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A Medicinal Profile Review on Semecarpus Anacardium

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ABSTRACT :

The marking nut, or Bhilawa, scientifically known as Semecarpus Anacardium, is a plant that holds significant medicinal value and is widely utilized in traditional healing systems such as Ayurveda, Siddha, and Unani. Extracts from the fruit and nut have been found to possess antiatherogenic, anti-inflammatory, antioxidant, antimicrobial, anti-reproductive, CNS stimulant, hypoglycemic, anticarcinogenic, and hair growth promoting activities. The nuts of this plant are rich in various biologically active substances including bioflavonoids, phenolic compounds, bhilawanols, minerals, vitamins, and amino acids, all of which exhibit diverse medicinal properties. Extracts from the fruit and nut have been found to possess antiatherogenic, anti-inflammatory, antioxidant, antimicrobial, anti-reproductive, CNS stimulant, hypoglycemic, anticarcinogenic, and hair growth promoting activities.

Keywords: Anti-inflammatory, Semecarpus anacardium, Hypoglycemic, Bioflavonoids.

1. Introduction :

Herbal medicines, particularly those originating from India, are gaining global recognition. In Ayurveda, plant-based materials, whether raw or in the form of refined extracts and mixtures, form the basis of nearly all medicinal preparations. Despite advancements in modern medicine, there are still diseases that remain incurable. Alternative medicines have been successful in treating many such diseases that are resistant to Western treatment methods. Traditional Indian medicine, with its centuries-old evolution, continues to intrigue practitioners and researchers due to its depth of analytical research and practical application. This form of medicine promotes health as the perfect balance of physical, psychological, social, and spiritual aspects of a human being. Its fundamental principles effectively eliminate harmful side effects without compromising the beneficial medicinal properties(1). The phytocompounds in Semecarpus anacardium Linn., including Bioflavonoids, Phenols, and Bhilawanols, are well-known for their medicinal properties and can treat a variety of ailments, including psychological disorders. Semecarpus anacardium Linn., belonging to the Anacardiaceae family, is found in the sub-Himalayan region, tropical and central parts of India. The nut, commonly referred to as the ‘marking nut’ or ‘Ballataka’ or ‘Bhilwa’, is highly valued and used in indigenous medicine systems. However, plants from the Anacardiaceae family can potentially cause allergic reactions, such as dermatitis.(2,3)

2. Geographical Availability :

Semecarpus anacardium is distributed across various parts of the world, from the outer Himalayas to the Coromandel Coast of Africa, East Asia to the Indian subcontinent, the western peninsula, the Indo-Malaysian region, North Africa, and countries like China, Nepal, India, and Northern Australia. In India, it is found in warmer regions up to an altitude of 3500 ft, in areas such as Maharashtra, Karnataka, Konkan, Bihar, West Bengal, Orissa, the Kanara forest of Tamil Nadu, Madhya Pradesh, etc. Semecarpus anacardium plants naturally thrive in tropical regions with dry climates(4)

3. Taxonomical Classification :

- Kingdom: Plantae
- Subkingdom: Tracheobionta
- Super division :Spermatophyta
- Division: Magnoliophyta
- Class: Magnoliopsida
- Subclass: Rosidae
- Order: Sapindales
- Family: Anacardiaceae
- Genus: Semecarpus
- Species: Anacardium (5)

4. Botantical Description:

Semecarpus anacardium Linn., also known as Bhela, Bhelatuki (in Hindi and Bengali), Balia (in Oriya), and marking nut tree or Oriental cashew (in English), is a medium-sized deciduous tree that can reach a height of 12–15 m and a circumference of 1.25 m. The bark is coarse and has a dark brown hue. The leaves, which measure 18–60 × 10–30 cm, are obovate–oblong in shape, rounded at the top, and have a leathery texture. They are glabrous on the upper surface and more or less pubescent beneath, with a color that ranges from ashy gray to buff. The leaf base is rounded, cordate or cuneate, sometimes shortly auricled; there are 12–25 pairs of main nerves making a wide angle with the coasts; the petioles are 1.2–3.8 cm long. The flowers are greenish white, subsessile, fascicled in pubscent panicles, with short pedicles and lanceolate bracts, pilose, with calyse segments about 1 mm long. Petals are 4–5 mm long by 2 mm broad, ovate, and acute. The ovary in male flowers is rudimentary and hairy; in female flowers it is subglobose, densely pilose, and crowned with three styles.(4,5).Drupes are 2.5 cm long, obliquely ovoid or oblong, smooth and shining, and black when ripe; they are seated on a fleshy receptacle about 2 cm long, which is smooth and yellow when ripe . The fruit has an acrid scent, and is hot and sweetish. Its active principles include anacardic acid, cardol, catechol, anacardoside, fixed oil, semecarpol, bhilawanol, biflavonoids, biflavones, etc(6)

