Aglaia elaeagnoidea* fruit (crude) showed gradual increase in percentage inhibition as the concentration increased. Overall *Aglaia elaeagnoidea* fruit showed moderate percentage of inhibition, thus presence of good amount of antioxidant principle.

Anti-asthmatic effect

Rajagopal P Letal. (2018) assessed the bronchodilating effect of lupeol, substance extracted from the fruit pulp of *Aglaia elaeagnoidea* in an isolated goat's tracheal chain preparation. To record dose response curve, isolated goat tracheal chain was prepared. Histamine's dose response curve in a plane krebs solution and in 800 µg/ml of ethanolic extract of fruit pulp of *Aglaia elaeagnoidea* contained in krebs solution was

recorded. It was observed that ethanolic extract of fruit pulp inhibit contractions produced by histamine in these tissue preparations. Preliminary phytochemical screening was performed by successive solvent extraction technique by preparing petroleum ether extract, benzene extract, chloroform extract, acetone extract, ethanolic extract and aqueous extract. Alcoholic extract of *Aglaia elaeagnoidea*'s fruit pulp was subjected to column chromatography using silica gel as the stationary phase. The components eluted were monitored by thin layer chromatographic studies which confirmed the presence of single compound lupeol. Further confirmation as lupeol was made by co chromatography with standard lupeol by HPTLC technique. This study showed that lupeol present in the fruit pulp of *Aglaia elaeagnoidea* causes the cellularity and eosinophil levels in the broncho-alveolar fluid to significantly decrease.

Hepatoprotective activity

Maniyakumari K et al. (2012) examined the hydroalcoholic stem extract of *Aglaia elaeagnoidea* (A. Juss) Benth has hepatoprotective properties. Oral administration of the hydroalcoholic extract fractions of *Aglaia elaeagnoidea* in hexane, ethyl acetate and methanol at doses of 150, 300, and 600 mg/kg by suspending in sodium CMC to the wistar albino rats with carbon tetra chloride (1ml/kg) induced hepatotoxicity. Silymarin (50mg/kg) was given as reference standard drug. Histopathological investigations of liver tissue treated with CCl_4 and plant extract were conducted after this dose-dependent study. The results showed a considerable reduction in the levels of the serum biochemical markers glutamic oxaloacetic transaminase (SGOT), glutamic pyruvic transaminase (SGPT), alkaline phosphatase (ALKP) and total bilirubin (TBL) after treatment with extract of plant caused by carbon tetrachloride hepatotoxicity. The histopathological findings further demonstrated that liver tissue treated with plant extracts to prevent carbon tetrachloride-induced hepatotoxicity retained its cellular architecture. The findings of this study suggest that the stem of *Aglaia elaeagnoidea*, along with its bioactive phytoconstituents, primarily stigmasterol, sitosterol, daucosterol and unknown polyphenols, may have hepatoprotective properties.

Chemical components of *Aglaia elaeagnoidea* and their cytotoxicity

Ngoc.T.N Ngo et al. (2021) studied chemical compounds of *Aglaia elaeagnoidea* and

their cytotoxicity. Twelve known chemicals and two new rocaglamides, 8b-O-5-oxohexylrocaglaol (1) and elaeagnin (2), were also found in the bark of *Aglaia elaeagnoidea* and the entire tree of *Aglaia odorata*. The main spectroscopic techniques used to identify their structures were 1D and 2D NMR. The identified compounds' in-vitro cytotoxic activity against HepG₂ human liver cancer cells was assessed using the SRB test. Dehydroaglaiastatin (13), 8b-O-5-oxohexylrocaglaol (1), and rocaglaol (5)- three rocaglamide derivatives, all showed substantial effects with IC₅₀ values of 0.69, 4.77, and 7.37 M, respectively.

Anticancer activity

Unang Supratman et al. (2022) isolated terpenoids from the stem barks of ethylacetate extract of *Aglaia elaeagnoidea* and their cytotoxicity towards the cancer cell lines HeLa and DU145. Gradient elution was used to chromatograph the ethyl acetate extract of *Aglaia elaeagnoidea*'s stem bark over a vacuum liquid chromatography (VLC) column packed with silica gel 60. The VLC components underwent a series of silica gel 60 and ODS column chromatography to get isolated compounds. Five terpenoids namely, two eudesmane-type sesquiterpenoids, 5-epi-eudesm-4(15)-ene-1 β ,6 β -diol (1) and 6 α -Hydroxy-eudesm-4(15)-en-1-one (2), as well as three dammarane-type triterpenoids, 20S,24Sepoxy-25-hydroxydammarane-3-one (3), 20S,24Sepoxydammarane-3 α ,25-diol (4), 3 α -epicabraleahydroxy lactone (5) being separated from *Aglaia elaeagnoidea*'s stem bark ethyl acetate extract for the first time. The compound 4 showed the stronger cytotoxic activity than other compounds towards DU145 prostate cancer and HeLa cervical cancer cell lines, indicated that the cytotoxic activity are influenced by the existence of hydroxyl group.

II. CONCLUSION

Throughout human history, medicinal plants possess been located and utilized to treat several ailments. The greatest quantity of natural substances comes from plants, which are utilized directly or indirectly in a number of ways to benefit humans. For a long time, people have utilized the plant *Aglaia elaeagnoidea* as a medicine. Leaf, stem bark, fruit and seed extracts from this plant has previously the focused numerous pharmacological studies and the results support many of its traditional uses. *Aglaia elaeagnoidea* extracts were discovered to include a range of phytochemicals,

including alkaloids and flavonoids. These phytochemicals there have communicated to assists the biological functions of therapeutic herbs which could help to explain the extracts' pharmacological effects like anti-oxidants, anti-microbial anti-asthmatic, anti-cancer and hepatoprotective effect.

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