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A toxicological review of *Bhallataka*

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ABSTRACT

Bhallataka (*Semecarpus anacardium* Linn.) is mentioned in the group of *Sthavar vanaspatika Visha* in different Ayurvedic text book's also it is irritant organic vegetable poison. All the parts are poisonous mostly seeds are hazardous to human, due to its irritant property. The *Bhallataka* nut contain bilwanol and semecarpal as toxic ingredient show some medicinal properties. By its hot potency it has some local action like *Sphotjananam* (*Ushna-Virya*). A number of Ayurvedic formulation includes this drug after the proper *Shodhana* (purification) as in judicious use of *Asuddha* (impure) *Bhallataka* may results in toxic effect like burning sensation of skin blister formation, ulcer and so on. Treatment of toxic effect of *Bhallataka* is described various texts of *Ayurveda*. Modern toxicology also describes manifestation, treatment, autopsy finding and medico legal aspect of *semecarpus anacardium* linn.

Key words: *Ayurveda, Toxicology, Bhallataka, Semecarpus anacardium, Medico-legal.*

INTRODUCTION

Agadtantra is the branch of *Ayurveda* which is meant for diagnosis and treatment of various poisoning such as bites by snakes, insect, spider, rats, etc. and also other poisonous substances like plants and minerals.^[1] *Bhallataka* (*semecarpus anacardium* linn.) Popularly known as marking nut, tree-dhobis nut, belonging to the family Anacardiaceae. It has many therapeutic application in Indian system of medicine. Preparation of the nut from *Bhallataka* were used in ancient medicine and still find a place indigenous medicine we are getting different of opinions on the properties of marking nut which is stated in *Ayurveda* scripture's and text books that is *Bhallataka* having

typical properties, it is used in various diseases, which described in *Ayurveda*.^[2]

Vernacular Name^[3]

- English - Marking nut tree.
- Hindi - Bhilawa, Bhela.
- Bengali - Bhela, Bhelatuki.
- Gujarati - Bhilamu.
- Kannada - *Bhallataka*, Godugeru, Karigeri.
- Malayalam - Chera, Cheru, Alakkucheru.
- Marathi - Bibba, Bhilava.
- Punjabi - Bhilawa, Bhela, Bhiladar.
- Tamil - Tatamkottai, Scramkotati, Senkottati, Erimurgi.
- Telugu - Nallajidi, Nallajidiginga, Bhalatamu.
- Arabia - Beladin, Habbul-fahm.
- Assam - Bhelaguti, Bhala, Bholaguti.
- Oriya - Bholataki, Bholai, Balia.
- Urdu - Baladur, Bhilavan.

Type of Poison

- Ayurveda* - *Sthavarvanaspatika Visha*^[4]
- Modern science - Irritant organic vegetable poison^[5]

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Plant description

A moderate sized deciduous tree, exuding a dark juice. Young branches, inflorescence, petioles and underside of leaves pubescent. Leaves - along-ovate, rounded at apex, cartilaginous at margin, very coriaceous. Flowers - fasciculate, arranged in erect, compound, terminal panicles, greenish yellow coloured. Fruits - drupes, obliquely oval or oblong, smooth, shining, purplish-black, when ripe, cup orange-red (Flowering round the year, mostly during May-June, fruits ripen from November to February).^[6]

Synonyms of *Bhallataka*^[7]

Bhallataka, *Dahana*, *Arushkara*, *Krimighna*, *Vatari*, *Prthagvija*, *Agni*, *Tapana*, *Anala*, *Taila-bija*, *Sphotaka-bijaka*, *Dhanurvija*.

Table 1: Characteristic of *Bhallataka* fruit in different *Nighantu*.^[8-11]

