A TOXICOLOGICAL REVIEW OF BHALLATAKA (Semecarpus anacardium Linn)

Pawade Uday Venkatrao

Assistant Professor, Department of Agadtantra, Vyavahar Ayurved Evum Vidhivaidyak, S.C. Mutha Aryangla Vaidyak Mahavidyalaya, ITI Road, Gendamal, Satara, Maharashtra, India.

INTRODUCTION

Agadatantra is the branch of Ayurveda which is meant for diagnosis and treatment of various poisoning such as bites by snakes, insects, spiders, rats etc. and also other poisonous substances like plants and minerals.¹

In western medicine Agadatantra is named as toxicology. Toxicology is the science which deals with poisons with reference to their sources, properties, mode of action, symptoms which they produce, lethal dose, nature of fatal results, treatment, method of their detection & estimation and autopsy findings. Forensic toxicology deals with medical and legal aspect of harmful effects of poisonous substances on human body. A poison is a substance which when administered, inhaled or ingested is capable of acting deleteriously on human body. Thus almost anything is a poison. There is no bounding between a medicine and poison, for a medicine in a toxic dose is a poison and a poison in a small dose may be medicine.²

Bhallataka (Semecarpus anacardium Linn) is widely used therapeutically in the form of Ayurvedic formulations to cure various diseases like piles, skin disease, ascitis, fever, worm infestation etc. But before using therapeutically Shodhana sanskara (purification process) of Bhallataka is carried out to avoid its toxic effect on the body. Bhallataka is mentioned in Upavisha Varga by Rasatarangini and Dhanvantari Nighantu. Toxicological views of

ABSTRACT

Bhallataka (Semecarpus anacardium Linn) is mentioned in Upavisha Varga in Ayurvedic texts like Rasatarangini and Dhanvantari Nighantu. It is a common drug indicated therapeutically for the management of various disease like Arsha (Piles), Kushtha (Skin disease), Udara (Ascitis), Jwara (fever), Krimi (Worm infestation) etc. Number of Ayurvedic formulations includes this drug after its proper shodhana sanskara (Purification process) as injudicious use of Ashuddha (impure) Bhallataka may results in toxic effects like burning sensation of skin, blister formation, ulcer and so on. Treatment of toxic effects of Bhallataka is described in various texts of Ayurveda. Modern toxicology also describes manifestation, treatment, autopsy findings and medico-legal points of Semecarpus anacardium. This review will summarize toxicological aspect of Bhallataka (Semecarpus anacardium) in Ayurveda and Modern toxicology.

Key Words: Bhallataka, Toxicology, Ayurveda, Semecarpus anacardium Linn, Medico-legal
Bhallataka (Semecarpus anacardium) explained in both Ayurveda and Modern Toxicology. Hence this review article is an attempt to highlight toxicological aspect of Bhallataka in Ayurveda and Modern toxicology.

**TOXICOLOGICAL REVIEW OF BHALLATAKA IN AYURVEDA**

**Synonyms** 

**Description & Part of Use:** Bhallataka is tree found in hilly regions and its fruits are used for therapeutic purpose.\(^9\)

**Classification of Poison:** 1. Upavisha\(^{10-11}\)
2. Phalavisha\(^{12}\)

**Characteristics of Bhallataka & its fruit in Nighantu:** As fruits of Bhallataka are used for therapeutic purpose common characters of Bhallataka and its fruits are shown in Table-1 and Table-2.

---

**Table-1: Common Characters of Bhallataka**\(^{13-17}\)

<table>
<thead>
<tr>
<th>Nighantu</th>
<th>Bhavaprakash Nighantu</th>
<th>Dhanvantari Nighantu</th>
<th>Raj Nighantu</th>
<th>Kaideva Nighantu</th>
<th>Madanpal Nighantu</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Guna</td>
<td>Laghu</td>
<td>---</td>
<td>---</td>
<td>Laghu</td>
<td>Laghu</td>
</tr>
<tr>
<td>2. Rasa</td>
<td>Kashaya, Madhura</td>
<td>Katu, Tikta, Madhura</td>
<td>Katu, Tikta, Kashaya</td>
<td>Tikta, Kashaya, Madhura</td>
<td></td>
</tr>
<tr>
<td>3. Vipaka</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>Catu</td>
<td>---</td>
</tr>
<tr>
<td>4. Veerya</td>
<td>Ushna</td>
<td>Ushna</td>
<td>Ushna</td>
<td>Sheeta</td>
<td>Ushna</td>
</tr>
<tr>
<td>5. Karma</td>
<td>Shukrsla</td>
<td>---</td>
<td>---</td>
<td>Grahi, Deepana</td>
<td>Shukrsla</td>
</tr>
<tr>
<td>6. Doshaghnata</td>
<td>Vata, Kapha</td>
<td>Vata, Kapha</td>
<td>Vata, Kapha</td>
<td>Pitta, Kapha</td>
<td>Vata, Kapha</td>
</tr>
</tbody>
</table>
Table-2: Characters of Bhallataka Phala(Fruit)\textsuperscript{18-20}

