

SEMECARPUS ANACARDIUM: A REVIEW

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ABSTRACT

Semecarpus anacardium is commonly known as *BHALLATAK*. It has been used since hundred of years in Indian system of medicine(Ayurveda).It has lots of medicinal property due to various chemical compounds, which are present in it, like bhilawanol, biflavonoids, phenolic compounds etc. The present review deals with the description, chemical composition, pharmacological activities of *Semecarpus anacardium*.

Key words: Bhallataka, Semecarpus anacardium

INTRODUCTION

Semecarpus anacardium is a well known medicinal plant in Ayurvedic medicine.It is one of the most powerful and fast acting Ayurvedic herbs. It is used extensively in piles,skin diseases,etc. Since it is very hot in potency,it is used only after purification procedures. In Sanskrit commonly known as, *Bhallatakah,aruskarah;bhela,bhilva* in hindi;*goddugeru,karigeri, bhallika* in kannada; *ceru,allakkuceru* in Malayalam;*senkottai,erimugi* in tamil; *bhallatamu,jidi* in telugu.^[1]

Semecarpus anacardium Linn. (Family: *Anacardiaceae*) is distributed in sub-Himalayan region, tropical and central parts of India. The nut is commonly known as 'marking nut' and in the vernacular as '*Bhallataka*' or '*Bhilwa*'. It has high priority and applicability in indigenous system of medicine.^[2,3]

In English commonly known as Marking nut tree, oriental cashew, marany nut.

It has been well known as a medicine since ancient times where the fruit,gum and oil are used for their medicinal properties; this

plant has been claimed as "HAIF PHYSICIAN", in Ayurveda.

Recent reports from all over the world reveals several scientific studies have been conducted on *S.anacardium* to evaluate its medicinal value. The present review summarizes its description ,phytochemistry,therapeutic activity, pharmacological activity.

PLANT DESCRIPTION

It is a medium sized to large tree,15-25m in height with a grey bark exfoliating in small irregular flakes. Leaves are simple, alternate, obviate oblong, rounded at the apex, coriaceous, glabrous above and more or less pubescent beneath, main nerves 15-25pairs.Flowers are greenish white fascicled in pubescent pedicles .Fruits are obliquely ovoid or oblong drupes and 2-5cm long. The upper portion of the fruit is cup shaped, smooth, fleshy, orange red in colour and sweet & edible when ripe. It is formed of the thickened disc and accerescent calyx base. The lower base which may be turned the nut, consists of smooth, black shining pericarp which is thick, containing between its outer and inner laminae oblong cells full

of a corrosive resinous juice. This juice is white when the fruit is immature, but brownish or quite black when the fruit is ripe. The nut is approximately 1”x 0.75”x 0.33” and weighs on an average 3.5g.^[4]

Marking nut tree is similar to the cashew nut tree, in having an edible false fruit that is orange & fleshy, like the cashew nut, the true fruit is black oily and bitter, the kernels of the nut are edible, but the juice of the nut is highly vesicant, and has been traditionally used to mark cloth by washermen. The tree bark exudes a gum resin used in leprosy, venereal infections and nervous debility, juice from the nut is used in ascites, rheumatism, asthma, neuralgia, epilepsy and psoriasis, as well as for warts and tumours, the juice of the nut was effective against epidermal carcinoma, it also has some antidiabetic activity, nut bruised and the exudates is used as an abortifacient and a vermifuge.

CHEMICAL COMPOSITION

A variety of nut extract preparations from *S.anacardium* are effective against many diseases viz. arthritis, tumours, infections etc. Understanding the mechanism of the pharmacological action of *S.anacardium* can be greatly aided by the isolation of its active principle and determination of structure and function relationship. Based on this principle a lot of phytopharmaceuticals from different parts of *S.anacardium* have been isolated.

The most significant components of the *S.anacardium* are bhilawanols, phenolic compounds, biflavonoids. Bhilawanol from fruits was shown to be a mixture of cis and trans isomers of ursuhenol. Kernel of the nut contains a small quantity of sweet oil; the pericarp of the fruit contains a bitter and powerful astringent principle (which is universally used in India as a substitute for marking ink).

The black corrosive juice of the pericarp contains a tarry oil consisting of 90percent of an oxy-acid named anacardic acid and 10percent of a higher, non-volatile alcohol called cardol. Naidu isolated catechol and a mono-hydroxyphenol which he called ‘anacardol’, besides two acids and a fixed oil from the kernel of the nut.

