



# *Anogeissus latifolia*: A Systematic Review with Pharmacological Action

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## **Abstract:**

*Anogeissus latifolia* is a member of the Combretaceae family. It is sometimes referred to as the Ghatti tree or the Axlewood tree. Additionally, it produces ghatti gum, a gum exudate that is widely employed as a polymer in the drug development process. Leaves might be sub-opposite or opposite. The bark is smooth, grey-white in hue, and peels in sporadic, thin scales. The plant has a high amount of terpenoids and flavonoids, which give it a high potential for antioxidant activity. It is also rich in ellagic acid, a phenolic phytoconstituent that is pharmacologically active. Studies have been conducted on the tree's ability to donate hydrogen, generate nitric oxide, scavenge superoxide, and break down hydrogen peroxide. In Ayurveda, this herb is commonly used to cure a wide range of illnesses. It is used medicinally to treat a wide range of conditions, including heart problems, nausea, vomiting, diarrhea, dysentery, colds, snake and scorpion bites, fever, skin conditions, diabetes, anemia, piles, stomach aches, anemia, and urine discharge. This plant has been tested for anti-oxidant, anti-inflammatory, hepatoprotective, anti-ulcer, antibacterial, or wound-healing properties.

**Key Words:** *Anogeissus latifolia*, Combreraceae, Gum exudate, Scavenge, Dysentery,

## **Introduction:**

A tree native to India, Nepal, Myanmar, and Sri Lanka, *Anogeissus latifolia* grows to a height of 20 to 30 meters and has a straight, cylindrical bole that can reach a diameter of 80 to 100 centimeters.<sup>[1]</sup> *A. latifolia* is found in all of India's tropical and subtropical regions, except for the dry regions of North-West India and North-East India (Champion and Seth 1968). According to Luna (2005), it frequently forms a pristine stand in the Shiwalik highlands and sub-Himalayan tract. Known locally as "Bakili," *Anogeissus latifolia*

is a medium- to large-sized deciduous tree that is a member of the Combretaceae family. It features drooping branches and rounded, feathery crowns.<sup>[2]</sup> The smooth bark of the shrub ranges in color from pale grey to dark grey. Greyish-yellow or whitish hairs grow underneath the simple, whole, distichous, opposite, or subopposite leaves. Sessile flowers have dense crowns, petite, compressed fruits with beak-like wings, and ovoid seeds. The tree typically bears fruit and blooms from September through March.<sup>[3]</sup>

This plant has broad ethnobotanical importance. It has been observed that *A. Latifolia* produces a variety of secondary metabolites, including polysaccharides, lectins, peptides, flavonoids, and tannins. Among the numerous phytochemicals discovered are tri-terpenoids such as 3- $\beta$ -hydroxyl -28-acetyl taraxen and  $\beta$ -sitosterol, as well as leucocyanidin and gallotannins<sup>[4]</sup>. It is one of the more beneficial trees because it is used medicinally, provides wood, fuel, and agricultural tools, and its leaves and bark can be used to tan. Traditional medicine has used the plant to treat a wide range of human illnesses and conditions, including fever, skin diseases, diabetes, anemia, piles, fistula, stomach ache, sexual debility, whooping cough, vomiting, cold, diarrhoea, dysentery, bites from snakes and scorpions.<sup>[5]</sup> The herb is already employed in the Ayurvedic medical system.<sup>[4]</sup> The tribal people who live in the Gundlabranhmeswaram Wildlife Sanctuary's jungle administer stem bark paste to scorpion bites.<sup>[6]</sup> The bark of this tree is used by the tribal people of Rajasthan's Udaipur area to treat fever.<sup>[7]</sup> Bark decoction can be used twice a day to treat coughs, while leaf decoction can help with epileptic fits.<sup>[8]</sup>



### Chemistry of *Anogeissus latifolia*

Numerous chemical substances have been found in *Anogeissus latifolia*, as evidenced by recently published research studies. According to Rahman et al., this plant includes a variety of triterpenoids, including 3- $\beta$ -hydroxy-28-acetyltaraxaren and  $\beta$ -sitosterol. Reddy et al. conducted the initial examination of the bark and isolated (+)-leucocyanidin. Subsequent reports included ellagic acids and two novel flavellagic and ellagic acid glycosides. This plant's leaf is abundant in gallotannins, according to Reddy et al. Using an activity-guided isolation approach, Govindarajan et al. recently isolated the molecules responsible for antioxidant action.<sup>[4]</sup>

