

Review on *Semecarpus Anacardium* Linn

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Abstract: *Since ancient times, Semecarpus anacardium Linn. (Family: Anacardiaceae), also known as "Ballataka" or "Bhilwa," has been utilized in numerous traditional systems of medicine for a variety of diseases. The biologically active substances found in its nuts, including biflavonoids, phenolic compounds, bhilawanols, minerals, vitamins, and amino acids, have a variety of therapeutic effects. The fruit and nut extract has a wide range of properties, including those that are antiatherogenic, anti-inflammatory, antioxidant, antimicrobial, anti-reproductive, CNS stimulant, hypoglycemic, anticarcinogenic, and hair growth promoter. The article discusses the plant's numerous operations in detail.*

Keywords: *Semecarpus Anacardium (SA), phyto-components, Bhallataka, toxicity.*

I. INTRODUCTION

Indian herbal treatment is becoming more and more well-known throughout the world. Almost all therapeutic remedies used in Ayurveda are made from plants, either in their most basic form as raw plant materials or in their refined form as crude extracts, mixes, etc. [1] In some parts of the world, different types of traditional medicines are referred to as Complementary and Alternative Medicine (CAM). Any treatment used in conjunction (complementary) or in substitute of (alternative) standard medical care is referred to as complementary and alternative medicine (CAM). In alternative medicine, medicinal plant formulations are frequently used, especially for diseases that cannot be effectively treated by modern therapies. [2]

Semecarpus anacardium Linn., member of the *Anacardiaceae* family, is found in sub-Himalayan, tropical, and central India. The nut is also referred to as "marking nut" and "Ballataka" or "Bhilwa" in local dialects. In the traditional systems of medicine, it is given considerable priority and relevance. [3] & [4]

Semecarpus anacardium Linn., is a widely recognized plant in Ayurvedic and Siddha medicine systems due to its medicinal properties. Chemical and phytochemical examinations of the *Semecarpus anacardium* Linn. nut have indicated the presence of biflavonoids, phenolic compounds, bhilawanols, minerals, vitamins, and amino acids. Extracts derived from this nut have shown effectiveness against various ailments such as arthritis, tumors, and infections. The understanding of the nut's pharmacological action can be significantly advanced by isolating its active principle and studying the relationship between its structure and function.

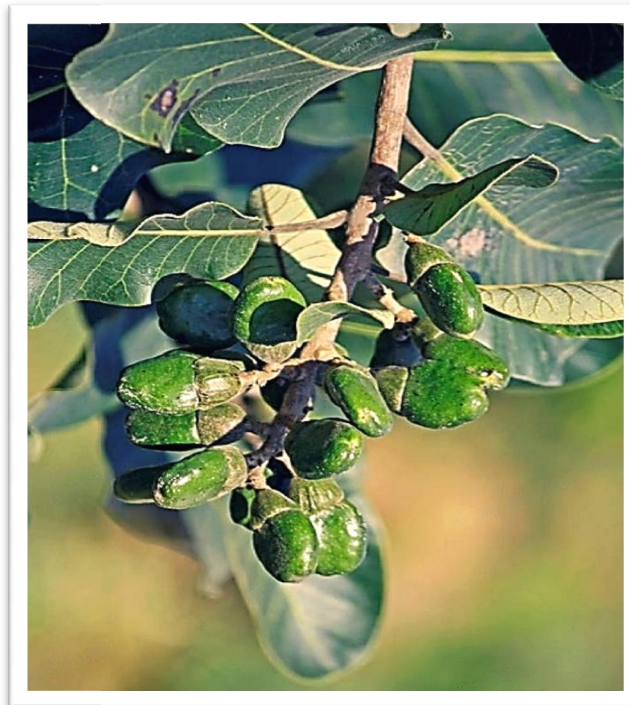
Taxonomical Classification

Kingdom:	<i>Plantae</i>
Subkingdom:	<i>Tracheobionta</i>
Super division:	<i>Spermatophyta</i>
Division:	<i>Magnoliophyta</i>
Class:	<i>Magnoliopsida</i>
Subclass:	<i>Rosidae</i>
Order:	<i>Sapindales</i>
Family:	<i>Anacardiaceae</i>
Genus:	<i>Semecarpus</i>
Species:	<i>Anacardium</i>

Botanical Description

This moderate-sized deciduous tree is native to the outer Himalayas and the warmer regions of India, growing at altitudes of up to 3500 ft. It is abundant in regions such as Assam, Bihar, Bengal, Orissa, Chittagong, central India, the western peninsula of the East Archipelago, and Northern Australia.