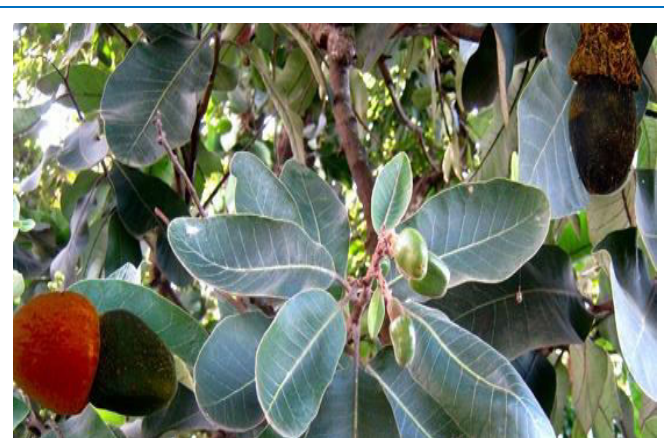
Characters	<i>Bhavprakash Nighantu</i>	<i>Raj Nighantu</i>	<i>Madanpal Nighantu</i>	<i>Kaiyadeva Nighantu</i>
<i>Guna</i> (Qualities)	<i>Laghu, Snigdha, Teeksna</i>	-	<i>Laghu, Snigdha, Teeksna</i>	<i>Guru, Ruksha</i>
<i>Rasa</i> (Taste)	<i>Madhur, Kashaya</i>	<i>Kashya, Madhur</i>	<i>Madhur, Kashaya</i>	<i>Madhur</i>
<i>Vipaka</i>	<i>Madhur</i>	<i>Madhur</i>	<i>Madhur</i>	<i>Madhur</i>
<i>Veerya</i> (Potency)	<i>Ushna</i>	<i>Koshna</i>	<i>Ushna</i>	<i>Sheeta</i>
<i>Karma</i> (Action)	<i>Agnideepan, Pachan, Chedana, Medhya</i>	-	<i>Deepan, Pachan, Rasayan, Medhya</i>	<i>Sukrala</i>
<i>Dosha-ghnata</i>	<i>Kapha-Vata</i>	<i>Kapha</i>	<i>Kapha-Vata</i>	<i>Pitta</i>
<i>Roga-ghnata</i>	<i>Vrana, Udar, Kustha, Arsha, etc.</i>	<i>Shwas, Anaha, Vibandha, Krimi, etc.</i>	<i>Twakvikar, Urustambha, Switra, Kastaartava</i>	<i>Rakta – Pitta</i>

Chemical Constituents^[12]

- Nuts - Bioflavanoids : A, B & tetra hydrobusta flavones; tetra hydromenta flavones, nalla flavones.

- Nut Shell - Anacardic acid, Bhilawanols; gallu flavanone jeedi flavanone.
- Kernel Oil - linoleic, myristic, oleic, palmetic and stearic acids
- Fruits - Nicotinic acid, riboflavin, thiamine and essential amino acids.
- Leaves - Amentoflavine

Active Principles - The fruit contain : the biflavanones, semecarpetin (C₃₄H₃₀O₉), anacaduflavanone (C₃₅H₃₀O₁₂) semecarduflavanone, galluflavanone, jeediflavanone, and dimeic flavonoid, nallaflavanone. The kerel oil contains : oleic acid, linoleic acid, palmetic acid, stearic acid and arachid acid, the oil is unsuitable for edible purposes because of it high acid value.^[13]

**Fig. 1: Fruit of *Bhallataka*****Toxic Part**^[14]**Fruit**

- Colour - hard, black rind within which brownish, oily juice known as *Bhallataka* oil is present.
- Weight - 1.5 to 3.5 gm
- Oil - Colour : Brownish, oily

Medicinal Dose^[15]

- Kalka* - 3-6 gm
- Taila* - 10-20 drop

Fatal Dose - 5-10gm (pulpy juice) & 140-150 grain

Fatal Period - 12-24 hour

Pharmacognosy^[16]

The fruit is laterally flattened, kidney shaped, drupaceous nut with a fleshy pear shaped receptacle, dark brown, generally 2.5 - 3cm long, obliquely ovoid, smooth, shining green. When ripe, the nut becomes black and the receptacle orange coloured. The pericarp is differentiated into epicarp, mesocarp and endocarp. In longitudinal section the pericarp shows a single layered epidermal cells get radially elongated and lignified as the fruit matures. Characteristic glands are found in the pericarp which arise as small protuberances in epicarp and exude oil globules due to pressure exerted by the cells of mesocarp. The mesocarp is a broad zone, 30-40 layers thick and composed mostly of parenchymatous cell, lysigenous cavities and fibro vascular bundle. Rosette crystals of calcium oxalate are scattered in parenchymatous cell. They increase in size with maturity of fruit and contain an acrid and irritant yellowish oily secretion. The endocarp consists of two distinct layers, the most is prismatic layer, which is very much elongated, columnar, compactly arranged, thick walled and lignified, the lateral walls being highly thickened. The outer layer is shorter and thinner than prismatic layer, but the cells are similar to the former.

