

A review on pharmacological profiles of ethno-medicinal plant: *Avicennia alba* Blume.

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Abstract: *Avicennia alba* is a common mangrove tree, widely distributed throughout the tropical and subtropical areas of the World. The literature reveals its wide application in traditional system of medicine against different types of conditions such as ulcers, skin diseases, contraception and snake bites etc. A number of bioactive compounds such as Naphthoquinolines and their analogues like avicequinone A,B,C and betulin, betulinic acid, taraxerol, taraxenone and hydrocarbon etc. are present in this plant. The objective of the present review is to give comprehensive information on botanical description, phytochemistry, pharmacological activities and therapeutic uses. The plant possesses potential analgesic, antipyretic, anti-inflammatory, anti-ulcer, hepatoprotective, antidiarrhoeal, estrogenic and anti bacterial activity.
Keywords- *Avicennia alba*, Phytochemistry, Pharmacology.

Introduction:

Plants have provided a number of novel drug compounds. India has about 35000 plants species. According to the World Health Organization (WHO) approximately 80% of the world's population currently use herbal traditional system of medicine for their primary health care.¹ *Avicennia alba* Blume, belonging to the family Avicenniaceae, is known to be a type of mangrove tree, growing in the tidal forests at the mouth of rivers, widely distributed throughout the tropical and subtropical areas of the World. *Avicennia alba* is an evergreen shrub or small tree that can grow up to 30 metres tall but is usually much smaller². It is used in Indian system of medicine for the treatment of several type of conditions such as scabies, rheumatism, paralysis, asthma and snake-bites, skin disease and ulcer.^{3,4}

The plant is rich source of steroids, triterpenes, saponins, flavonoids, alkaloids and tannins⁵. Recently three naphthoquinones and their analogues, named avicequinone-A, avicequinone-B, avicequinone-C and avicenol-A, avicenol-B, avicenol-C respectively, were isolated from stem bark of *Avicennia alba*⁶. We have isolated a new flavonoid, 2-[3'-(3''-(hydroxymethyl) oxiran-2''-yl)-2'-methoxy-4'-(methoxymethyl) phenyl]-4H-chromen-4-one from the aerial parts of *Avicennia alba*.⁷

Botanical description:

Avicennia alba Blume is a common mangrove tree mostly found in the coastal areas. It is indigenous to India, Srilanka, Singapore, Indonesia, Malaysia and Bangladesh. It is also found in Australia, Papua New Guinea and Solomon Islands.

It is a medium to large size mangrove tree usually 15-20 m tall with dark grey bark. The wood is grayish to yellow with fine and even texture. The roots are pencil like pneumatophore which emerges above the ground from long shallow underground roots. The leaves are 8-10 cm long, simple, opposite, shortly petiolate with narrow apex and entire margin. The surface of the leaves is glossy green while the base is white and waxy. They have salt secreting glands. The flowers are yellow, small, regular in shape, bisexual and together form a

cross shaped florescence. The fruit is pale green single seeded capsule flattened allover and have a conical elongated ellipsoid with seedling. The seeds are cotyledons which are erect and solitary.^{8,9}



Aerial parts of Avicennia alba

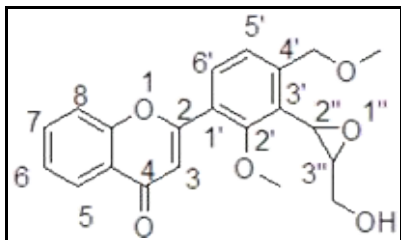


Fruits of Avicennia alba

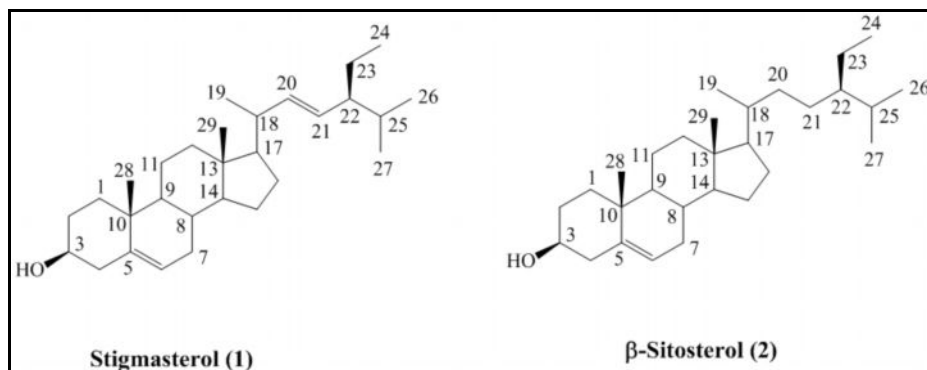
Phytochemistry:

The major phytochemicals of Avicennia alba Blume are alkaloids, flavonoids, glycosides, steroids, tannins and phenol compounds. It also contains Naphthoquinolines along with their analogue named avicequinone A, B, C. The bark contains betulinic acid, betulin, betulinic acid, taraxerol, taraxenone and hydrocarbon.