The tree is of medium to large size, reaching heights between 15 to 25 meters. It features grey bark that peels off in small, irregular flakes. Its leaves are simple, arranged alternately, and shaped like an obviate-oblong, measuring 30 to 60 cm in length and 12 to 30 cm in width. The leaves have rounded tips, are leathery and smooth on the upper surface, and somewhat hairy on the underside. The tree produces greenish-white flowers arranged in panicles, which bloom alongside new leaves during May and June. It is easily identifiable by its large leaves and the red resinous substance it exudes, which turns black upon exposure to air. The nut, measuring about 2.5 cm in length, is ovoid (egg shaped) and has a smooth, shiny black surface.



This tree is commonly found in dry regions rather than damp areas. Its fruits, which ripen from December to March, are 2–3 cm wide. The tree does not have a specific soil preference. It moderately tolerates shade and produces obliquely ovoid or oblong drupes, measuring 2.5 to 3.8 cm in length. These drupes are compressed and become shiny black when ripe. They are seated on an orange-colored receptacle formed by the disk, at the base of the calyx and the tip of the peduncle. The bark of the tree is grey and releases an irritant secretion when cut.



Synonyms

Common names in different languages:

- Marathi: Bibba, Bhillava
- English: Indian Marking Nut Tree, Marsh Nut, Oriental Cashew Nut
- Hindi: Bhela (Bhel), Bhelwa, Bhilawa (Bhilv), Bhilwa
- Sanskrit: Antahsattva, Arusharah, Aruskara (Arukara), Arzohita, Balla'ta (Bhallata, Ballata), Bhallataka (Bhalltaka), Bhallatakah, Viravrksa, Visasya
- Tamil: Erimugi (Erimuki)
- Telugu: Nallajeedi
- Gujarati: Bhilamu
- Russian: SemekarpusAnakardii.

Phytochemistry

S. anacardium Linn. contains various phyto-components, including alkaloids, phenolic compounds, biflavonoids, sterols, and glycosides. Specifically, an alkaloid called Bhilawanol has been extracted from both the oil and seeds of the plant. In fruits, Bhilawanol has been identified as a mixture of cis and trans isomers of ursuhenol. The oil extracted from the nuts contains Bhilavanol, while the leaves contain amentoflavone as the sole biflavonoid. Among the phenolic compounds, there are bhilavanol A (monoeneptadecyl catechol I) and bhilavanol B (dienepentadecyl catechol II). Additionally, the nuts also contain several biflavonoids, including biflavones A, C, A1, A2; tetrahydrorobustaflavone, tetrahydroamentoflavone, jeediflavone, jeediflavanone, semecarpufflavone, gallufflavanone, amentoflavanone, nallaflavanone, semicarpetin, anacardufflavanone, o-trimethyl bioflavanone A1, o-trimethyl bioflavanone A2, o-tetramethyl bioflavanone A1, o-hexamethyl bichalcone A, o-dimethyl biflavanone B, o-heptamethyl bichalcone B1, o-hexamethyl bichalcone B2, o-tetramethyl biflavanone C, and so on.

Figure 2 displays the chemical structures of several constituents found in the plant. In Table 1, the nutritional information including proximate principles, minerals, and vitamin contents of *S. anacardium* is provided.