Toxicity Evaluation

S. anacardium nuts can be given orally with milk, ghee, peanut oil etc. Toxic effects are not observed by such routes of administration. On the contrary, anabolic effects are obtained. Traditional methods recommended in *Ayurveda* and *Siddha* should be closely followed so as to get therapeutic effects without toxicity. Various reports have mentioned the range of dosage from 300 to 9000mg in a graded manner.^[17] Toxicity studies were carried out by Ghosh et al. with one *Siddha* preparation of *S. anacardium* (coded as SKx) and they found that, in rats, there was no adverse effect or mortality upto the oral dose of 2000mg/kg. The histopathological studies on liver, lung, kidney and heart did not reveal any significant pathological lesions even when the extract was administered at a high dose of 1000mg/kg. The animals looked healthy and active without any

physiological disturbance and loss in body weight. Hematological picture was almost normal. The extract did affect total WBC count but there was no effect on RBC count and haemoglobin percentage.^[18] The LD₅₀ dose of 40g/kg in rats and rabbits was determined by Vaishnav et al. The toxic side effects of the very high dose of the drug are diarrhea and vomiting, swelling all over the body, ulceration and vesication on the skin. It should be used cautiously and in lesser doses in hot season.^[19] During use, whether external or internal the least appearance of a rash or redness of the skin or an itchy or uneasy sensation in any part of the body should be considered as a manifestation of undesirable effects and use should be discontinued immediately.^[20]

Therapeutic Evaluation^[21]

- Milk decoction of nuts was administered orally to 120 patients of rheumatoid arthritis for 27 days. Very good symptomatic relief was observed in 65% of the patients. Toxicity symptoms common in female as compared to male.
- Clinical trials of the drug, *Bhallataka Vati (semecarpus anacardium)* have shown spectacular effects on patients suffering from *Amavata*.
- Clinical trials have shown that the combined therapy with the three drugs, viz. *Bhallataka (semecarpus anacardium)*, *Gourakh (Dalbergia laniolaria)* and *Guggulu (Commiphora mukul)* in osteo-arthritis, frozen shoulder and sciatica, has better effects than the individual drugs.
- Clinical trials have shown that the combined therapy with the three drugs, viz. *Bhallataka (semecarpus anacardium)*, *Gourakh (Dalbergia laniolaria)* and *Guggulu (Commiphora mukul)* have shown a definitive evidence of improvement in patients suffering from rheumatic arthritis.
- A study was conducted with *Bhallataka (semecarpus anacardium)* to assess its utility in sciatica. *Bhallataka* was encouraging and the optimum dose was found to be 4g/day. This dose was found highly effective in *Gridhrasi (Sciatica)*.

- A controlled clinical trial was conducted with milk decoction of *semicarpus anacardium* in 20 patients of rheumatoid arthritis, 15 patients of ankylosing spondylitis 25 cases of sciatica and 6 cases of knee joint arthritis. Among the 25 cases of sciatica of variable etiology treated with the drug and cases due to primary idiopathic sciatic neuritis responded well to therapy while those due to osteoarthritis of lumbar spine showed mild to moderate improvement. Anacardium forte - Bhilawa nuts and seeds in proportion of 1:200 was found to be beneficial in giving clinical relief to cancer patients, improve general condition and increases life span. No unpleasant or toxic symptoms were or toxic symptoms were observed in any case.

Clinical manifestation of *Bhallataka* poisoning^[22]

1. If Ingested Orally

- Burning sensation in mouth, throat, chest & epigastric region (upper GIT)
- Blackish blister containing acid serum
- Excessive salivation, nausea & vomiting
- Pain & cramps in abdomen (Entire)
- Watery purgation, sometime with blood stains & mucus
- Excessive thirst, Oligourea, Anurea

2. Application on Skin

- Painful blackish blister containing acid serum
- Eczematous eruption with severe itching
- Fever, painful micturation with brown urine

Table 2: Examples of medico legal cases^[23]

SN	Preparation used of <i>Bhallatak</i>	Gender / Age	Toxic Effect
1.	Juice rubbed on the skin	Male	Severe irritation and blistering there was very intense itching and oozing of the serum and developed suppurative lymphadenitis of the axilla

			which required surgical treatment.
2.	Oily substance used in paralysed limb	12 year old male	Child died from the corrosive action of preparation of marking nut.
3.	Boiled with milk and took	Male child	Relief of chest pain but severe vomiting and purging and died after few hours.
4.	Drink containing <i>Bhallatak</i>	Male	Severe gastrointestinal irritation and died within 12 hours.
5.	Administered with finger to a 7 month old child	Male child 7 month old	Vomiting & diarrhea and external blister on the chest, child was died within 24 hours.
6.	Feet exposed to juice of <i>Bhallataka</i>	Male	Severe vesication