<table>
<thead>
<tr>
<th>Characters</th>
<th>Bhavaprakash Nighantu</th>
<th>Raj Nighantu</th>
<th>Kaideva Nighantu</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Guna</td>
<td>Laghu, Snigdha, Teeksna</td>
<td>---</td>
<td>Guru, Ruksha</td>
</tr>
<tr>
<td>2. Rasa</td>
<td>Madhura, Kashaya,</td>
<td>Kashaya, Madhura</td>
<td>Madhura</td>
</tr>
<tr>
<td>3. Vipaka</td>
<td>Madhura</td>
<td>---</td>
<td>Madhura</td>
</tr>
<tr>
<td>4. Veerya</td>
<td>Ushna</td>
<td>Koshna</td>
<td>Sheeta</td>
</tr>
<tr>
<td>5. Karma</td>
<td>Agnideepana, Pachana, Chedana, Bhedana, Medhya</td>
<td>---</td>
<td>Shukrala</td>
</tr>
<tr>
<td>6. Doshaghnata</td>
<td>Kapha, Vata</td>
<td>Kapha</td>
<td>Pitta</td>
</tr>
</tbody>
</table>

Charaka samhita has mentioned properties of Bhallataka fruits that they are Teekshna(Sharp), Paki(Corrosive), and Agnisama(like fire).\textsuperscript{21} Charaka samhita describes Laghu, Ruksha, Aashu, Vishada, Vyavayi, Teekshna, Vikasi, Sukshma, Ushna, and Anirdeshya rasa as ten Guna(Properties) of visha(Poison).\textsuperscript{22} Sushruta has described same ten properties but instead of Anirdeshya rasa he described Apaki property.\textsuperscript{23} Vagbhata has mentioned both Avyakta rasa and Apaki property of Visha.\textsuperscript{24} Pharmacological action of medicine and poison depends upon Guna, Rasa, Veerya, Vipaka of the substance. So when we study common characteristics of Bhallataka, we find that Bhallataka carries properties like Laghu(Lightness) & Teekshna(Sharp) and its Veerya is Ushna(Hot) which is similar to poison. According to Sushruta, Laghu guna implies instability due to which therapeutic measures do not produce desired results and it becomes Dushchikitsya. Teekshna guna causes injury to marmas(vital points) and also aggrevates pitta & rakta. Ushna guna aggrevates pitta & rakta. Thus all these three properties of Bhallataka may cause harmful effect when it comes in contact with human body.

**Shodhana Sanskara of Bhallataka:** The process in which specific substances are treated with advised matter by rubbing, steaming etc., so as to remove its harmful or toxic effects is known as shodhana sanskara(purification process).\textsuperscript{26} Poisonous plants are subjected to shodhana sanskara(purification process), before its therapeutic use. This process reduces toxicity of poisonous plant considerably and keeps it to required optimum level.\textsuperscript{27} If juice of Bhallataka (even in traces) comes in contact with body, produces severe daha(burning sensation), and Vrana(ulcer). When it comes in contact with face, it produces acute burning sensation with shotha(inflammation) and Visarpa. Hence it is necessary to undertake shodhana sanskara of Bhallataka with precaution before using it in medicine to avoid toxic effects of Ashuddha(impure) Bhallataka.\textsuperscript{28}
Methods of shodhana sanskara of Bhallataka-

1. With Brick Powder- The ripened Bhallataka fruits which are submerged in water are selected for shodhana sanskara.29 Bhallataka fruits and Ishtika churna (Brick powder) are filled up in a pottali made up of 3-4 folds of cotton cloth. This pottali is rubbed by hand by applying moderate pressure. When brick powder become wet with oil and the skin of Bhallataka fruit is peeled off, it is washed with hot water. In this process Bhallataka becomes Shuddha (pure).30,31

2. With Coconut water32,33- Bhallataka fruits are cut in two pieces and placed in Dolayantra (swing apparatus) is heated for about 1-2 hrs. In this process Bhallataka becomes shuddha. Precaution during Shodhana sanskara34- Coconut oil should be applied on face, hand, legs and other exposed parts of body to avoid harmful effects.