5. Synonyms:

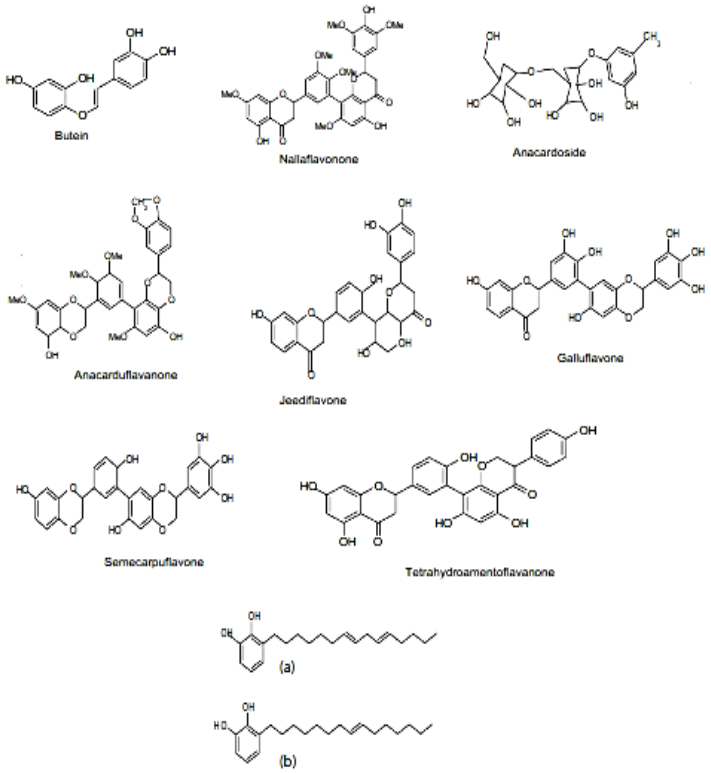
- Hindi : Bhilwa, Billar, Bhelwa, Bhilawa
- Sanskrit : Bhallataka, Antahsattva, Arusharah, Aruskara, Arzohita, Bhallata, Viravrksa,
- Vishasya, Bhallatakah.
- English : Marking Nut Tree, Marsh Nut, Oriental Cashew Nut
- Malayalam : Alakkucheru, Cheru.(7)

6. Uses in Ayurvedic medicine

Semecarpus anacardium is utilized in Ayurvedic medicine for enhancing sexual potency, boosting sperm count, treating digestive system-related diseases, balancing phlegm (Sanskrit: kapha doṣa), and inducing abortion. In the Middle Ages, the plant was believed to aid in memory retention (7)

Phytochemistry

Phytoconstituents	Name
Glycoside	Anacardoside
Alkaloid	Bhilawanol/urushiol
	Urshenol
Phenolic compounds	1,2-dihydroxy-3 (penta decadienyl-8, 11) benzene
	1,2-dihydroxy-3 (penta decadienyl-8′, 11′) benzene
	Bhilavanol A (monoenepentadecyl catechol I)
	Bhilavanol B (dienepentadecyl catechol II)
Biflavonoids	Biflavones A, C, A1, A2
	Tetrahydrorobustaflavone
	Tetrahydromentoflavone
	Jeediflavanone
	Semicarpuflavonone
	Galluflavone
	Nallaflavanone
	Semicarpetin