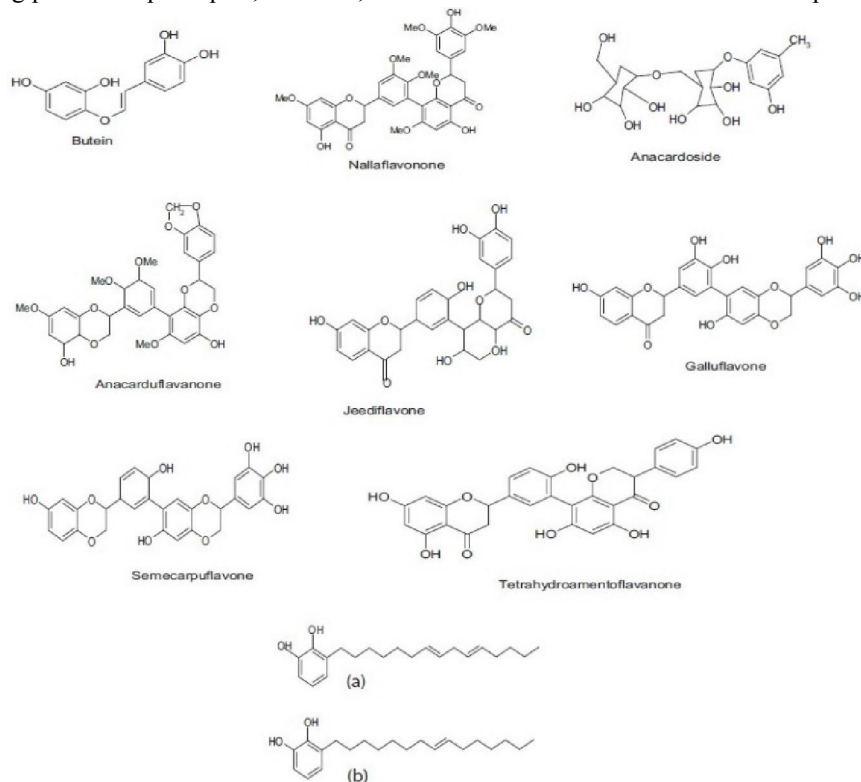


Figure 2: Biochemical constituents of *S. anacardium*. (a) and (b) are cytotoxic compounds

Table 1 – Proximate principle, minerals and vitamins in *Semecarpus anacardium* nuts (in 100 g)

Moisture (g)	3.8
Protein (g)	26.4
Fat (g)	36.4
Minerals (g)	3.6
Fibre (g)	10.4
Carbohydrates (g)	28.4
Energy (Kcal)	587
Calcium (mg)	295
Phosphorus (mg)	836
Iron (mg)	6.1
Thiamine (mg)	0.38
Riboflavin (mg)	0.15
Niacin (mg)	2.7

Pharmacology

CNS activity

Farooq and colleagues conducted a study to assess the positive impact of *Semecarpus anacardium* (SA) nuts extracted with milk on the Central Nervous System (CNS), specifically focusing on locomotor and nootropic activities in various experimental animal models. The study found that the extract exhibited a minor CNS depressant effect, observed at a dosage of 150 mg/kg. However, it was discovered to possess nootropic activity, indicating potential cognitive-enhancing properties. [5]

Antimicrobial activity

Nair and colleagues discovered that the alcoholic extract obtained from dry nuts of *Semecarpus anacardium* (Bhallatak) exhibited bactericidal activity in vitro against three gram-negative strains (*Escherichia coli*, *Salmonella typhi*, and *Proteus vulgaris*) and two gram-positive strains (*Staphylococcus aureus* and *Corynebacterium diphtheriae*). Subsequent studies revealed that alcoholic extracts from different parts of the plant, including leaves, twigs, and green fruit, also possessed antibacterial properties, with the leaf extract showing particularly strong activity. Additionally, in a mouse skin irritant assay, no dermatotoxic effects (irritant properties) were observed. [6]

Mohanta and colleagues prepared aqueous and organic solvent extracts from the plant and conducted screenings for antimicrobial properties using the disc diffusion method. The petroleum ether (PEE) and aqueous extract fractions (AQE) exhibited inhibitory activity against *Staphylococcus aureus* (10 mm) and *Shigella flexneri* (16 mm) at a concentration of 100 mg/ml, respectively. The chloroform extract demonstrated inhibition against *Bacillus licheniformis*, *Vibrio cholerae*, and *Pseudomonas aeruginosa*, while the ethanol extract showed inhibition against *Pseudomonas aeruginosa* and *S. aureus*. [7]

Antiatherogenic effect

The development of atherosclerosis is primarily caused by an imbalance between pro-oxidants and antioxidants in the body. To counteract this condition, antioxidant therapy is beneficial. *Semecarpus anacardium* (SA) possesses antioxidant properties and has the ability to scavenge superoxide and hydroxyl radicals at low concentrations. Additionally, SA has been found to inhibit the process of atherogenesis, which is initiated by the peroxidation of lipids in low-density lipoproteins.