**Phytochemical constituents of *Anogeissus latifolia***

Alkaloids, carbohydrates, steroids, tannins, amino acids, flavonoids, saponins, and triterpenoids were all present in the ethanol extract of *Anogeissus latifolia* leaves.<sup>[9]</sup>

Test	Ethanol Extract
Alkaloids	+
Carbohydrates	+
Glycosides	-
Steroids	+
Tannins	+
Amino acids	+
Flavonoids	+
Saponins	+
Triterpenoids	+
Gums & mucilage	-

**Pharmacological Application**

The bark and leaves of *AL* have been used for many years to treat a variety of ailments; however, there isn't much evidence in the literature or study to support the plant's legitimacy or establish it as a powerful herbal remedy. This review aims to compile all the pharmacological activity data necessary for the plant's eventual recognition as a powerful therapeutic herb.

**Antioxidant and Hepatoprotective activity**

The antioxidant capacity of *AL* plant extracts was investigated by Govindarajan et al., who concluded that the potential was good to moderate. Pradeep et al investigated the hydro-alcoholic extract of *AL*'s hepatoprotective properties and assessed both its in vivo and in vitro efficacy. Its antioxidant potential is supported by the presence of polyphenols and flavonoids.<sup>[10]</sup> The medication also has gallic acid in it. The significant antioxidant activity of the extract, which leads to its hepatoprotective potential, is justified by the high concentration of gallic acid, rutin, and quercetin in it. Due to their ability to quench free radicals and lessen oxidative DNA damage and lipid peroxidation, quercetin and rutin are suggested to be promising therapeutic agents.<sup>[11]</sup>

### **Antiulcer and antimicrobial activity**

The possible use of *AL* bark as an antiulcer medication has been investigated. Possible mechanisms for the potential gastroprotective action of the hydroalcoholic extract of *AL* include lower levels of LPO and SOD and concurrent increases in catalase activity.<sup>[12]</sup> Owing to the presence of gallic acid, ellagic acid, and its derivative in good quantities, leaf extracts, and volatile oil both exhibited moderate antibacterial and antifungal activity.

### **Heparin-mimicking arabinogalactan sulfates and anti-herpes simplex virus activity**

The outcomes demonstrated that, as previously reported for plant extracts and molecules isolated therefrom, the anti-HSV activity of arabinogalactan sulfates derived from *A. latifolia* gum was exercised directly, either by interfering with virion envelope structures or by hiding viral structures that are essential for entry or adsorption into host cells. The current study's findings indicate that the chemical sulfation reaction of initially inactive precursors can be used to optimize arabinogalactan sulfates therapeutically. Therefore, our work represents a practical method for generating libraries of chemically modified antiviral compounds by beginning with several naturally occurring non-sulfated precursors.<sup>[13]</sup>

### **Anthelmintic activity**

The anthelmintic activity of many bark and leaf extracts of *AL* has been assessed using an earthworm model. There is moderate to strong anthelmintic activity in all of the extracts. The bark extract in chloroform and the leaf extract in pet ether both exhibited strong anthelmintic activity.<sup>[14]</sup>

### **Gum exudates**

A significant amount of gum known as Ghatti gum is produced by the *AL* plant. The colour of the gum ranges from grey to reddish-grey. The primary components of this gum are calcium salts of high molecular weight polysaccharides, which hydrolyse to produce glucuronic acid, galactose, mannose, xylose, and arabinose. High viscosity, which is only dependent on the medium's pH, was observed in the physicochemical analysis of this gum.<sup>[15]</sup> Kaur et al. discovered that the molecular weight of gum is roughly  $8.94 \times 10^7$  g/mol after studying its rheological and structural characteristics. Time-dependent, pseudoplastic shear thickening behaviour is observed in the gummy solution at low concentrations.<sup>[16]</sup> Ghatti gum's excellent gelling qualities have led to substantial research on it as a sustained-release polymer. Recently, Parvathi et al. investigated this gum's hypolipidemic properties.<sup>[17]</sup>