7. Pharmacological activitiy

Analgesic activity	The analgesic activities of different extracts of salicylic acid compared to acetyl salicylic acid. The methanol extract, given at 50 mg/kg, showed strong pain relief. It worked better than the petroleum ether and chloroform extracts.(10)
Hypoglycemic Effect	The impact of a dried SA nut extract, prepared with ethanol, on blood sugar regulation in rats. The experiment included two groups: one with diabetes induced by streptozotocin and the other comprising healthy rats. When the healthy group received a dose of 100 mg/kg of the SA nut extract, their blood sugar levels decreased, showcasing the extract's potential for lowering glucose. Interestingly, this effect wasn't observed in the diabetic group of rats, suggesting that the extracts ability to combat high blood sugar might be limited.(11,12)
Hepatoprotective Effect	SA has been studied for its potential to shield the body from the harmful effects of lead acetate. This protective quality may be due to the plant's rich array of phytochemicals, including flavonoids, alkaloids, resins, tannins, carbohydrates, and proteins.These compounds are believed to play a key role in the plant's ability to safeguard liver health.(13)
Anti-Cancer Activity	Researchers have found that an extract from SA nuts can slow down the growth of a certain type of breast cancer cells known as T47D. They discovered that the extract causes these cancer cells to undergo a process that leads to their death, which includes the

	activation of specific proteins and the breaking apart of DNA. SA nut extract has shown promising results in inhibiting the growth of the T47D human breast cancer cell line. Detailed molecular studies have indicated that the extract leads to a decrease in Bcl proteins and triggers an increase in several key markers of cell death, including PARP cleavage, Bax, cytochrome c, caspases activity, and DNA fragmentation. In experiments with leukemic mice, the SA nut milk extract helped to normalize energy metabolism, comparable to the effects of Imatinib mesylate, a standard treatment. Moreover, the administration of SA extract led to the elimination of leukemic cells from the bone marrow and corrected the oxidative damage and imbalance in antioxidant levels caused by the disease. Similar therapeutic effects were observed in rats treated with the carcinogen dimethylbenzanthracene (DMBA). Furthermore, when mice were given 500 and 250 mg/kg doses of SA intraperitoneally, there was a significant reduction in genetic aberrations, particularly with a 12-hour pretreatment. This suggests that the flavonoids present in SA are effective antioxidants, which not only help in reducing chromosome abnormalities but also offer both healing and protective benefits.(15-20)
Neuroprotective Activity	The benefits of SA nuts, extracted with milk, primarily for their nootropic and locomotor effects on the central nervous system (CNS) the neurotransmitter acetyl choline (ACh) is lost along with the loss of cholinergic cells, especially in the basal forebrain. By inhibiting ACh esterase, the SA effectively extends the half-life of acetylcholine. SA helps with memory improvement and cognitive decline treatment.(21,22)
Anti-Inflammatory Activity	Using a carrageenan-induced rat hind paw edema model, the anti-inflammatory properties of an ethanolic extract of the fruits of the SA plant in albino rats. A dose-dependent anti-inflammatory effect was demonstrated by the ethanolic extract of SA fruit. Ramprasath's research revealed that SA considerably reduced the paw edema and cotton particle granuloma caused by carrageenan The fruit extracts (methanolic, ethanolic, chloroform, ethyl acetate, and petroleum ether) are used in albino rats' paw oedema caused by carrageenan to investigate the anti-inflammatory properties of the extracts. Aspirin-like anti-inflammatory efficacy was demonstrated by the extract.Thus the generation of proinflammatory cytokines can be inhibited by SA extract. The anti-inflammatory properties of crude ethanolic extract of SA nuts were investigated in vitro utilizing mononuclear cells from synovial fluid and peripheral blood of healthy individuals as well as patients with rheumatoid arthritis (RA). The

