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A BRIEF REVIEW ON TOXICOLOGICAL ASPECT OF BHALLATAKA

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ABSTRACT

Bhallataka is one of the medicinally important plants included in *Upavisha Varga* by our ancient *Acharyas*. In Indian medicine, it has a wide range of therapeutic uses. Since *Bhallataka* is extremely hot and sharp in its attributes; it should be used with caution. All the parts are poisonous mostly seeds are hazardous to humans because of their irritant properties. Precautionary methods must be followed right from collection of *Bhallataka* and disposal of media and handling of utensils used in *the Shodhana* process. In *Ayurveda*, it is mentioned that the drug *Bhallataka* should be used after *Shodhana*. Some individuals show allergic reactions to it. Accidental poisoning may result from the administration of juice internally by quakes. Toxicological manifestations are described in both *Ayurveda* as well as modern science. Hence, here is an attempt to give an outline of the toxicological aspect of *Bhallataka* in Ayurveda and modern toxicology.

Keywords: *Ayurveda*, *Bhallataka*, Semecarpus anacardium, Toxicology.

INTRODUCTION

Agadtantra is an important branch among the *Ashtang Ayurveda* which describes *the Ayurvedic* aspect of toxicology i.e. deals with *Nidana* and *Chikitsa* of poisoning caused by different *Sthavara* & *Jangama* poi-

sons & as well as *Kritrima* poison. [1] *The* fruit o *Bhallataka* is a potent drug having high priority and applicability in indigenous systems of medicine and is being indicated for many ailments. *Bhallataka* is one of the Anacardiaceae plants that have the potential to elicit allergic manifestations through contact dermatitis. *Bhallataka's* toxicological perspectives are described in both *Ayurveda* and Modern toxicology. It's an Irritant Organic Vegetable Poison [2]. *Rasatarangini* [3] and *Dhanvantari Nighantu* [4] both mentioned *Bhallataka* in the *Upavisha Varga*. Because *Bhalltaka* is commonly used for medicinal and nonmedicinal purposes, hazardous exposure to people is prevalent. The Tarry oil found in the fruit's pericarp contains Anacardic acid, which contains Urushiol, which causes blisters when it comes in contact with it. This Tarry oil is utilized commercially in the dyeing process, although the extraction of this oil is a tedious and laborious process. It affects and exposes a vast number of workers. Accidental poisoning may occur during collection, *Shodhana* procedure, and among children while consumption of *Godambi.*

TAXONOMICAL CLASSIFICATION [5]

- Kingdom: Plantae- plants
- Subkingdom: Tracheobionta
- Super division: Spermatophyta
- Division: Magnoliophyta
- Class: Magnoliopsida
- Subclass: Rosidae
- Order: Sapindales
- Family: Anacardiaceae
- Genus: Semicarpus
- Species: Semecarpus anacardium Linn.
- English name: Marking nut tree,
- Hindi name: Bhilawa, Bhela

Table No 1: CLASSICAL CATEGORIZATION

Samhita/Nighantu	***Gana / Makashaya / Varga***
Charaka Samhita [6], [7]	*Deepaniya MahakashayaKusthaghna Mahakashya* *Mutra Sangrahniya Mahakashya* *Kashaya Skandha*
Sushruta Samhita [8]	*Nyagrodhadi Gana* *Mustadi Gana*
Ashtang Sangraha [9]	*Deepaniya Gana* *Kusthaghna Gana*
Ashtang Hridaya [10]	*Mustadi Gana*
Bhavprakasha. Nighantu [11]	*Haritakyadi Varga*
Dhanwantari Nighantu [12]	*Chandanadi Varga*
Raj Nighantu [13]	*Amradi Varga*
Kaiydev Nighantu [14]	*Oshadhi Varga*
Madanpal Nighantu [15]	*Abhayadi Varga*

Table No 2: *RASA PANCHAK* OF *BHALLATAKA*

Sr.no.	***Nighantu***	***Rasa***	***Guna***	***Vipaka***	***Virya***
1.	*Bhavprakash Nighantu[11]*	*Madhur, Kashaya*	*Laghu, Viryavardhak*	*Madhur*	*Ushna*
2.	*Raj Nighantu*[16]	*Katu, Tikta, Kashaya*	*Krumighna*	*Madhur*	*Ushna*
3.	*Kaiydev Nighantu*[14]	*Tikta, Kashaya, Madhur, Katu*	*Laghu, Ruksh, Brunhan*	*Madhur*	*Sheeta*
4.	*Dhanvantari Nighantu[17]*	*Katu, Tikta,Madhur*	*Kruminashak, Vaakaphaghna*	*Madhur*	*Ushna*

***Ayurvedic* properties of the main useful part (fruit) of *Bhallataka*:**

Bhallataka is having *Madhur Rasa*, *Madhura Vipaka*, and *Ushna Veerya*. It has the qualities of *Laghu*, *Snigdha*, *Tikshna*, and *Ushna* and relieves *Kapha* and *Vatadoshas*. It's a heat-generating, digestive, rejuvenative, aphrodisiac herb that also helps with skin and rheumatic problems.