Manifestation of toxicity of *Bhallataka*

In *Charaka Samhita* one of the cause of *Agantuja shotha* is contact of fruits or flowers of *Bhallataka* with body.^[24] If juice of *Bhallataka* comes in contact with body, produces severe *Daha*, and *Vrana*. When it comes in contact with face, it produces acute burning sensation with *Shotha* and *Visarpa*.^[25] Some person have intolerance of *Bhallataka* and they show manifestation like dark urine, itching all over body, red patches, blister diarrhea, fever, bloody urine, blister are ruptured even show *Unmada*. *Oligouria*, cloudy urine, itching at anus and penis may also find.^[26]

Treatment of *Bhallataka* Toxicity

Bhallataka Shothahara Yoga - Local application of paste of *Tila* rubbed with buffalo milk and mixed butter or local application of paste of *Yasthimadhu* and *Tila* rubbed *Shalapatra*.^[27]

Arushkara Shothaghna Lepa - Paste of *Tila* with goat milk and butter or *Krishna Mritika* is used in *Shotha* caused by *Bhallataka*.^[28]

Local Application - For quick relief of *Bhallataka Shotha* are as follows - Mixture of *Mehnad Swarasa*

and butter or mixture of *Devdaru*, *Sarshapa*, *Nagarmotha* and *Navneeta* or mixture of *Navneeta*, *Tila Mishri* and milk or *Neema*, *Tila*, *Tila Tail* are boiled together and made concentrated to apply locally.

When manifestation of toxicity observed, medication of *Bhallataka* is stopped and white albumen of coconut juice of leaves of *Chincha* given to eat. Externally coconut oil, ghee, lead lotion is applied.^[29]

The specific antidote for the toxicity of *Bhallataka* is *Bibhitaka* (*terminalia belerica*). The decoction of powder preparation with fruit rind and bark of *terminalia belerica* are effective for the sudden reactions and for systemic effects. Drug that mitigate *Pitta* like milk and clarified butter and other drugs with cold potency may also be used.^[30]

Precaution while consuming formulation of *Bhallataka*^[31]

Pathya - Person should consume milk & rice and ghee in large quantity.

Varjya - Walking in sun, excess sexual intercourse, meat consumption, salt, exercise and oil massage.

Contraindication of *Bhallataka* formulations in - *Pitta* disease, hemorrhagic tendency, pregnancy, child, old age, diarrhea, nephritis & summer season.

Medico - Legal Aspect / Circumstances of Poisoning^[32]

1. Accidental poisoning may result from the administration of juice internally by quacks.
2. Homicidal and suicidal poisoning is rare.
3. Sometimes the juice is introduced in vagina as a punishment for infidelity.
4. To support false charge of assault the juice is applied to skin which produce lesion stimulating bruises.
5. The juice may be thrown on the body to cause injury.
6. For criminal abortion, the bruised nut is applied to cervicalos.
7. Malingerers use juice to produce opththalmia.

DISCUSSION

The *Semecarpus anacardium* nut shell liquid present in the pericarp of the fruit contains oil consisting of anacardic acid and cardol. Other isolated chemical constituents are bhilawanols, semecaduflavanone, arachid acid. These are the chemical constituents responsible for the irritation and toxicity. In *Ayurveda*, it is clearly mentioned that the drug *Bhallataka* should be used after purification. Purification plays an important role to reduce the adverse effects during internal administration.

CONCLUSION

Semecarpus anacardium is mentioned in the group of *Sthavar Vanaspathic Upavisha* in different *Ayurvedic* text books also it is irritant organic vegetable poison. Synonyms of *Bhallataka* (*Semecarpus anacardium*) are *Shophahetu*, *Shophakrita*, *Vranakrita* which means it causes inflammation and ulceration. We find *Laghu*, *Ruksha* property & hot potency in *Semecarpus anacardium* which is similar to poison. So this review article aims to focus on local & systematic manifestation and treatment of *Semecarpus anacardium* (*Bhallataka*) are described in both *Ayurveda* and Modern texts.

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