	production of the proinflammatory cytokines IL-1beta and IL-12p40, both spontaneously and in response to LPS, was decreased by SA extract, but TNF-alpha and IL-6 production, both at the protein and mRNA levels, were unaffected. Moreover, the LPS-induced nuclear translocation of transcription factors was inhibited by the crude extract.(23-30)
Antioxidant Activity	The SA stem bark's ethyl acetate extract's antioxidant capacity. In comparison to the other extracts (hexane, chloroform, and methanol), ethyl acetate extract exhibited the most antioxidant activity since it contained the highest total phenolic content (68.67% assessed as pyrocatechol equivalent). When the SA stem bark's ethyl acetate extract was separated, a crystalline crystal that was bright yellow in color and recognized as butein was produced. This substance demonstrated antioxidant properties.(31-33)
Antimicrobial Activity	An alcoholic extract of dry nuts from South Africa exhibits antifungal action against Aspergillus fumigatus and Candida albicans at a concentration of 400 mg/ml, owing to the presence of flavonoids. Growth suppression, cell size reduction, and decreased sporulation were seen in both fungi. Nair discovered that two gram positive strains (Staphylococcus aureus and Corynebacterium diphtheriae) and three gram negative strains (Escherichia coli, Salmonella typhi, and Proteus vulgaris) were susceptible to bacterial growth when the alcoholic extract of dry nuts from SA (Bhallatak) was applied in vitro. According to studies, the alcoholic extracts of the plant's leaves, twigs, and green fruit also have antibacterial qualities. In the mouse skin irritant assay, no dermatoxic impact (irritant property) was seen.(34-37)
Anti-Spermatogenic Effect	The spermicidal action in the aqueous extract of the aerial portion of SA. When albino rats are given an ethanolic extract of SA fruit, spermatogenic arrest occurs. There was a noticeable decline in sperm motility and density. There was also a noticeable decrease in the quantity of primary, secondary, and spermatid spermatocytes after the fruit extract feeding. These findings unequivocally demonstrate SA70's anti-spermatogenic properties. Male albino rats fed SA extract had a decrease in spermatogenic cells and spermatozoa, indicating an anti-spermatogenic action. (38-40)
Antiatherogenic Effect	The primary factor contributing to the development of atherosclerosis is an imbalance between prooxidants and antioxidants. Antioxidant therapy is helpful in preventing such a disease. SA exhibits antioxidant properties. At low concentrations, it has the ability to scavenge hydroxyl and super oxide radicals. Peroxidation of lipids in low-density lipoproteins is the first step in the atherogenesis process, and this was observed in SA.(41)
Hypolipidemic and Hypocholesterolemic Activity	In rats fed an atherogenic diet, Tripathi found that SA nut extract oil fraction at a dose of 1 mg/100g body weight dramatically decreased serum cholesterol levels and improved HDL cholesterol levels.

Memory Enhancing Effect	SA has a positive effect on the brain's memory functions by enhancing cholinergic activity, which is crucial for memory and learning. Our research indicates that the process of 'shodhana', a traditional method of purifying the nuts, can influence the memory-boosting effects of SA. Specifically, the methanolic extract of the SA nut, which is known for its nootropic (cognitive-enhancing) properties, likely works by preventing the breakdown of important memory-related chemicals in the brain. However, it seems that the 'shodhana' process might actually decrease the nut's ability to enhance cognitive functions.
Cardioprotective Effect	The cardioprotective efficacy of S. anacardium nut hydroxyalcoholic extract (SANE) against rats' myocardial injury induced by isoproterenol (ISO). When comparing the serum and heart tissue of rats given with low and high doses of SANE to the ISO control, the CK-MB activity were lower in the former and higher in the latter. Both low and high dosages of SANE dramatically decreased the LDH activity in serum, however both levels had no effect on heart tissue when compared to the ISO control. Thus, it can be said that SA has the ability to lessen the cardiac harm that isoproterenol causes in rats.

8. Conclusion

Semecarpus Anacardium, commonly known as marking nut or Bhilawa, exhibits a wide range of pharmacological activities due to its rich composition of bioactive compounds such as biflavonoids, phenolic compounds, and bhilawanols. The plant's extracts have demonstrated significant medicinal properties including anti-inflammatory, antioxidant, antimicrobial, anti-reproductive, CNS stimulant, hypoglycemic, anticarcinogenic, and hair growth promoting effects. This review is focused on exploring the plant's morphological, phytochemical and pharmacological activities, making it a promising candidate for the promotion of alternative medicine. This extensive medicinal potential of Semecarpus Anacardium highlights its value as a therapeutic agent in various traditional healing systems such as Ayurveda, Siddha, and Unani, with potential applications for the treatment of diverse health conditions.

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