Table No 3: Chemical Composition of *Bhallataka* [5]

Semecarpol,	Biflavonoid	Bhilwanols	Sterols
Phenolic compounds	Semecarpetin	Nallaflavan	Anacardoside
Jeediflavanone	Anacarduflavone	Semecarpuflavanone	Galluflavanone
Bhilawanol-A	Bhilawanol-B	Amentoflavone	Anacardicacid
Tetrahydro- amentoflavone	O - trimethyl biflavanone A1	O- trimethyl biflavanone A2	O- tetramethyl biflavanone A1

Bhilwanols, phenolic compounds, and biflavonoids are the most significant components of *Bhallataka*. Bhilwanol from fruits was discovered to be a combination of urushiol's Cis and Tran's isomers. The nut's kernel contains a little amount of sweet oil, but the fruit's pericarp contains a bitter and potent astringent principle (which is often used in India as a substitute for ink). The pericarp's black, corrosive juice includes tarry oil made up of 90% anacardic acid and 10% higher, non-volatile alcohol called cardol. From the nut's kernel, Naidu separated catechol and a mono- hydroxyphenol he dubbed 'anacardol,' as well as two acids and a fixed oil. Pericarp also contains vesicating oil 32p.c. soluble in ether and which blackens on exposure to the air. Root bark contains an acrid, viscid juice similar to that formed in the pericarp.

- Amonohydroxyphenol, which forms 0.1% of the extract, has been named 'semecarpol'.
- An o-dihydroxy compound forming 46% extract (15% of the nut), thishas been called 'bhilwanol'.
- A tarry, non-volatile corrosive residue forming about 18% of the nut. Chemical and photochemical analysis of its nut reveal the presence ofcarbohydrates, proteins, flavonoids, tannins, and steroids [18].

***Shodhana* (purification) methods of *Bhallataka*:**

Shodhana is a purification method used in *Ayurveda* to purify hazardous medicinal plants (*Upavisha Dravya*) using a variety of pharmaceutical techniques such as soaking, rubbing, and washing with specialised media such as *Gomutra*, *Godugdha*, and others. There have already been reports of physico-chemical alterations and reductions in hazardous compounds from dangerous plants such as strychnine, brucine, and scopolamine in *Kupilu* and *Dhattura* [19]. When *Shodhita* samples of *Bhallataka* were compared to raw *Bhallataka*, recent research revealed alterations in RF values [20].

There are different methods for *Shodhana* of *Bhallataka* [21] described in *Ayurveda*-

Criteria for selection of *Bhallataka* fruit for *Shodhana*

Bhallataka fruits that have been ripened and dipped in water are used. Fruits that are submerged in water are considered for *Shodhana*, whereas fruits that float in the water are discarded.

With Brick Powder (*Ishtika Churna)*

In a *Pottali* made of 3-4 folds of cotton cloth, *Bhallataka* fruits and brick powder (*Ishtika Churna*) are filled. This *Pottali* is rubbed with moderate pressure by hand. After the brick powder has been wetted with oil and the skin of the *Bhallataka* fruit has been peeled off; it is washed with hot water. Through this process, *Bhallataka* becomes purified.

With coconut water (*Narikela Jala)*

The fruits of *Bhallataka* are cut into two pieces and placed in a *Pottali*. This *Pottali* is placed in a *Dolayantra* that has been filled with coconut water and heated for 1-2 hours. *Bhallataka* is purified as a result of this process.

Precautions during *Shodhana*

Before beginning the *Shodhana* technique, coconut oil should be applied all over the body. Always away from the fumes of *Bhallataka* when *Shodhana* doing by *Dolayantra*.

Manifestation Toxicity of *Bhallataka* (*Ayurvedic* Review)

Contact of *Bhallataka* fruits or flowers with the body, according to *Charaka Samhita*, is one of the reasons for *Agantuja Shotha* (exogenous swelling). [22]

When *Bhallataka* juice (even in small amounts) comes in contact with the body, it causes intense *Daha* (burning sensation) and *Vrana* (ulcer). It causes an acute burning sensation with *Shotha* (inflammation) and *Visarpa* when it comes in contact with the face. [23]

Sign and Symptoms of *Bhallataka* poisoning [24]

- When the juice is applied to the skin, it causes irritation,inflammation, vesication, ulceration, and painful blisters with an acrid serum that causes an eczematous eruption on each patch of skin it comes into contact with.
- These lesions resemble a bruise and may eventually ulcerate and slough; however, when taken internally, the juice is far less irritating.
- When used in large amounts, it produces burning pain in the mouth, blister formation in the mouth, tongue, and throat, and acute gastroenteritis, which can lead to dyspnea, cyanosis, tachycardia, Coma, and death.
- Severe poisoning results in vomiting, abdominal pain, diarrhea, hypotension, tachycardia, delirium, and coma.
- Pupils may be dilated.