### **Lipid-lowering and Antioxidant properties**

The antioxidant status was returned to normal in the hyperlipidemic rats treated with the Methanolic extract of *Anogeissus latifolia*, suggesting that both extracts can lower lipid peroxidation and raise antioxidant levels. The outcomes unequivocally showed that *Anogeissus latifolia* methanol extract (200 mg/kg) had a stronger lipid-lowering effect than (100 mg/kg). Because of this, *Anogeissus latifolia* leaves may help lower atherosclerosis, which in turn may lower the risks of cardiovascular disease linked to hyperlipidemia.<sup>[18]</sup>

### **Hypoglycemic and Hypolipidemic activity**

The results showing that *A. latifolia* bark extract in petroleum ether and chloroform does not exhibit hypoglycemia or hypolipidemic effects in diabetic rats were validated by Subramaniam Ramachandran et al. In type 1 diabetic rats, methanol extract of *A. latifolia* bark was administered over an extended period of 28 days, and it significantly reduced blood sugar and cholesterol levels.<sup>[19]</sup>

### **Wound healing activity**

Govidarajan et al.'s study on the ability of *AL* extracts to heal wounds showed a reduction in the epithelization period and a measurable decrease in the scar area, which supports the use of *A. latifolia* in Indian traditional medicine systems for a variety of skin conditions, including boils, itching, and sores.<sup>[20]</sup>

### **Catalytic, peroxidase, PCR enhancing and antioxidant activities**

Under harsh circumstances, Aruna Jyothi Kora showed how very stable nanoparticles can function as a peroxidase mimic and outcompete HRP. Additionally, they have strong antioxidant activity as measured by increased PCR activity and DPPH scavenging. Therefore, the current study enumerates the many gum-reduced, extremely stable biogenic Pt NP.<sup>[21]</sup>

### **Detection of Heavy Metal Contents**

Upon investigation with an inductively coupled plasma atomic spectrometer, the root revealed the absence of heavy metals. Also ascertained for the root sample were its ash values, extractive values, moisture content, total solid content, and crude fiber content.<sup>[22]</sup>

### **Gum tapping using Ethephon**

The current study presents an enhanced tapping technique that makes use of ethephon. The structure of the plant-induced gum-producing tissue system and the ideal tapping season are explained. A benefit of the ethephon application is gummosis. When plants were fed with 1600 mg of the active ingredient in ethephon during the leafless months of April and May, the plants' gum output increased by 466 times. This astounding increase in production is risk-free, doesn't require any specialized equipment, and the tribal people may easily learn how to tap. "Schizo-lysigenous formation of gum cavities in the axial parenchyma of sapwood" is the result of applying etherphon. The sticky substance clogs several secondary xylem channels in conjunction with the creation of cavities.<sup>[23]</sup>

### **Medicinal uses:**

The bark and leaves are utilized for tanning, and the timber is significant. Bark can be used to treat piles, urine discharges, and anemia. Astringent, hemostatic, constipating, depurative, and helpful in vitiated vata and kapha situations is the stem bark. The stem bark is said to help with skin conditions, snakebite, colic, coughing, diarrhea, dysuria, and liver problems. Gum is typically eaten after delivery and is used as a

tonic. The Satpura Hills para tribes, according to Jagtap et al., utilize gum in the morning to aid in lactation along with a cup of water or milk. Leaf juice treats purulent ear discharges; fruit is astringent to the bowels and helps with biliousness and Kapha.<sup>[24]</sup>

### **Conclusion:**

The systematic study of *Anogeissus latifolia* concludes by highlighting the plant's potential medicinal benefits and revealing a wide spectrum of pharmacological effects. The plant shows promise in terms of antibacterial activity, antioxidant and anti-inflammatory qualities, and all three. To completely understand its methods of action and determine its effectiveness in particular medical applications, more research is necessary. The basis for further investigation and application of *Anogeissus latifolia* in the fields of medicine and pharmacology is laid by this review.

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