



Premna Species: A Review

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ABSTRACT: Millions of people all over the world are using herbal medicines from thousands of years, due to their great interest in traditional medicines. They believe that herbal medicines might be effective in the treatment of certain diseases (Calixto, 2000). The genus *Premna* contains 200 species under the family *Verbenaceae* all over the world and out of that approximately 30 species are present in India. The *Premna* genus can be used traditionally in treating various ailments like rheumatism, asthma, dropsy, cough, fever, boils and scrofulous disease's. The different parts of the plant like leaves, stem, stem barks, root, root barks and wood have been used for extraction purpose. The chemical constituents or secondary metabolites found are mainly alkaloids, terpenoids, phenolic compounds, flavanoids and amino acids. The Pharmacological activities like anti-bacterial, anti-oxidant, anti-inflammatory, anti-hyperlipidemic and immuno-modulatory are mainly reported during *in-vitro* and *in-vivo* evaluation.

Keywords: *Premna*; *Verbenaceae*; anti-inflammatory; Diuretics and anti-microbial.

INTRODUCTION: Man and animals depend directly or indirectly on the plants for their existence. Our environment is characterized by richly diversified plant life and the plant diversity is composed of more than 5,00,000 botanical species. The green algae and duckweed on the surface of some ponds, the lichens, fungi, mosses, ferns, conifers and the flowering plants are representatives of plant diversity.

Worldwide, drugs derived from various sources continue to be significant ways for treatment and prevention of diseases. Wild plants have enormous endemic, cultural and aesthetic importance and provide food, medicine, fuel, clothing and shelter to majority of people. Worldwide interest in adopting and studying traditional systems and exploring their potential based on different health care systems are emerging. In this regard one of these heritages is species belonging to the *Premna* genus and family *Verbenaceae*. The *Premna* species can be used in treating various ailments like rheumatism, asthma, dropsy, cough, fever, boils and scrofulous disease. The aim of this review is to highlight the pharmacological investigation so far carried out on the species of *Premna* genus, so that further research could be carried out on these genus plants.

PLANT PROFILE: The *Premna* consists of trees, shrubs and rarely herbs and climbers. This genus be-

longing to the family *Verbenaceae* was established by Linnaeus (1771) based on *P. serratifolia*. The genus now contains about 200 species worldwide which are mainly distributed in tropical and subtropical Asia, Africa, Australia and the Pacific Island (Harley et al., 2004). A preliminary study of the genus in Thailand was first undertaken by Fletcher (1938), enumerating 30 species. Later, Moldenke (1980), The Forest Herbarium (2001) and Govaerts et al., (2008) reported the checklists of *Premna* with 39, 19 and 33 taxa, respectively. About 35 species occur in India.

TAXONOMICAL/SCIENTIFIC CLASSIFICATION:

Domain:	Eukaryota.
Kingdom:	Plante.
Subkingdom:	Tracheobionta.
Phylum:	Tracheophyta
Subphylum:	Euphyllophytina
Infraphylum:	Radiatopses
Class:	Magnoliopsida
Subclass:	Lamiidae
Superorder:	Lamianae
Genus:	<i>Premna</i>
Family:	<i>Verbenaceae</i>

TRADITIONAL USES: The *Premna* genus can be used in treating various ailments like rheumatism, asthma, dropsy, cough, fever, boils and scrofulous diseases, etc. (Table1.).

Table 1: Traditional uses of *Premna* species.

S. No.	Name of the plant	Traditional Uses
1.	<i>Premna latifolia</i>	Diuretic, dropsy, fever, liver complaints, etc.
2.	<i>P. herbacea</i>	Toothache, stomach ailments, asthma and rheumatism, scorpion and snake bite.
3.	<i>P. divaricata</i>	Colds
4.	<i>P. chrysoclada</i>	Purgative, eye infection.
5.	<i>P. mucronata</i>	Boils.
6.	<i>P. obtusifolia</i>	Fevers, stomachic.
7.	<i>P. serratifolia</i>	Vaginal irrigation, headache, beriberi, eye lotion.
8.	<i>P. lispida</i>	Buccal infections.
9.	<i>P. tomentosa</i>	Diuretic, diarrhoea.

CHEMICAL CONSTITUENTS: The essential oil of *Premna latifolia* Roxb. was obtained by hydrodistillation of fresh leaves of the plant having an oil yield of 0.05%, both non-polar and essential oil were analysed by GC and GC-MS. Hexane fraction of the leaves of *P. latifolia* was transesterified and analysed by GC and GC-MS, 40 non-polar components were identified comprising 89.3%. The most abundant fatty acid constituents were hexadecanoic acid (25.04%), 8, 11, 14-docosatrienoic acid (13.62%), octadecanoic acid (6.82%), 9, 12-octadecadienoic acid (4.19%) and 29 components were investigated in the essential oil which comprises 78.1%. The most abundant oil constituents were 1- octen-3-ol (35.69%), terpendiol II (7.19%), δ -guaiene (7.49%) 2-undecanone (4.80%) and α -pinene (3.27%). The different parts of the *Premna* species contains the chemical constituents which shows the activities are given in Table 2.