Pericarp also contains a vesicating oil 32p.c., soluble in ether and which blackens on exposure to the air. Fruit yields 2.14p.c. of ash.

CLASSICAL REFERANCE

c rya usruta has included *bhallatak* (*Semecarpus anacardium*) in, *Nyagrodh di ga a* and *Must di ga a*.

Caraka samhita describes it in, *Deepaniya*-Group of herbs that promotes digestion. *Kushtaghna*-Group of herbs that are useful in skin diseases *Mutrasangrahaniya* –Group of herbs that cause urine retention

MEDICINAL PROPERTIES

RASA(taste)-

Katu(pungent), *Tikta*(bitter), *Kashaya*(astringent).

GUNA(qualities)-*Laghu*(light to digest), *Snigdha*(unctuous), *ikshna*(piercing)

Veerya- *Ushna*(hot in potency).

Vipaka- *madhura*(undergoes sweet taste conversion after digestion)

Bhallataka Shodhana– (Purification method) Because it is very hot in nature, its mere skin contact may cause boils. To reduce its hot potency and toxicity, it is subjected to purification procedure.

According to *Raj nighantu*, *Bhallataka* ripe seeds are taken, and put into water. Only those which sink are used for purification and rest are discarded. The seed is cut into two and kept immersed in dry brick powder for some time. During this time, the dry

brick powder absorbs all the strong pungent oil of *Bhallatak*, reducing its pungency and making it usable for medicinal purpose.

Therapeutic uses of *bhallatak*—

1. There is no *Kapha* imbalance disease, no constipation, which can't be cured by *Bhallataka*. It improves intelligence and promotes digestion. ***¼charaka chikitsa sthana & 1½***

2. *Khadira* seeds help to treat all skin diseases. Similarly, all hemorrhoids can be well treated with *Bhallataka*. ***¼shushruta chikitsa sthana & 6½***

***Bhallatak*fruit**

After ripening, it is *Svadupaka rasa* – sweet in taste, *Laghu* – light to digest, *Kashaya* – Astringent, *Pachana* – helps in digestion, *Snigdha* (unctuous) *Teekshna* – pierce *Ushna* – hot, *Chedana* – has cutting, slicing effect, *Bhedi* – induces purgation, *Medhya* – improves intelligence, *vahnikara* – promotes digestion, *kaphavatahara* -balances *Kapha* and *Vata*, *Vranahara* – induces quick wound healing, *Udarahara* – useful in ascites, *Kushta* – useful in skin diseases, *Arshahara* – useful in piles, *Grahani* – Useful in malabsorption syndrome, *Gulma* – Useful in gaseous distention of abdomen, *Shopha* – Relieves inflammation *Anaha* – relieves bloating, *Jwara* – useful in fever, *Krimi*- useful in worm infestation.

***Bhallataka* seed kernel** is sweet, aphrodisiac, *Branghani* – nutritious, balances *Vata* and *Pitta* Bark is good for hair and improves digestion.

RECENT RESEARCHES DONE ON ANTI INFLAMMATORY ACTIVITY

The anti-inflammatory effects of SA nut extract investigated on developing and developed adjuvant arthritis. *Semecarpus anacardium* significantly decreased the carragee-

nan-induced paw edema and cotton pellet granuloma. These results indicate the potent antiinflammatory effect and therapeutic efficacy of SA Linn. Nut extract against all phases of inflammation is comparable to that of indomethacin.^[5] *Kalpaamrutha* (*KA*), an indigenous-modified Siddha formulation, consists of SA nut milk extract and fresh dried powder of *Emblica officinalis* (*EO*) fruit along with honey. *Kalpaamrutha* was found to be nontoxic up to the dose level of 2000 mg/kg. Further, *KA* has been reported for its potent antioxidant analgesic, antipyretic and non-ulcerogenic properties. Mythilypriya *et al.* studied the antiinflammatory activity of SA in adjuvant-induced arthritic



rat (AIA) model with reference to mediators of inflammation (lysosomal enzymes) and

its effect on proteoglycans. The activities of various enzymes and levels of plasma protein bound carbohydrate components of glycoproteins were determined and were found to be elevated in arthritic rats when compared to control animals.^[6]