Sharma and colleagues demonstrated the cardiac activity of *Semecarpus anacardium* (SA). Their research showed that SA reduces tissue and serum hyperlipidemia by inhibiting intestinal cholesterol absorption and facilitating peripheral disposal. This mechanism confers anti-atherosclerotic activity to SA. [8]

The beneficial antiatherogenic effect of *Semecarpus anacardium* (SA) is likely associated with its antioxidant, anticoagulant, hypolipidemic, platelet anti-aggregation, and lipoprotein lipase releasing properties. Studies have indicated that the hypotriglyceridemic effect of SA is partially attributed to the stimulation of lipoprotein lipase activity. These various mechanisms contribute to SA's positive impact on cardiovascular health and its potential in preventing atherosclerosis.

Anti-inflammatory activity

Sushma conducted a study to investigate the anti-inflammatory activity of the ethanolic extract derived from the fruits of the *Semecarpus anacardium* (SA) plant in albino rats. The experiment utilized the carrageenan-induced rat hind paw edema model. The results showed that the ethanolic extract of SA fruit displayed anti-inflammatory activity in a dose-dependent manner, indicating its potential as an effective anti-inflammatory agent. [9]

Premalatha reported on the immune-modulatory potency, anti-oxidative properties, membrane stabilizing effects, tumor marker regulative abilities, glucose level restoration, and mineral regulation properties of *Semecarpus anacardium* (SA) nut extract in hepatocellular carcinoma. They found that SA extract exhibited potency against the hepatocarcinogen aflatoxin B1. [10]

Salvam and colleagues investigated the ethyl acetate extract of *Semecarpus anacardium* (SA) and isolated the major active principle, tetrahydroamentoflavone (THA), a biflavonoid compound. In the *in vitro* cyclooxygenase (COX-1)-catalyzed prostaglandin biosynthesis assay, THA exhibited an IC₅₀ value of 29.5 μ M for COX-1 and 40.5% inhibition at 100 μ g/mL for COX-2. Furthermore, in the *in vivo* carrageenan-induced paw edema assay, THA demonstrated a dose-dependent anti-inflammatory effect, which was comparable to the activity of ibuprofen. These findings highlight the potential anti-inflammatory properties of THA, indicating its therapeutic relevance in inflammatory conditions. [11]

Antioxidant activity

Semecarpus anacardium has been consistently reported in various studies to possess potent antioxidant activity. This property makes it valuable for combating oxidative stress and protecting cells from damage caused by free radicals and reactive oxygen species.

Sahoo conducted a study focusing on the antioxidant activity of the ethyl acetate extract from the stem bark of *Semecarpus anacardium* (SA). The ethyl acetate extract displayed a stronger antioxidant activity due to its high total phenolic content of 68.67%, measured as pyrocatechol equivalent, in comparison to other extracts like hexane, chloroform, and methanol. Upon isolating the ethyl acetate extract from SA stem bark, a bright-yellow solid crystal was obtained and identified as butein. This compound exhibited significant antioxidant activity, with IC₅₀ values of 43.28 \pm 4.34 μ g/ml, indicating its effectiveness in quenching free radicals. [12]

Verma and colleagues investigated the antioxidant activity of the aqueous extract derived from *Semecarpus anacardium* (SA) nuts in AKR mouse liver during the development of lymphoma. Their study involved administering the aqueous extract of SA to lymphoma-transplanted mice. The results showed an increase in the activities of antioxidant enzymes, while lactate dehydrogenase (LDH) activity was significantly reduced. These findings suggest the potential of SA aqueous extract in enhancing antioxidant defenses and reducing cellular damage during lymphoma development. [13]