Manifestation of Toxicity of Bhallataka:

In Charaka samhita one of the cause of Agantuja shotha (exogenous swelling) is contact of fruits or flowers of Bhallataka with body.35

If juice of Bhallataka (even in traces) comes in contact with body, produces severe daha (burning sensation), and Vrana (ulcer). When it comes in contact with face, it produces acute burning sensation with shotha (inflammation) and Visarpa.36

Some persons have intolerance of Bhallataka and they show manifestation like dark urine, itching all over body, red patches, blisters, diarrhea, fever, bloody urine, blisters are ruptured even show Unmad (Psychological disorder). Oligouria, cloudy urine, itching at anus and penis may also find.37

Some cases are reported of adverse effect of Bhallataka during treatment of piles. After administration of this drug 32 patients developed hepatitis, albuminuria, and generalized urticaria.38

Treatment of Bhallataka Toxicity

Bhallatka Shothaghna Yoga39- Local application of paste of tila (sesamum) rubbed with buffalo milk and mixed with butter Or Local application of paste of Yashtimadhu (Glycyrrhiza glabra) and tila (sesamum) rubbed with milk Or local application of rubbed Shalapatra (Desmodium gangeticum). Arushkara Shothaghna lepa40- Paste of tila (sesamum) with goat milk and mixed with butter Or Krishna mrittika (Black clay) is used in shotha caused by Bhallata. Local application for quick relief of Bhallata shotha are as follows41- Mixture of Meghnad swarasa (Amaranthus spinosa juice) and butter Or Mixture of Devdaru (Cedrus deodara), Sarshapa (Brasica juncea), Nagarmotha (Cyperus rotundus) and Navneeta (butter) Or Mixture of Navneeta (Butter), tila (sesamum), Mishri (sugar) and milk Or Neema (Azadirachta indica), tila (sesamum), tila taila (sesamum oil) are boiled together and made concentrated to apply locally.

When manifestation of toxicity observed, medication of Bhallataka is stopped and white albumen of coconut or juice of leaves of Chincha (Tamarindus indica) given or Sesamum or coconut is given to eat. Externally coconut oil, ghee, lead lotion is applied.42

The specific antidote for the toxicity of Bhallataka is Bibhitaka (Terminalia belerica). The decoction or powder
preparations with fruit rind and bark of Terminalia belerica are effective for the sudden reactions and for systemic effects. Drugs that mitigate Pitta like milk and clarified butter and other drugs with cold potency may also be used.43

Five cases of contact dermatitis caused during different stages of shodhana sanskara of Bhallataka fruits due to improper handling of utensils and disposal of media used in shodhana procedure. The affected persons were advised external application with pounded Nimba (Azadirachta indica) leaves on affected parts and internal administration of Sarivadyasava 30 ml thrice daily after food & tripala churna 5gm before food twice daily.44

Precaution while consuming Formulation of Bhallataka45
Pathya- Person should consume milk & rice and ghee in large quantity.
Varjya(Avoid)- Walking in sun, excess sexual intercourse, meat consumption, salt, exercise, and oil massage.
Contraindication of Bhallataka Formulations in- Pitta diseases, Hemorrhagic tendency, Pregnancy, Child, old age, Diarrhea, Nephritis & summer (hot) season.

TOXICOLOGICAL REVIEW OF Semecarpus anacardium IN MODERN TOXICOLOGY
This tree belongs to N.O. Anacardiaceae. Its fruit called Marking nut (Bhilawan), weighs 1.6 to 3.6 G. and has a hard black rind within which is a thick pericarp. The pericarp or fleshy pulp of the fruit or seed abounds in a brownish, oily acrid juice, which turns biack when mixed with lime and exposed to air, and is used by dhobis (washermen) as "marking ink" for lines and cotton clothes.