The aerial parts of plants contain lupeol, lupenone, beta sitosterol and stigmasterol. The aerial parts contain a new flavonoid, 2-[3'-(3''-(hydroxymethyl) oxiran-2''-yl)-2'-methoxy-4'-(methoxymethyl) phenyl]-4H-chromen-4-one.^{5,6,7}



2-[3'-(3''-(hydroxymethyl) oxiran-2''-yl)-2'-methoxy-4'-(methoxymethyl) phenyl]-4H-chromen-4-one



Pharmacological activity:

(1) Analgesic activity

We have investigated the analgesic activity of methanolic extract of aerial parts of *Avicennia alba* in albino rats at two dose levels i.e 100 and 200 mg/kg body weight using two different animal models; the radiant heat method and tail immersion method. The methanolic extract showed a significant increase in basal reaction time in both the models.¹⁰

(2) Antipyretic activity

We have also evaluated the antipyretic activity by brewer's yeast-induced fever models in rats at two dose level 100 and 200 mg/kg body weight. The methanolic extract of aerial parts of *Avicennia alba* showed a significant inhibition of elevated body temperature in albino rats when compared to the corresponding control groups of animals. The inhibition of prostaglandin synthesis may be responsible for antipyretic effect of methanolic extract of *Avicennia alba*.¹⁰

(3) Antiinflammatory activity

Sumithra M *et al.* reported the antiinflammatory activity after evaluating the crude methanolic extract of *Avicennia officinalis* leaves on carragenin, formalin and freunds complete adjuvant rats paw edema model. The extract at a dose of 200 and 400 mg/kg body weight given orally showed significant reduction in the inflammation of rat paw which may be due to betulinic acid present in the leaves.¹¹

(4) Estrogenic activity

We have evaluated the estrogenic activity using the uterine weight and vaginal cornification method. The aerial parts of methanolic extract of *Avicennia alba* at dose level 400mg/kg body weight showed a significant increase in diameter of uterus and thickness of endometrial and vaginal epithelial cornification in immature rats when compared with control. The plant *Avicennia alba* showed the presence of presence of alkaloids, steroids, anthraquinone glycosides, flavonoids, and polyphenolic compounds. Phytoestrogens like β -sitosterol, stigmastanol etc possess estrogenic activity due to their affinity with estrogenic receptors leading to infertility in rats. Therefore, the plant may be useful both as a contraceptive as well as in post menopausal hormonal replacement therapy.¹²

(5) Protective effect

M Aftaf *et al* reported the possible protective effect of *Avicennia alba* leaves extract on ethanol induced gastric mucosal damage in wistar female rats. The ethanol extract at two dose level of 100 mg and 300 mg /kg body weight showed significant hepatoprotective, gastro protective and antiulcerogenic properties which could be due to antioxidant action of *Avicennia alba* leaves extract.¹³

(6) Antidiarrhoeal activity

M A Rahman investigated the effect of methanolic extract of leaves of *Avicennia alba* using model of castor oil induced diarrhea in mice. The mice were administered 0.5 ml of castor oil orally. The methanolic extract of plant at dose level 500mg/kg body weight showed significant antidiarrhoeal effect.¹⁴

(7) Antibacterial activity

Vadlapudi V *et al.* found that methanolic and chloroform extract of plant *Avicennia alba* is active against different types of gram+ve and gram –ve bacteria including *Streptococcus mutans*, *Lactobacillus acidophilus*, *Rhizoctonia solani*, *Pseudomonas marginales*, *Erwinia carotovora*, *Acremonium strictum*.¹⁵

Conclusion:

This article briefly reviews the medicinal, phytochemical, pharmacological and therapeutic uses of the plant *Avicennia alba* Blume. It is chemically rich with its diverse content of active compounds, such as betulinic acid, betulin, betulinic acid and many useful naphthaquinone constituents. It is anticipated that this review will provide some valuable information on forgoing research and development of this fascinating species and its phytochemicals.

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