Table 2: Chemical constituents in *Premna* species.

Plant species	Parts used	Chemical constituents	Activity	References
<i>Premna integrifolia</i>	Leaves	Phytol, α -Humulene, spathulenol, 1-octen-3-ol, eugenol, phenyl ethyl alcohol	Antibacterial	Aliqur Rahman et al., 2011
<i>P. microphylla</i>	Leaves and stem	Flavonoids, proanthocyanidin, phenolic, β -carotene	Antioxidant and Antibacterial	Feng Xu, 2011
<i>P. serratifolia</i>	Leaves and roots	Alkaloids, terpenoids, phenolic, flavanoids and amino acids	Antimicrobial	Singh, 2011
<i>P. barbata</i>	Leaves	Flavonoids, terpenoids, alkaloids and polysaccharides	Antibacterial	Tamta et al., 2011
<i>P. esculenta</i>	Leaves and roots	Phenols, Tannins, terpenoids, flavonoids	Anti-hyperlipidemic	Zobaer et al, 2011
<i>P. integrifolia</i>	Stem and leaves	Alkaloids, premnine, ganarine, ganikarine, Reducingsugars, unsaturated hydrocarbons	Analgesic and antibacterial	Utpal kumar et al., 2011
<i>P. integrifolia</i>	Root bark	Alkaloids, Reducing sugars, unsaturated hydrocarbons	Anti-hyperlipidemic	Patel, 2011
<i>P. serratifolia</i>	Wood	Iridoids, glycosides, alkaloids, phenolic compounds, flavonoids	Anti-arthritis	Rajendran, 2010
<i>P. serratifolia</i>	Stem bark, stem wood	Iridoids, glycosides, alkaloids, phenolic compounds, flavonoids	Cardio protective effect	Rajendran, 2008
<i>P. latifolia</i>	Leaves	Iridoids, glycosides, diterpenes and saponins	Anti-inflammatory	Mahire, 2009
<i>P. sp.</i>	Root, stem and leaves	Volatile oil, Iridoids, glycosides, alkaloids, acteoside and xanthenes	Anti-inflammatory, antipyretic	Thirumalai, 2011

<i>P. integrifolia</i>	Root	Ganikarine, premnazole, flavanoids, sterols, Triterpenes	Immuno-modulatory	Gokani,2007
<i>P. obtusifolia</i>	Leaves	Premnazole, flavanoids, β -sitosterol, premnalinal, flavonesglycoside	Anti-inflammatory	Harsithakumari at al., 2013
<i>P. schimperi</i>	Leaves	Diterpenes and andrographolide	Anti-leishmanial	Solomon et al., 2013
<i>P. oligotricha</i>	Leaves	Diterpenes and andrographolide	Antibacterial	Solomon et al.,2013
<i>P. corymbosa</i>	Leaves	Alkaloids, tannins, cardiacycosides, flavonoids	Anti-hyperlipidemic	Subarmanyam et al.,2010
<i>P. obtusifolia</i>	Root bark	Flavanoids, diterpenes and alkaloids	Anti-hyperlipidemic	Rina Ghosh et al.,2009
<i>P. tomentosa</i>	Leaves	Diterpenes and glycosides	Immuno-modulatory	Devi et al.,2004
<i>P. latifolia</i>	Leaves	Hexadecanoicacid, essential oil(terpendiol, α -pinene)	Anti-feedant	Kumar et al.,2011
<i>P. odorata</i>	Leaves	Diosmetin and acacetin	Antimicrobial and Anti-inflammatory	Lunesa et al.,2011
<i>P. latifolia</i>	Stem bark	Premnalatifolin A (diterpene)	Immuno-modulatory	Suresh et al., 2011
<i>P. tomentosa</i>	Stem bark	Diterpenes	Cytotoxic activity	Hymavathi et al., 2009
<i>P. latifolia</i>	Leaves	Hexadecanoicacid, terpendiol, α -pinene	Anti-feedant	Kumar et al.,2010

PHARMACOLOGICAL ACTIVITIES:

Diuretic Activity: Alcoholic extract of roots of *Premna latifolia* was found to show diuretic activity. The urine output was more in rats treated with 1mg/kg and 2mg/kg body weight and also in dogs treated with 2mg/kg than the control group. The mechanism of action was thought to be direct vasodilator effect (Rema and Vijayamma, 1995). A study on indigenous knowledge of *Premna tomentosa* was done. It was concluded that leaves of this plant has diuretic properties and can be used in dropsy treatment. Also an extract of inner bark was used to arrest diarrhea and the decoction of root can be given in stomachache. It was also used by people for curing rheumatism, liver and spleen disorders and joint pains (Anbazhakan and Babu, 2007).

Anti calculogenic effect: When the effect of *Premna latifolia* and *Imperata arundinacea* on the in vitro oxalate crystal growth was studied, it was found that the anti calculogenic effect at 20-100 mg concentration were equally effective in reducing the size of oxalic crystal growth *invitro* over a period of 30 days.