Active Principles: Pillay and Siddiqui have isolated the following constituents from the juice of the pericarp:-
1. A monohydroxyphenol named semecarpol, which boils at 185-190°C at 2.5 mm pressure, congeals below 25 °C to a fatty mass and forms 0.1 percent of the extract.
2. An O-dihydroxy compound named bhilawanol, which distills constantly at 225-26°C at 3mm pressure, congeals below 5°C and forms 46 percent of the juice (15 to 17 percent of the nut).
3. A tarry, non-volatile corrosive residue forming about 18 percent of nut.
4. Fatty oils, tannic acid and other acids.
The juice is used internally mixed with bland oil or melted butter as a remedy for nervous and scrofulous affection and syphilis.46

Manifestation: When juice is applied to the skin, it causes an eczematous eruption on any part of the skin with which it comes in to contact. The lesion resembles a bruise which may later ulcerate and slough. Internally administered, the juice is much less irritant.47

Taken in large doses it produces blister on throat and severe gastro-intestinal irritation, followed in some cases by impending fear of death, dyspnoea, tachycardia, hypotension, cyanosis, dilated pupils, areflexia, delirium, coma and death within 12 to 24 hours.48

In central India evils eye protection by burning Semecarpus anacardium Linn seed is very common practice. The smoke produced by burning Semecarpus anacardium Linn seed can cause allergic dermatitis. So a study designed to know exact cause of allergic dermatitis in patient
Exposed to smoke of burning *Semecarpus anacardium* Linn seed. A total 40 patients of allergic dermatitis and exposed to smoke of *Semecarpus anacardium* Linn seeds and 40 healthy controls were recruited for the study. A patch test was performed contacting Urushiol as an additional allergen in firm chamber. Urushiol is an active ingredient of smoke of *Semecarpus anacardium* Linn seeds. All patients of contact dermatitis were found sensitive to urushiol and none of healthy control was found sensitive to urushiol in the patch test.\(^49\)

**Fatal dose:** 5 to 10 gms\(^50\) or 6 - 8 seeds.\(^51\)

**Fatal Period:** 12 to 24 hours\(^52\)

**Treatment:** This is symptomatic. When applied externally the parts should be washed with water and bland liniments applied.\(^53\) If taken orally wash stomach with warm water. Give milk, ice to suck and 10 mg morphine for pain.\(^54\)

**Post-mortem Appearances:** Externally, bruise like lesion with surrounding small blisters may be noticed 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 oesophagus. The stomach may be highly congested. Other organs are congested. Liver may show early degenerative change.\(^55\) The blister fluid should be preserved in rectified spirit and sent to a forensic science laboratory for analysis if necessary.\(^56\)

**Chemical Analysis**\(^57\): The vesicating principles of marking-nut juice is extracted from an organic mixture or stained cloth by Stas-Otto process up to the stage of the evaporation of alcoholic extract. The alcoholic residue is then taken up in hot water acidified with dilute sulphuric acid and extracted with petroleum ether. After evaporation of the solvent to dryness, the residue identified following tests:-

1. If a portion of the residue is dissolved in a little alcohol and a few drops of an alcoholic solution of caustic potash are added, a bluish-green or green color develops.
2. Of another portion of the residue is dissolved in a little alcohol and a few drops of basic lead acetate solution are added, a greenish-black precipitate is produced.
3. When a small portion of the residue is mixed with a drop or two of olive oil, and a drop of mixture is rubbed on the skin, it produces after an interval of about one or two days a painful and irritating blister which spreads over the surrounding area. It must be remembered that the vesicating action of the active principle of marking-nut juice is destroyed by caustic potash. This property is not found in other vesicating principles.
4. To find out whether a vesicle on the skin is produced by marking-nut juice, remove the epidermis of vesicle and extract it with absolute alcohol, or apply lint soaked in absolute alcohol under gutta percha tissue over the vesicle. The alcoholic extract with a few drops of an alcoholic solution of caustic potash assumes a bluish-green color.

**Medico-legal Aspect/Circumstances of poisoning**\(^58\):

1. Accidental poisoning may result from the administration of juice internally by quaks.
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 cervical os.
7. Malingerers use juice to produce Ophthalmia.

