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Case Report

Urushiol-induced contact dermatitis caused during *Shodhana* (purificatory measures) of *Bhallataka* (*Semecarpus anacardium* Linn.) fruit

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Abstract

Bhallataka (*Semecarpus anacardium* Linn.; Ancardiaceae) is mentioned under *Upavisha* group in *Ayurvedic* classics and it is described as a poisonous medicinal plant in Drugs and Cosmetics Act (India), 1940. Fruit of *Bhallataka* is used either as a single drug or as an ingredient in many compound formulations of Indian systems of medicine to cure many diseases. Tarry oil present in the pericarp of the fruit causes blisters on contact. The major constituent of the tarry oil is anacardic acid and bhilawanol, a mixture of 3-*n*-pentadec(en)yl catechols. Bhilawanol A and B are known as Urushiols, and also, anacardic acid is closely related to Urushiol. Urushiol-induced contact dermatitis is the medical name given to allergic rashes produced by the oil Urushiol. This paper deals with five case reports of contact dermatitis caused during different stages of *Shodhana* (purificatory measures) of *Bhallataka* fruit due to improper handling of the utensils and disposal of media used in *Shodhana* procedure and their Ayurvedic management. To combat these clinical conditions, the affected persons were advised external application with pounded *Nimba* (*Azadirachta indica* A. Juss.) leaves on the affected parts and internal administration of *Sarivadyasava* 30 ml thrice daily after food and *Triphala Churna* 5 g before food twice daily. Reduction of itching and burning sensation was observed after topical application.

Key words: *Bhallataka*, bhilawanol, blisters, dermatitis, *Semecarpus anacardium* Linn., urushiol

Introduction

The fruit of *Bhallataka* (*Semecarpus anacardium* Linn.; Anacardiaceae) is a potent drug having high priority and applicability in indigenous systems of medicine and is being indicated for many ailments. It is administered internally in cases of *Nadi Dourbalya* (nervous debility), *Amavata* (rheumatism), *Apasmara* (epilepsy), *Gridhrasi* (sciatica), *Shvasa* (asthma),[1] etc. Many compound formulations like *Brihatbhallataka Avaleha*, *Bhallatakadi Churna*, *Bhallataka Kshara*,[2] *Bhallatakadi Kwatha*, *Bhallataka Ghrita*,[3] etc. contain *Bhallataka* as an ingredient. *Bhallataka* is mentioned under *Upavisha* group in Ayurvedic classics,[4] as a poisonous medicinal plant in Drugs and Cosmetics Act (India), 1940[5] and should be administered internally only after *Shodhana* (purificatory measures).[6] *Sophahetu*, the synonym attributed to *Bhallataka* due to its blister causing nature,[7] indicates that this drug has to be handled with proper precautionary methods during collection, processing, etc. During collection and processing, coconut oil should be applied on face and exposing parts of the body to avoid possibility of irritation and blister formation.[8]

Semecarpus ancardium fruits are attached with receptacle, where receptacle is considered as false fruit. The color of the false fruit is green in unripe stage and turns yellowish orange on ripening. Pericarp is considered as fruit, and it is drupaceous, laterally flattened, obliquely ovoid, of 2.5–3 cm in length, and is green in unripe and turns blackish brown when ripe. The nature of the fruit is smooth and shining with residual receptacle. Cotyledon is white in color and is 1–1.5 cm long. Microscopic studies revealed the presence of large amount of oils in the pericarp on treatment with Sudan III.[9] Tarry oil present in the pericarp of the fruit causes blisters on contact. The corrosive juice from the pericarp of the fruit is found to contain catechol, fixed oil, and anacardol ($C_{18}H_{13}O_3$.

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COOH) and the corrosive properties of the juice are due to two phenolic acids $C_{16}H_{15}O_3$.COOH and $C_{14}H_{13}O_3$.COOH.[10] Major chemical constituents of tarry oil are bhilawanol, a mixture of phenolic compounds, including *cis* and *trans* isomers of urushiol (3-pentadecenyl-8′catechol).[11] Two incompletely identified phenols, perhaps analogous to the cardanol of Cashew Nut Shell Liquid (CNSL), being decarboxylated anacardic acids are also reported. Among these, one is being named as semecarpol and appears to be an undecenyl phenol[12] and the other, named as anacardol, appears to be a dodecenyl phenol.[10]

When the tarry oil comes in contact with skin, it produces dermatitis.[13] Medically it is named as urushiol-induced contact dermatitis. The American Academy of Dermatology estimates that there are up to 50 million cases of urushiol-induced dermatitis annually in the United States alone, accounting for 10% of all lost-time injuries in the United States Forest Service.[14]