Chemolysis was assumed to be the mechanism for action drugs (Aravindakshan and Bai et al., 1996).

Antimicrobial Activity: Antimicrobial activities of root nodules of *Premna herbacea* were studied. It was found bharanginmono acetate showed antimicrobial activity. Bharanginmono acetate showed more antimicrobial activity, against gram +ve, gram -ve organisms and fungi, than bharangin. The reason reported was due to presence of acetoxyl group (Murthy et al.,2000). When antimicrobial studies of crude extract and fractions of *Premna serratifolia* root were concluded, finding showed potential antimicrobial properties of extracts (133.33mg/ml) and fractions (33.33mg/ml) of roots against different bacterial organisms and fungus tested. They also found that, their zone of inhibition were comparable with that of standard antibiotics (Rajendran and Basha, 2010).

Anti-pyretic, Anti-nociceptive and Anti-inflammatory Activity: When alcoholic extract of *Premna herbacea* was administered orally to mice. It was found to be safe up to a dose of 8g/kg. It was reported that this plant showed significant anti-pyretic effect, mild anti-nociceptive effects but no anti-

inflammatory activity in acute cases but significantly reduced chronic inflammation (Narayanan et al., 2000).

Cytotoxic Activity: Detailed study on two diterpenes and their cytotoxic activity from *Premna schimperi* and *Premna oligotricha* were done. Their cytotoxic activity against three human and two murine carcinoma cell lines varied between 1.5-35 μ g/ml and was comparable with Azaridine and Chlorambucil (Habtemaniam, 1995).

Cardiac Stimulant Activity: Cardiac stimulant activity was reported for water and ethanol extract of bark and wood of *Premna serratifolia*. The ethanol extract produced significant positive inotropic effects similar to that of Digoxin. A significant decrease in membrane Na⁺K⁺ATPase and Mg²⁺ATPase and significant positive inotropic and chronotropic effects similar to that of Adrenaline. It was concluded that the ethanol extract produced cardiogenic effect and the aqueous extract produced adrenergic effect (Rajendran et al., 2008).

Antiparasitic Activity: When antiparasitic activity of some new caldonian medicinal plants including *Premna serratifolia* were evaluated. It was observed that *Premna serratifolia* was active against *Leishmania donovani* with IC₅₀ values between 0.5-5 μ g/ml (Desrivit et al., 2007).

PAF Receptor Binding Activity: Significant PAF receptor binding activity was reported binding activity was reported for ethanolic extract of *Premna integrifolia* when inhibitory effects of Malaysian medicinal plants were studied (Jantan et al., 1996).

Antitumor Activity: Anti-tumor promoting activity of decoctions and expressed juices from some philippinel medicinal plants including *Premna nauseosa* were evaluated. Significant inhibition of growth of tumours was shown by *Premna nauseosa* (Serrame and Limsylianco, 1995).

Anti-hyperglycemic Activity: When a study on anti-hyperglycemic activity was done on the roots of *Premna corymbosa* was conducted on both normoglycemic and hyperglycemic rats at dose levels 200-400mg/kg, it was found that the extract produced marked reduction in blood glucose concentration at tested dose levels in a dose dependent manner. However in normoglycemic animals the extract at 400mg/kg dose level produced significant reduction of blood glucose at the 8th hour of administration. These results suggest the use of roots of *Premna corymbosa*

for treating diabetes as in folklore remedies (Dash et al., 2005).

Antibacterial Activity: Antibacterial activity of hexane, chloroform, ethyl alcohol and water extracts and water extracts of the stem bark of *Premna tomentosa* was done and it was reported that chloroform extract of the root inhibited the growth of *Enterobacter aerogenes* but there was no activity on the other extracts. The presence of Di-C-glycosyl flavones in the heart wood of plant might be the reason for antibacterial activity. Also all the extracts were active against *Alkaligenes faecalis*, *Bacillus subtilis* and *Escheria coli* (Anbazhakan and Bahu, 2007).

Other uses: A study on folk therapy for eczema, bone fracture, boils, sores and gingivitis in Uttaranchal, found out that *Premna mucronata* were used for the above mentioned diseases (Arya and Agarwal, 2008).

CONCLUSION: The current trend of medicinal system of universe is shifting from synthetic to herbal medicine, so we can say 'Come Back to Nature'. Medicinal plants known as millenaries and are highly esteemed all over the world as a rich source of therapeutic agents for the prevention of diseases and ailments. Herbal drugs are more popular among rural and urban community of Indian indigenous medicinal system (Ayurvedic, Sidhaetc). *Premna latifolia* which is commonly known as Agnimanthais a very little-exploited native plant of India has immense medicinal potential. With the present review we can conclude that *Premna* species have proved to be useful in treating various disorders in humans but still there is need of conducting further phytochemical, pharmacognosical and pharmacological studies on these species which can help in future research work.

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