Table: Difference between Bruise & Lesion produced by Semecarpus juice:

<table>
<thead>
<tr>
<th>Points</th>
<th>Bruise</th>
<th>Lesion due to Semecarpus juice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Shape</td>
<td>Regular</td>
<td>Irregular</td>
</tr>
<tr>
<td>2. Margin</td>
<td>Diffused</td>
<td>Sharp and clear</td>
</tr>
<tr>
<td>3. Swelling</td>
<td>Present</td>
<td>Absent in some cases</td>
</tr>
<tr>
<td>4. Color change</td>
<td>Occurs</td>
<td>Does not occur</td>
</tr>
<tr>
<td>5. Itching</td>
<td>Absent</td>
<td>Present</td>
</tr>
<tr>
<td>6. Blister</td>
<td>Absent</td>
<td>Present on the margin</td>
</tr>
<tr>
<td>7. Cause</td>
<td>Rupture of subcutaneous capillaries</td>
<td>Chemical damage of the skin</td>
</tr>
<tr>
<td>8. Extravasation in the tissue</td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>9. Nail beds</td>
<td>Nothing significant</td>
<td>Similar lesion due to itching</td>
</tr>
<tr>
<td>10. Analysis</td>
<td>Chemical not found</td>
<td>Chemical found in blister fluid</td>
</tr>
</tbody>
</table>

Examples of Medico-legal points/Cases:
1. During the process of chemical examination of marking-nut juice a little of the liquid was rubbed on the skin of the dorsum of the left hand of S.R. Nayudu. After an interval of two days it produced very severe irritation and blistering. The blister tended to spread along the margin till the whole dorsum of the hand was swollen and blistered. There was very intense itching and oozing of the serum. The hand took about a fortnight to heal and a black stain remained on the hand for some weeks. Nayudu developed suppurative lymphadenitis of the axilla which required surgical treatment and kept him in bed for two months.
2. In Bombay, an oily substance was applied by Hakim to the paralysed limbs of a child of 12 years from the corrosive action of which the child died in the G.T. Hospital. The substance proved on analysis to be preparation of marking-nut.
3. A Hindu child of Angul took some milk boiled with marking-nuts for relief of pain in the chest and had vomiting and purging and died after a few hours.
4. A Hindu female of District Warangal gave to her husband a drink containing ground marking-nut. The man suffered from symptoms of severe gastro-intestinal irritation and died within 12 hours.
5. A Hindu female of District Raichur administered with her finger ground marking-nut to a child 7 months old. The child started vomiting and diarrhea soon afterwards. There were blisters on the tongue. A blister appeared on the chest was touched by the woman with her soiled finger. The child was died within 24 hours.
6. Some twigs imbued with marking-nut juice were thrown in to the bed of a man and when his feet touched them, they
produce severe vesication. The juice of marking-nut was detected on the twigs.

7. During his wife's absence a man had been carrying on with woman, but on his wife's return he stopped visiting the woman. The woman was very much annoyed with the wife of her lover and as a punishment for alienating his love, she poured some juice of marking-nut mixed with oil on the private parts of the wife when she was asleep and her husband was not at home. The woman was charged with having voluntarily caused grievous hurt by means of a poison under secton 326, I.P.C.

DISCUSSION

Synonyms of Bhallataka are Shophahetu, Shophakrita, Vranakrita which means it causes inflammation and ulceration. We find Laghu, Ruksha property & hot potency in Bhallataka which is similar to poison. Local & systematic manifestation and treatment of Bhallataka( Semecarpus anacardium) are described in both Ayurveda and Modern toxicology. According to Modern toxicology allergic dermatitis in Semecarpus anacardium fruits is caused due to Urushiol. Local manifestations are more common than systemic manifestations. Various local applications are suggested by Ayurveda in different texts. It can be used in treatment.

CONCLUSION

Bhallataka is therapeutically more useful. But before using internally, it should be subjected through shodhana sanskara(Purification process). Application of coconut oil on face, extermeties or exposed parts of body should be done before shodhana sanskara as precaution to avoid its toxic effects. Modern toxicology mentions stomach wash and symptomatic treatment, in its toxicity if taken internally. But as described in Ayurvedic texts various pastes like application of goat milk, seasamum, butter or Mixture of Amaranthus spinosa leaves juice and butter can be applied for local manifestation. Internally, albumen of coconut or juice of Tamarindus indica leaves or seasamum and coconut can be given.

REFERENCES

6. Prof.Priyavat Sharma, Dr.Guru Prasad Sharma; Kaiyadeva Nighantu; 1st edition; Chaukhamba Orientalia, Varanasi; Oshadhivarga/121; 1979, p.90.
7. Dr.Indradeo Tripathi; Raj Nighantu of Pandit Narhari; 3rd edition, Chaukhamba Krishnadas


11. Dr.Jharkhande Ojha; Dhanvantari Nighantu; Reprint edition, Chaukhamba Surbharti Prakashana, Varanasi; Mishrakadi shashtovarga, 82, Upavishagana/114-115; 2004, p.357.