ANTI-ARTHRITIC EFFECT *Semecarpus anacardium* nut milk extract was found to be effective against adjuvant-induced arthritis in albino Wistar rat at the dose level of 150mg/kg body weight on the basis of dose dependent study.^[7] The milk extract of the nut was found to inhibit acute tuberculin reaction in sensitized rats and also the primary phase of adjuvant arthritis.^[8,9] Nut milk extract modulates reactive oxygen/nitrogen species levels and antioxidative system in adjuvant arthritic rats. A signifi-

cant increase in the levels of lipid peroxides (LPOs), ROS (superoxide radical, hydroxyl radical, H₂O₂ and myeloperoxidase) and RNS (nitrate + nitrite) observed in adjuvant arthritic animals were found to be significantly decreased on administration of the drug at 150 mg/kg body weight/day. Treatment with SA recouped the altered antioxidant defense components to near normal levels. These evidences suggest that the SA preparations are mainly used for irregularities caused during arthritis and to cure arthritis.^[10] Apart from this, *S.anacardium* also possess a capability to modulate the accumulation of neutrophils.^[11] and brings down the increased levels of lysosomal enzymes in adjuvant induced arthritis rats. All these observations indicated that *S.anacardium* nut milk extract is a good therapeutic agent for the arthritis.

ANTIOXIDANT ACTIVITY *Semecarpus anacardium* has been reported in various studies to possess potent antioxidant activity. Investigated antioxidant activity of the aqueous extract of nuts of medicinal plant SA in AKR mouse liver during development of lymphoma. Administration of the aqueous extract of SA to lymphoma-transplanted mouse leads to increase in the activities of antioxidant enzymes, whereas LDH activity is brought down significantly indicating a decrease in carcinogenesis.^[12] Sahoo et al. investigated the antioxidant activity of ethyl acetate extract of stem bark of SA. Ethyl acetate extract showed the stronger antioxidant activity (due to presence of highest total phenolic content of 68.67% measured as pyrocatechol equivalent) compared to the other (hexane, chloroform and methanol) extracts. The isolation of the ethyl acetate extract of SA stem bark yielded a bright-

yellow solid crystal, which was identified as butein. This compound exhibited antioxidant activity (IC₅₀ values of 43.28 ± 4.34 µg/ml), which was comparable to rutin, taken as a standard.^[13]

ANTIMICROBIAL ACTIVITY Alcoholic and oil extracts of *S.anacardium* dry nuts have antimicrobial activity against Gram-positive and Gram-negative bacteria.^[14] An Ayurvedic preparations of *S.anacardium* called “*Bhallatakasava*” was shown to have antibacterial activity against tetanus causing micro organism.^[15] Alcoholic extract of dry nuts showed dose dependant antifungal activity *in vitro* against *Aspergillus fumigatus* and *Candida albicans*. At 400mg/ml concentration, growth of both fungi were inhibited and considerable reduction in size of cells, hyphae, and reduced sporulation was also observed.^[16] Anacardic acid from the nuts exhibited antimicrobial properties.^[17] Monoene and diene bhillawanols inhibit gram positive anaerobes but not gram positive anaerobes which is probably due to lipoprotein layer which prevents penetration of lipophilic agents like bhillawanols into the cell membranes. Bhillawanols are susceptible to atmospheric oxidation and complex polymerization in the presence of oxygen which makes them unable to inhibit aerobic bacteria.^[18]

ANTI- CARCINOGENIC ACTIVITY *Semecarpus anacardium* has been under investigation for its antitumour properties. A variety of marking nut preparations had been used in clinical practice and encouraging results have been reported, particularly for cancer of the oesophagus, liver, urinary bladder and leukaemia.^[19] The investigation of pericarp oil revealed its anticancer activ-

ity.^[20] The flavanoids present in the *S.anacardium* nut have the ability to prevent various cancers.^[21]

S.anacardium nut extract revealed potent anticarcinogenic activity against AFB1 mediated hepatocellular carcinoma. The adverse effects induced by AFB1 were reversed to near normal cells with reference to biochemical parameters and histological pattern.^[22]

S.anacardium oil prepared according to the Ayurvedic principle displayed strong cytotoxic activity in human leukaemia cell lines. It is surmised that this cytotoxic activity of *S.anacardium* oil in human leukaemia cells is attributed to its phenolic constituents, particularly biflavones.^[23]