The presence of reactive oxygen species (ROS) and reactive nitrogen species (RNS) plays a significant role in the development of tissue injury in rheumatoid arthritis (RA). Research has shown that treatment with *Semecarpus anacardium* (SA) helps restore altered antioxidant defense components to nearly normal levels. These findings indicate that SA can potentially control the damage caused by free radicals during arthritis through its ability to quench free radicals and exhibit antioxidative properties (Molecular and Cellular Biochemistry, Volume 276, Pages 97–104, 2005). [14]

Shanmugam Arulkumaran observed that rats treated with *Kalpaamrutha* exhibited normal levels of lipid peroxide, indicating reduced oxidative stress, and maintained antioxidant defenses at their regular levels. This suggests the potential of *Kalpaamrutha* in protecting against oxidative damage by maintaining the balance between reactive oxygen species and antioxidants in the body. [15]

Anti-carcinogenic activity

The nut of *Semecarpus anacardium* has been found to possess anti-tumor activity. Numerous studies have been conducted to demonstrate its anticancer and hepatoprotective properties. These studies suggest that *Semecarpus anacardium* nut may have potential benefits in the context of cancer prevention and liver protection. However, it's essential to consult with healthcare professionals before using any natural remedies for medical purposes.

Mathivadhani and colleagues conducted a study on *Semecarpus anacardium* (SA) nut extract to investigate its inhibitory effect on human breast cancer cells (T47D). The results of cytotoxicity analyses indicated that these cells underwent apoptosis. The study revealed that *Semecarpus anacardium* induced rapid Ca^{2+} mobilization from intracellular stores in the T47D cell line. Its cytotoxicity against T47D was found to be correlated with altered mitochondrial transmembrane potential.

At the molecular level, these changes were accompanied by a decrease in Bcl(2) (an anti-apoptotic protein) and an increase in Bax, cytochrome c, caspases, and PARP cleavage, leading ultimately to internucleosomal DNA fragmentation. These findings provided compelling evidence that *Semecarpus anacardium* triggers apoptotic signals in T47D breast cancer cells. This research highlights the potential of SA nut extract as a source of compounds with apoptotic properties against cancer cells.[16]

Sanjay R. Patel and colleagues conducted a study to estimate the anticancer activity of Methanolic Extract of *Semecarpus anacardium* nut on the human epidermoid larynx carcinoma cell line (Hep 2) using the SRB assay. The IC50 value, indicating the concentration at which the extract inhibited 50% of cell growth, for *Semecarpus anacardium* on Hep 2 cells was found to be 468 μ g/ml. Additionally, the R2 value, representing the correlation coefficient for the dose-response curve, was calculated to be 0.688 by SRB assay.

In contrast, the IC50 value of *Semecarpus anacardium* on Vero cells (a cell line derived from African green monkey kidney) was not determined, and the R2 value was 0.008 by SRB assay. These results suggest the potential of *Semecarpus anacardium* nut extract in inhibiting the growth of human epidermoid larynx carcinoma cells, highlighting its possible application in cancer research. [17]

The study conducted by **Sugapriya** and colleagues demonstrated the restoration of energy metabolism in leukemic mice treated with *Semecarpus anacardium* (SA) nut milk extract. Leukemia-bearing mice exhibited a significant increase in lipid peroxides (LPOs) and glycolytic enzymes, along with a decrease in gluconeogenic enzymes and the activities of tricarboxylic acid (TCA) cycle and respiratory chain enzymes, when compared to control animals.

Semecarpus anacardium treatment was compared with the standard drug imatinib mesylate. Administration of *Semecarpus anacardium* to leukemic animals resulted in the clearance of leukemic cells from the bone marrow and internal organs. This indicates the potential of SA nut milk extract in restoring the altered energy metabolism and effectively eliminating leukemic cells in the studied animals. [18]

Hypoglycemic effect

The study was designed to evaluate the hypoglycemic activity of an herbal drug *Semecarpus anacardium*. Considering that synthetic hypoglycemic drugs often come with associated side effects, herbal drugs like *Semecarpus anacardium* were investigated due to their generally considered non-toxic nature.