Route of exposure

The substance can be absorbed by inhalation of its aerosol, through the skinand by ingestion.

Fatal dose: 5 to 10 gm or 10 seeds

Fatal period: 12 to 24 hrs.

Treatment:

Gastric lavage, Demulcent drinks, When applied externally the parts should be washed with water and bland liniments applied. If taken orally wash your stomach with warm water.

Give milk, ice to suck, and 10 mg morphine for pain.

Post-mortem Appearances:

-Externally, bruise-like lesions with surrounding small blisters may benoticed near the angle of the mouth or on the lips, if juice is swallowed. Internally, inflammation and blister formation may be seen in the pharynx and esophagus. The stomach may be highly congested. Other organs are congested.

- The liver may show early degenerative change·

-The blister fluid should be preserved in rectified spirit and sent to a forensic science laboratory for analysis if necessary.

Medico legal aspect [25]

1. Accidental poisoning may result from the administration of juice internally by quakes.
2. Homicidal and suicidal poisoning is rare.
3. Sometimes the juice is applied to the genitals as a punishment for adultery.
4. To support a false charge of assault the juice is applied to the skin which produces lesion-stimulating bruises.
5. The juice may be thrown on the body to cause injury
6. The juice is used as an abortifacient by application to the os uteri by means of an abortion stick.
7. The juice may be instilled into the eyes to produce an irritant conjunctivitis.
8. It is used by malingerers to produce an artificial bruise to support a false charge; its presence, however, can be detected by chemical analysis of the blister fluid.

Table No 5: **Difference between Bruise and Lesion produced by Semecarpus juice [26]**

Points	Bruise	Lesion due to Semecarpusjuice
1. Shape	Regular	Irregular
2. Margin	Diffused	Sharp and clear
3. Swelling	Present	Absent in some cases

4. Colour Change	Occurs	Does not occur
5. Itching	Absent	Present
6. Blister	Absent	Present on the margin
7. Cause	Rupture of subcutaneouscapillaries	Chemical damage to the skin
8. Extravasation in the tissue	Present	Absent
9. Nail beds	Nothing significant	Similar lesion due to itching
10. Analysis	Chemical not found	Chemicals found in blister fluid

Following are the conditions where blister formation also occurs-

1. Scalds (i.e., burns due to steam or moist heat): They mainly contain fluidthat is rich in chloride, protein, and RBC (sero sanguinous fluid). The base of blister is reddish, showing a red line of demarcation and raised papillae. If the blistered skin is removed, it will leave a pink raw surface.
2. Putrefactive blister: This mainly contains the gases of decomposition.
3. A bite from Viper: blisters contain serosanguinous or rarely serous fluid.

DISCUSSION

The plant *Bhallataka* belongs to the family Anacardiaceae; commonly known as marking nut, *Dhobi* nut, *Bhilawa*, and *Bibba*. It has been used for the treatment of diseases throughout the world since the beginning of civilization. It is mentioned in the group of *Sthavara Vanaspatik Visha* in different *Ayurvedic* text books, also it is an irritant organic vegetable poison. *Shophahetu*, the synonym attributed to *Bhallataka* due to its blister-causing nature, indicates that this drug has to be handled with proper precautionary methods during collection, processing, etc. The *Bhallataka* Nut Shell Liquid present in the pericarp of the fruit contains tarry oil consisting of anacardic acid 90% and cardol 10%. Other isolated chemical constituents are bhilwanols. These are the chemical constituents responsible for the irritation and toxicity. When tarry oil comes in contact with the skin, it produces dermatitis. Medically it is termed urushiol-induced contact dermatitis. Sometimes it may result in allergic eczematous contact dermatitis. Various local applications are suggested by Ayurveda in different texts. Application of goat milk, seasamum, butter, Shorea robusta, etc. can be applied for local manifestation.

CONCLUSION

There are many significant uses of *Bhallataka* and is used both internally as well as externally. The fruit, oil, and seeds have a wide range of therapeutic properties and are used to cure a variety of ailments. Antihelminthic, digestive, carminative, heart stimulants, liver stimulating, diuretics, and *Rasayana* are only a few of its therapeutic benefits. There are also some adverse reactions like contact dermatitis. Some cases of contact dermatitis have been reported when the patients were exposed to Urushiol. *Bhallataka* puts children, the elderly, pregnant women, and sensitive people, such as those with a *Pitta* constitution, at risk of contact poisoning. Local and systemic manifestations and treatment of Bhallataka poisoning are described in both Ayurveda and modern toxicology.

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