Mathivadhani et al. studied SA nut extract for inhibitory effect on human breast cancer cells (T47D). Cytotoxicity analyses suggested that these cells had become apoptotic. *Semecarpus anacardium* was discovered to induce rapid Ca(2+) mobilization from intracellular stores of T47D cell line, and its cytotoxicity against T47D was well correlated with altered mitochondrial transmembrane potential. At the molecular level, these changes are accompanied by decrease in Bcl(2) and increase in Bax, cytochrome c, caspases and PARP cleavage, and ultimately by internucleosomal DNA fragmentation. Taken together, our results provide unprecedented evidence that SA triggers apoptotic signals in T47D cells.^[24]

CONTRACEPTIVE AGENT *Narayan et al.*(1985) reported that the water extract of the aerial part of *S.anacardium* exhibited a spermicidal activity.^[25] The administration of ethanolic extract of *S.anacardium* fruit leads to spermatogenic arrest in albino rats. The significant reduction in the sperm motility and density was observed. The fruit extract

feeding also caused marked reduction in the number of primary spermatocytes, secondary spermatocytes and spermatids. The number of mature leydig cells was also decreased and degenerating cells increased proportionately. These results clearly show the anti spermatogenic activity of *S.anacardium*.^[26]

HYPOGLYCAEMIC ACTIVITY Ethanolic extract of dried nuts (100mg/kg) of *S.anacardium* reduced blood glucose levels of both normal(hypoglycaemic) and streptozotocin-induced (antihyperglycaemic) diabetic rats. The antihyperglycaemic activity of *S.anacardium* was compared with tolbutamide, a sulfonylurea derivative used in diabetes in diabetes mellitus.^[27]

HYPOLIPIDEMIC AND HYPOCHOLESTEROLEMIC ACTIVITY

Semecarpus anacardium nut extract oil fraction at adose of 1mg/100g body weight significantly reduced serum cholesterol levels and increased HDL cholesterol levels in the rat fed with atherogenic diet.^[28]

TOXICITY

Since *Bhallataka* is extremely hot and sharp in its attributes, it should be used with caution. Individuals showing allergic reactions to it should stop and avoid the usage of *Bhallataka*. It should not be used in small children, very old persons, pregnant women and individuals of predominant *pitta* constitution. The use of the same should be restricted in summer season. For its allergic reactions like rash, itching and swelling, the antidotes used externally are coconut oil, rala ointment, ghee, coriander leaves pulp or butter mixed with *musta* (*Cyperus rotundus*). The oily part of the nut is toxic and its

degree of removal is proportional to its safety margin.

TREATMENT OF OVERMEDICATION

With mild toxic symptoms it is often not necessary to stop the drug altogether, only a reduction of the dose being sufficient; *but if there is any great difficulty in micturition or any rash, S.anacardium should at once be omitted.* Antidotes for the treatment of the toxic symptoms produced by this drug: These are the albumen of the coconut, *sesamum* seeds, the chebulic myrabolan, and so forth. Best results are obtained by using the first antidote. Milky juice of the albumen of coconut, sweetened to taste, is to drunk in large quantities, and as soon as there is the full purgative action, the itchiness, rash etc., disappear. Any saline purgative also serves the same purpose. The itchy parts are to be covered with lint soaked in Goulard's lotion.

Restrictions to be observed when taking preparations of S.anacardium: Avoidance of walking in the sun of excess in sexual intercourse of indulgence in nitrogenous foods and salt and water. Plenty of ghee, milk, starchy and saccharine foods should be taken. Speedy marked benefit is the result of observing the restrictions.

Contra-indications against administration: Bilious temperament, haemorrhagic diathesis, pregnancy, diarrhoea, dysentery, and gastritis, also inflammatory diseases of the kidneys and chronic constipation. Toxic symptoms of over medication with *S.anacardium* are: High coloured and scanty urine, sometimes tinged with blood, irritable and loose bowels with griping, erythematous skin eruptions with itching and burning.

CONCLUSION

It is concluded that *Semecarpus Anacardium* is used for various medicinal properties. The fruit and nut extract shows various activities like an anti inflammatory, hypoglycaemic, anticarcinogenic activity etc. It can be used as a drug of choice for many dreaded diseases but with some special precautions.

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