The symptoms include itching, redness, burning sensation, swelling, papules, vesicles, blisters, and streaking. Sometimes it may result in an allergic eczematous contact dermatitis. The rash takes 1–2 weeks to run its course and normally does not leave scars. Severe cases have small (1–2 mm) clear fluid-filled blisters on the skin. Pus-filled vesicles, containing a whitish fluid, may indicate a secondary infection. Excessive scratching may result in secondary infection, commonly by staphylococcal and streptococcal species.[13]

Primary treatment involves washing the exposed skin thoroughly with soap and water as soon as possible after exposure is discovered. Soap or detergent is necessary, as urushiol is a hydrophobic (not water soluble) oil. Scrubbing with plain soap and cold water will remove the urushiol from skin, if it is done within a few minutes of exposure, before it bonds.[13] Ice, cold water, or cold air does not help to cure rashes, but cooling can reduce inflammation and soothe the itch.[15] To reduce the severity of rashes and blisters, internal and external medication should be done.[16] Ayurvedic system of medicine advised to take the *Pitta Shamaka* treatments both externally and internally.[17] *Bhallataka*-induced dermatitis has been reported,[18] but dermatitis caused during collection, storage, and during different stages of *Shodhana* process is not reported. Hence, an attempt has been made to report five cases of urushiol-induced dermatitis from *Bhallataka* fruit, during different stages of *Shodhana*, and their clinical management through Ayurveda.

Case Report

Shodhana of *Bhallataka* was carried out in the Department of Dravyaguna, I.P.G.T. and R.A., Gujarat Ayurved University. Five research workers and laboratory assistants, who came in contact with the fruits at work place during storage, processing (*Shodhana*), cleaning the instruments and equipments, and disposing the media (cow's urine, cow's milk, tender coconut water, etc.) used for *Bhallataka Shodhana* reported contact dermatitis. They were treated in the O.P.D., Department of Dravyaguna, IPGT & RA, Jamnagar.

A male of 33 years (Case 1) presented with blisters and itching caused after *Bhallataka* collection and drying process. Accidentally the contact of oil on leg from the ruptured nut caused itching in the beginning with slight burning sensation. After 10 h of the contact, blisters occurred in the leg [Figure 1].

Four cases were reported while processing the *Bhallataka* nuts. A male research worker of 40 years (Case 2) who used to assist in cleaning the instruments and equipments used for processing the *Bhallataka* reported with itching, burning sensation, and redness of the skin. After 11 h of contact, severe blisters occurred [Figure 2]. Two female research workers of 55 years [Case 3, Figure 3] and a 43 years [Case 4, Figure 4] who disposed the media used for *Shodhana* reported with itching, redness, and burning sensation on both hands. Blisters were not reported in Case 3 and 4. Another case, a male of 33 years (Case 5), reported with itching all over the body and black patches on the face because of the fumes coming out during *Svedana* (boiling) of *Bhallataka*, a traditional method of processing the *Bhallataka* fruits.[6]

Management and Observations

Along with internal and external medication, [Table 1] the subjects were advised to take tender coconut water twice daily. In Case 1, blisters subsided within 2 days and it took 5 days for the blisters to subside in Case 2, but the external medication was continued for 7 days. The severity of blisters and area of blister formation was more in Case 2 [Figure 2]. In Case 3 and 4, there was no blister formation; only itching with reddish discoloration was observed, so only external application of coconut oil was advised. Within 3 days, the symptoms subsided, but application of coconut oil was done for 7 days. For Case 5, treatment was continued for 15 days internally and 7 days externally to reduce the black patches on face and to get the normal glow on the face.

Discussion

The *Bhallataka* Nut Shell Liquid (BNSL) present in the pericarp of the fruit contains tarry oil consisting of anacardic acid 90% and cardol 10%. Other isolated chemical constituents are bhilawanols (urushiols). These are the chemical constituents responsible for the irritation and toxicity.[19,20]