After treatment with *Semecarpus anacardium*, the study observed positive effects including an increase in body weight, insulin, and C-peptide levels, as well as a decrease in blood glucose levels. These outcomes indicate the potential hypoglycemic (blood sugar-lowering) effects of *Semecarpus anacardium*, making it a promising candidate for managing diabetes and related metabolic disorders.

Krishnamurthy and colleagues observed that Kalpaamruthaa (KA) and *Semecarpus anacardium* (SA) treatment increased levels of total cholesterol, free cholesterol, phospholipids, triglycerides, and free fatty acids. Additionally, levels of ester cholesterol in plasma, liver, and kidney, which were altered in cancer-suffering animals, were reverted back to near-normal levels upon treatment with KA and SA.

In diabetes, glucose produced by gluconeogenesis and glycogenolysis aggravates hyperglycemia, and altered mitochondrial function is associated with impaired energy production. The study found that the levels of enzymes involved in glycolysis and the tricarboxylic acid (TCA) cycle increased, while those of gluconeogenesis decreased. Furthermore, the activities of mitochondrial complexes were favorably modulated. These effects were attributed to the

hypoglycemic and antioxidative activity of *Semecarpus anacardium*. Essentially, *Semecarpus anacardium* was able to restore the altered activities of enzymes involved in carbohydrate metabolism and energy production, indicating its potential in managing diabetes-related metabolic dysregulation. [20]

Arul and colleagues studied the effect of the ethanolic extract of dried nuts of *Semecarpus anacardium* (SA) on blood glucose levels in both normal (hypoglycemic) and streptozotocin-induced diabetic (antihyperglycemic) rats. The ethanolic extract of SA, administered at a dose of 100 mg/kg, reduced the blood glucose levels in normal rats. The blood glucose levels were measured at 0, 1, 2, and 3 hours after the treatment, and the antihyperglycemic activity of SA was compared with tolbutamide, a sulfonylurea derivative commonly used in the treatment of diabetes mellitus. This study suggests the potential of SA as an antihyperglycemic agent, comparable to the effects of tolbutamide. [22]

Analgesic Activity

The analgesic activity of petroleum ether, chloroform, and methanol extracts of *Semecarpus anacardium* (SA) was investigated using the tail flicking and writhing methods, with acetyl salicylic acid as the standard reference. The study found that the methanol extract at a dose of 50 mg/kg exhibited significant analgesic activity. Moreover, the methanol extract was more potent than the petroleum ether and chloroform extracts in inducing analgesia, indicating its effectiveness in pain management. [19]

Anthelmintic Activity

Pal conducted a study on the anthelmintic activity of different extracts of *Semecarpus anacardium* (SA) nuts on adult Indian earthworms (*Pheritimaposthuma*). The results showed that the petroleum ether (PESA) and chloroform (CESA) extracts of SA exhibited better anthelmintic activities compared to the ethanol (EESA) and aqueous (AESA) extracts. This indicates the potential of petroleum ether and chloroform extracts of SA nuts in expelling or killing parasitic worms, suggesting their possible use in anthelmintic treatments. [23]

Hypolipidemic and Hypocholesterolemic Activity

Tripathi noted that administering a dose of 1 mg/100g body weight of SA nut extract oil fraction significantly decreased serum cholesterol levels and increased HDL cholesterol levels in rats fed an atherogenic diet. [26]

Memory Enhancing Effect

Semecarpus anacardium (SA) has been found to enhance memory and cognitive function by increasing cholinergic function in the brain. The cholinergic system plays a crucial role in learning and memory processes. By modulating this system, SA may support better memory retention and cognitive abilities. The process of shodhana reduces the nootropic effect of *Semecarpus anacardium* (SA). The methanolic extract of SA nuts exhibits nootropic activity by inhibiting cholinesterase activity. However, after undergoing shodhana, the nuts lose their nootropic activity. [27]

Cardioprotective Effect

Asdaq conducted a study to assess the cardioprotective properties of a hydroalcoholic extract obtained from *Semecarpus anacardium* nuts (SANE) against myocardial damage induced by isoproterenol (ISO) in rats.