15. Dr.Indradeo Tripathi; Raj Nighantu of Pandit Narhari; 3rd edition, Chaukhamba Krishandas Academy, Varanasi; Amradivarga Bhallataka/66-67; 2003, p.352.


19. Dr.Indradeo Tripathi; Raj Nighantu of Pandit Narhari; 3rd edition, Chaukhamba Krishandas Academy, Varanasi; Amradivarga Bhallataka/68; 2003, p.353.


38. Dr. C.R. Agnives, Dr. P. Unnikrishnan, Dr George M.S.; Toxicology Aayurvedic Perspective; 1st edition; Department of Agadatantra, Vaidyaratnam P.S. Varier Ayurveda college, Kottakal; 2002, p.202.

39. Kaviraj Ambikadatta shastri; Bhaishajyaratnavali of Vd. Rajeshwar Datta, 17th edition, Chaukhamha Sanskrita santhhan, Varanasi; Chapter
42. Shotharoga chikitsa prakaran; 2004, p.560.
40. Prof. K.R. Srikanta Murthy; Sarangdhar samhita, 1st edition; Chaukambha Orientalia, Varanasi; section III, Chapter 11, Verse 7; 1984, p.236.
41. Pandit Dattaram Choube; Brihadrasarajyadvarga (Aparva Rasarantha); 5th edition; Dnyansagar printing press; A/P Matunga Bombay: Bhilawa Visha ki Shanti; 1979, p.188.
43. Dr. C.R. Agnives, Dr. P. Unnikrishnan, Dr. George M.S.; Toxicology Aayurvedic Perspective; 1st edition; Department of Agadatantra, Vaidyaratnam P.S. Varier Ayurveda college, Kottakal; 2002, p.202.
44. Ilan chezhian R., Roshy Joseph C., Rabinarayan Acharya; Urushiol-induced contact dermatitis caused during shodhana (purification process) of Bhallataka (Semecarpus anacardium Linn) fruit; http://www.ayujournal.org, on Friday November 20, 2015.
47. Dr. K.S. Narayan Reddy; The Essentials of Forensic Medicine And Toxicology; 31st edition; K. Sugunadevi, Malakpet, Hyderabad-500036; Chapter 29, Organic Irritant Poisons, Semecarpus anacardium; 2012, p.517.
Medicine and Toxicology; Reprint edition; CBS Publishers & Distributors, Daryaganj, New Delhi-110002, Section IX, Vegetable poisons, Q.923; 2002, p. 9.35.

54. Dr.C.K.Parikh; Parikh's Textbook of Medical Jurisprudence Forensic Medicine and Toxicology; Reprint edition; CBS Publishers & Distributors, Daryaganj, New Delhi-110002, Section XI, Alphabetical poison Table; 2002, p.11.35.

55. Apurba Nandy; Principles of Forensic Medicine; Reprint edition; New Central Book Agency (P) LTD, Caicutta-700009; Vegetable Irritants, Chapter 33, Semecarpus anacardium; 2004, p.500.

56. Dr.C.K.Parikh; Parikh's Textbook of Medical Jurisprudence Forensic Medicine and Toxicology; Reprint edition; CBS Publishers & Distributors, Daryaganj, New Delhi-110002, Section IX, Vegetable poisons, Q.923; 2002, p. 9.35.


58. Dr.K.S.Narayan Reddy; The Essentials of Forensic Medicine And Toxicology; 31st edition; K.Sugunadevi, Malakpet,Hyderabad-500036; Chapter 29, Organic Irritant Poisons,Semecarpus anacardium; 2012,p.517.

59. Apurba Nandy; Principles of Forensic Medicine; Reprint edition; New Central Book Agency (P) LTD, Caicutta-700009; Vegetable Irritants, Chapter 33, Semecarpus anacardium; 2004, p.500.

60. Dr.C.K.Parikh; Parikh's Textbook of Medical Jurisprudence Forensic Medicine and Toxicology; Reprint edition; CBS Publishers & Distributors, Daryaganj, New Delhi-110002, Section IX, Vegetable poisons, Q.923; 2002, p. 9.36.


CORRESPONDING AUTHOR

Dr.Uday V. Pawade
Assistant Professor, Department of Agadtantra, Vyavahar Ayurved Evum Vidhivaidyak, S.C.Mutha Aryangla Vaidyak Mahavidyalaya, Satara, Maharashtra, India.

Email: drudayvp143@gmail.com

Source of support: Nil
Conflict of interest: None Declared