In Ayurveda, it is clearly mentioned that the drug *Bhallataka* should be used after *Shodhana* (purification/processing).[6] *Shodhana* plays an important role to reduce the adverse effects during internal administration. *Bhallataka* should be collected and processed with due consideration of precautionary methods mentioned in Ayurvedic classics. Applying the coconut oil on exposed body parts and drinking tender coconut water will reduce the irritation. Hence, one should apply coconut oil on face, hands and legs during the collection, drying, and *Shodhana* process.[8] If dermatitis occurs, *Pitta Shamaka Dravyas* (drugs that alleviate *Pitta*) are advised internally and externally.[17,20] *Vibhitaki* (*Terminalia bellerica*),[20] albumin of coconut, *Tila* (*Sesamum indicum*), and *Haritaki* (*Terminalia chebula*)[21] are used as antidotes internally, and coconut oil[8] and ghee[22] are used externally. *Nimba Patra Kalka* (neem leaf paste) can be used externally because of its *Pitta Shamaka* property and it is indicated for *Vrana* (wound), *Krimi* (worms), *Kushtha* (skin diseases), and *Visha* (poison) in Ayurvedic classics.[23] Recent

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Table 1: Treatment schedule

Case No.	Internal treatment			External treatment	
	Medicine	Dose	Duration	Medicine	Duration
1.	*Sarivadyasava* mixed with equal quantity of water	30 ml t.i.d. after food	15 days	*Neem* leaf paste applied for 30 min and washed with *Panchavalkala Kwatha*	7 days
	Triphala Churna mixed with water	5 g b.i.d. before food	7 days		
2.	*Sarivadyasava* mixed with equal quantity of water	30 ml t.i.d. after food	15 days	*Neem* leaf paste applied for 30 min and washed with *Panchavalkala Kwatha*	7 days
	Triphala Churna mixed with water	5 g b.i.d. before food	7 days		
3.	-	-	-	Coconut oil	7 days
4.	-	-	-	Coconut oil	7 days
5.	*Sarivadyasava* mixed with equal quantity of water	30 ml t.i.d. after food	15 days	Coconut oil	7 days
	Triphala Churna mixed with water	5 g b.i.d. before food	7 days		

Figure 1: Urushiol induced contact dermatitis caused by *Bhallataka* fruits in case 1; a) *Bhallataka* blisters, b) Application of *Neem* paste, c) After treatment

Figure 2: Urushiol induced contact dermatitis caused by *Bhallataka* fruits in case 2; a) *Bhallataka* blisters, b) Application of *Neem* paste, c) After treatment

Figure 3: Urushiol induced contact dermatitis caused by *Bhallataka* fruits in case 3

Figure 4: Urushiol induced contact dermatitis caused by *Bhallataka* fruits in case 4

researches have proved its antibacterial[24] and wound healing activity.[25] *Panchavalkala Kwatha* (bark decoction of five *Ficus* species) is indicated for cleaning the wounds,[26] so can be used externally in the condition of *Bhallataka* blisters.

In the cases presented here, *Neem* leaf paste was used for *Lepa* (topical application) [Figures 1 and 2]. After 1 h, the paste was washed with *Panchavalkala Kwatha* and *Seka* (pouring continuously) with the same decoction (*Panchavalkala Kwatha*) for 30 min was done. This treatment was continued for 7 days. It showed good and quick results in subsiding the blisters. Internally *Sarivadyasava* for 15 days and *Triphala Churna* for 7 days helped in curing the blisters rapidly.

Conclusion

Precautionary methods must be followed right from collection of the drug *Bhallataka* (fruits) and disposal of media and handling of utensils used in *Shodhana* process. Applying coconut oil before collection and during processing will protect from developing contact dermatitis caused by *Bhallataka* fruits.

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Pitta Shamaka measures to be followed to subside the urushiol-induced contact dermatitis. The *Shodhana* (processing) of *Bhallataka* should be conducted in an open place.

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हिन्दी सारांश

भल्लातक (*Semecarpus anacardium* Linn.) फल के शोधन के दौरान घटित Urushiol जनित त्वकशोथ (Contact Dermatitis) पर अध्ययन

इलंचेलियन आर., रोशि जोसेफ सी., रबिनारायण आचार्य

भल्लातक का उपविष के रुप में आयुर्वेदीय ग्रन्थों में और विष औषध के रुप में औषधि और प्रसाधन सामग्री अधिनियम (भारत) १९४० में उल्लेख किया गया है । भल्लातक फल को अकेले या सम्मिश्रण के रुप में प्रयोग किया जाता है । फल में मौजूद काला तेल त्वचा में फफ़ोले उत्पन्न करता है । यह तैल के प्रधान घटक anacardic acid, bhilawanol A, B को Urushiol के रुप में जाना जाता है । भल्लातक शोधन के दौरान घटित Contact Dermatitis के पांच रोगियों का चिकित्सकीय अध्ययन किया गया एवं इनमें निम्ब कल्क (बाहरी लेपन), सारिवाद्यासव और त्रिफला चूर्ण के आन्तरिक प्रयोग को प्रभावी पाया गया है ।