The study observed a decrease in CK-MB activities in the serum and an increase in the heart tissue of animals treated with both low and high doses of SANE when compared to the ISO control group. LDH activity in serum was significantly reduced with both low and high doses of SANE. However, there was no change in LDH activity noted in heart tissue with both doses when compared to the ISO control group.

Therefore, it is concluded that *Semecarpus anacardium* (SA) has the potential to mitigate myocardial damage induced by isoproterenol in rats. [28]

Aphrodisiac Activity

Gupta studied the impact of the chloroform extract of *Semecarpus anacardium* (SA) in male mice at doses of 150mg/kg and 300mg/kg administered orally.

The mounting behavior and mating performance were assessed and compared with the standard drug Penegra (Sildenafil citrate). The SA extract was found to enhance the mounting behavior of male mice and significantly improve their mating performance.

The SA extract was observed to enhance the mounting behavior of male mice and significantly improve their mating performance. [29]

Anti-Tuberculosis Activity

Singh conducted a study to isolate, identify, and evaluate bioactive compounds from SA nuts using GC-MS analysis.

SA nuts were subjected to solvent extraction using petroleum ether, ethyl acetate, methanol, and water. The resulting extracts were tested for their bioactivity against the potential pathogen *Mycobacterium tuberculosis*.

The water extract of SA nuts exhibited significant anti-tuberculosis activity, with a minimum inhibitory concentration (MIC) of 6.25 µg/ml against *Mycobacterium tuberculosis*, as determined in in vitro bioassay investigations. [30]

Hepatoprotective Effect

Abirami conducted a study to assess the antioxidant and protective properties of SA against lead acetate-induced toxicity. The research focused on analyzing phytochemicals such as flavonoids, alkaloids, resins, tannins, carbohydrates, and proteins found in the plant, which likely contribute to its hepatoprotective efficacy. [31]

Nephrotoxicity

Choudhari and colleagues conducted a toxicity study on male albino rats at acute and sub-chronic levels using *Semecarpus anacardium* (SA) nut oil extract (50% w/v) in groundnut oil. The rats were orally treated with three sub-lethal doses of the extract.

During the toxicity study, a significant decrease in hemoglobin percentage and a lowering of erythrocytes were observed, indicating 'anemia.' Additionally, the acute and sub-chronic effects of the crude extract were evaluated on the activity of certain kidney enzymes including GOT (Glutamate Oxaloacetate Transaminase), GPT (Glutamate Pyruvate Transaminase), SDH (Succinate Dehydrogenase), LDH (Lactate Dehydrogenase), and the histology of the kidney in both male and female albino rats. Significant alterations in the activity levels of these marker enzymes in the kidney, as well as histological changes leading to nephritis, were observed, indicating renal dysfunction in the albino rats. These results demonstrated the nephrotoxicity-inducing potential of SA nut oil extract. [32]

Reproductivefunction (antispermatogenic effect)

The administration of *Semecarpus anacardium* (SA) extract resulted in an anti-spermatogenic effect, as evidenced by a reduction in the numbers of spermatogenic cells and spermatozoa in male albino rats.

Sharma's study highlighted a decrease in sperm density in the cauda epididymides, possibly due to alterations in androgen metabolism. Meiotic and postmeiotic germ cells were found to be highly sensitive to androgen concentration, and changes in androgen levels in the testes might impact the transformation of spermatocytes to spermatids. This indicates that SA extract can affect the process of spermatogenesis in male rats, potentially leading to reduced fertility. [33]

Toxicity and Antidote

Semecarpus anacardium is indeed classified in Ayurveda under the category of toxic plants. It is considered extremely hot and sharp in its attributes, and therefore, it should be used with caution. Individuals who show allergic reactions to it should stop using it and avoid the usage of bhallataka. It's crucial to be aware of its potential adverse effects and prioritize safety when dealing with this plant in any form.

***Semecarpus anacardium* should not be used in the following cases:**

1. Not suitable for small children due to potent properties.
2. Older individuals should avoid it as they may be more sensitive.
3. Pregnant women should steer clear due to potential risks.
4. Not recommended for those with a predominant pitta constitution in Ayurveda.
5. Limit usage in the summer season due to its heating properties..

Internal use of *Semecarpus anacardium* can cause skin rashes, burning, itching, excessive thirst, profuse sweating, reduced urine output, discolored urine, and in severe cases, blood in the urine (hematuria).

Before using *Semecarpus anacardium* for internal medicinal purposes, it's essential to detoxify it by washing with warm water or other methods. Additionally, adopting a bland and cooling diet, including rice, milk, butter, and ghee, can help suppress its potential side effects. This cautious approach is crucial to ensure safe consumption.

During *Semecarpus anacardium* treatment, it's important to strictly restrict salt and spices. Exposure to sun, heat, and excessive sexual activity should be avoided. In case of symptoms, consuming fresh juice of *Tamarindus indica* leaves internally can serve as an antidote. These precautions are vital for managing potential adverse effects.

ShodhanaSanskara of Bhallataka

Shodhanasanskara, also known as the purification process, involves treating specific substances with methods like rubbing, steaming, etc., to remove their harmful or toxic effects. Poisonous plants undergo shodhanasanskara, a purification process, before their therapeutic use. This method significantly reduces the toxicity of the plant, maintaining it at the required optimum level for safe consumption.

To prevent severe *daha* (burning sensation) and the formation of *vrana* (ulcer) caused by contact with Bhallataka juice, it is essential to undergo shodhanasanskara (purification process) before using it in medicine. This purification process helps eliminate impurities from Bhallataka, ensuring its safe therapeutic use and avoiding the toxic effects of *Ashuddha* (impure) Bhallataka. [34-36]

The shodhana process of dried nuts of SA involved following the traditional Ayurvedic method. Initially, the thalamus part of the fruit was removed using a steel knife. Subsequently, the nuts were treated with fresh cow urine daily for 7 days, followed by cow milk (OMFED) daily for another 7 days. Finally, the nuts were thoroughly rubbed with brick powder for 3 days. This meticulous purification process ensures the removal of impurities and toxins from the nuts, making them suitable for medicinal use.

Throughout the treatment with cow urine and cow milk, the nuts were washed with water before each application of fresh cow urine or milk. On the 18th day, which marked the final day of the shodhana process, the nuts were thoroughly washed with hot water to eliminate any remnants of brick powder. It's worth noting that this meticulous shodhana procedure was repeated three times, ensuring the complete purification of the nuts. [37][38]

Traditional uses

Semecarpus anacardium is utilized in Ayurvedic medicine for enhancing sexual potency, increasing sperm count, treating digestive disorders, balancing phlegm (kapha dosha), and inducing abortion. The red-orange part of the plant is collected and dried in the sun, then consumed after partial drying. It's important to note that the plant is poisonous in its natural state and requires proper purification methods. The oil extracted from its seeds can cause blisters and painful wounds if not handled correctly. Caution and proper processing are essential when using *Semecarpus anacardium* for medicinal purposes.

In traditional medicine systems, Bhallataka is used for hair care purposes. It is employed for dyeing hair and is believed to promote hair growth in folk medicine practices. However, it should be used cautiously due to its potent properties and potential side effects.

II. CONCLUSION

Semecarpus anacardium is indeed a plant of significant medicinal importance and is utilized in alternative medicine. Traditional healers and physicians incorporate its use in clinical practice. Numerous studies have highlighted the presence of various phytochemicals in SA nut extracts that possess therapeutic potential against several diseases. However, due to its poisonous nature, it should be used with great caution. Despite its potential, there are limited studies on the effects of shodhana (purification processes) on various activities of SA, warranting further research in this area.

Indeed, *Semecarpus anacardium* exhibits a wide range of activities, including antiatherogenic, anti-inflammatory, antioxidant, antimicrobial, anti-reproductive, CNS stimulant, hypoglycemic, anticarcinogenic, and hair growth promotion effects. However, there is a need for further research to comprehensively study the plant's traditional uses, validate its activities, and understand the underlying mechanisms of action. Continued efforts in this area can provide

valuable insights into its therapeutic potential and enhance its safe and effective utilization in various medicinal applications.

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