Physico-Chemical Analysis of Pure and Impure *Bhallataka*

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Abstract

Bhallataka, geeru beeja and marking nut is common Semecarpus anacardium. Washer men used this herb to mark clothes before washing. This versatile herb is used in ayurvedic system to cure various diseases by pacifying kapha dosha in human body. *Bhallataka* is mentioned under *Upavisha* group in *Ayurvedic* classics. All the parts are poisonous mostly seeds are hazardous to human due to its irritant property. By shodhan sanskara, *Bhallataka* has most beneficial effects. 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. *Bhallataka* grows throughout India in hot weather. *Bhallataka* used by externally and internally in both ways. *Ashuddha* (impure) *Bhallataka* containes oil in it which is removed after *Shodhana* process. It is observed that *Shodhana* (purification procedures) of the fruits should be carried out before its internal administration. There are different *Shodhana* methods mentioned in Ayurveda. This research paper deals with impact of *Shodhana* on *Ashuddha* (impure) *Bhallataka* and to compare the physico analytical parameters of *Ashuddha* (Impure) *Bhallataka* and *Shuddha* (Pure) *Bhallataka.*

Keywords: *Impure Bhallataka, Pure Bhallataka, Shodhana, Physico-chemical Analysis.*

Introduction

In Ayurveda *Bhallataka* is described as vanaspatij visha and in modern science, it is irritant organic vegetable poison. *Bhallataka* is described as a poisonous medicinal plant in Drugs and Cosmetics Act (India), 1940. 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.[1]. Juice from seeds mixed with lime is used by Dhobi to mark clothes. Seed is almost black, roughly cone shaped and 2.5*1.5cm.[2] Analytical study of the drug means its physical and chemical analysis. It is carried out to check quality, identity and purity of the drug. For this purpose some analytical tests are designed and their results should be comparing with standard parameters established by C.C.R.A.S. in "Pharmacopoeial Standards for Ayurvedic formulations". If a drug fulfilling these criteria can be taken as standard drug and used for therapeutic purpose. Till recently *Ayurvedic* medicines used to be prepared and practicing by physician himself for the use of the patients. He was well qualified for identifying the single drugs and trained in the various processes of preparing compound formulations because of his training in the *Gurushishya Parampara*. The physician was at liberty to modify the composition of any preparation according to prevailing local conditions and with a view to serve the needs of any individual patients.[3]

Aims and Objectives:

- *To collect the literature review of Bhallattak.*
- To evaluate the impact of *Shodhana* on *Ashuddha Bhallataka*.
- To compare the physico analytical parameters of *Ashuddha* (Impure) *Bhallataka* and *Shuddha* (Pure) *Bhallataka*

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Synonyms:

Sanskrit Name:

Bhallat, tapan, agni,	Bhallatak, agni	vatari, spotbijak,
Krumighn, vatari1.	dahan, tapan,	dhanurbeej,
Arushk arushkar, agnik,	aruskar, anal,	bhallat,
Agnimukhi, bhalli,	krimighnha,	veejpadap,
Veervruksha, shophkrut[4]	tailbeej,	vanhi, vartaru[5]

Classification[6]

English Name - Marking Nut

Botanical Name - Semecarpus anacardium

Family - Anacardiaceae

Hindi **-** *Bhilawa*

Marathi - *Bibba*

Ayurvedic - *Sthavar vanaspatij visha*

Modern - *Irritant Organic vegetable poison*

Chemical Composition : Semecarpol, Bhilwanol[7]

Ayurvedic Properties*:*

Rasa - *Katu, Tikta, Kashaya[8, 9]*

Guna - *Snigdha, Laghu, Tikshna*

Virya - *Ushna*

Vipaka - *Madhur, Katu[10, 11]*

Doshkarma - *kaphavatshamak and pittvardhak*

Local action - *Sphotjanana, shitprashaman, vishagnha[12]*

Internal action [13]:

No.	System	Karma
1	Pachanvah sansthan (Digestive)	Dipan, pachan, bhedan krumighna
2	Swasansanshtan (circulatory)	Hrudayuttejit, shothnashan
3	Mutravah sansthan (excretory)	Mutrajanan (diuretic)
4	Prajanan sansthan (Reproductive)	Vrushyya, garbhashauttejak
5	Tapakram (Fever)	Jwaraghn
6	Twaka	Swedjanam, kushtagnha
7	Nadisansthan	Medhya, balya

Vishakt lakshane:

1. Dah, vran, mukhshoth, visarp[14]
2. Kandu, dah, twakvaivarnya, atisar, jwar, raktmeh, unmad[15].
3. Guda-shishna kandu, swedatipravrutti, trushna, alpamutrapravrutti, twakdah-kandu [16.]

Vishakt chikitsa:

1. Til tail, nariyal tail, ghee or ral malahar – local application.[17]
2. Narriyal dugdha, chincha patra swaras, nariyal, lead lotion.[18].

Post mortem appearance: Blisters in the mouth, throat, mucous membrane in the stomach, congested and inflamed, fatty degeneration of liver.[19]

Medico-legal aspect:

1. Juice of an bhallataka is used as abortificient by means of its application to the os uteri by means of an abortion stick, applied to the genitals for the punishment for adultery, juice has been thrown on the face with an evil intensions. Used by malingerers to produce as artificial bruises, internal administration by quacks –due to accidental poisoning. [20].
2. Apllied externally produces irritaton and blisters containing acrid serum, administration of juice by hakim and vaid due to accidentally. Homicidal poisoning is rare[21]

Materials and Method

Physico-chemical analysis of *Bhallataka*: In Analytical study, the following parameters were used. Parameters were taken as per Ayurvedic pharmacopoeia.

Physico-chemical analysis:

1. Loss on drying
2. Total Ash value
3. Acid insoluble Ash values
4. Acid soluble ash values
5. Water soluble Ash values
6. Water soluble extract
7. Alcohol Extractive values
8. PH of Aqueous Extract of 1% of 10% ofsolution.
9. Conductivity of Aqueous Extract of 1% & 10% of solution.

Physico-chemical Analysis:

1. Loss on Drying:

Procedure: About 2 gm sample was taken in a tarred china dish, dried at 105 °C, cooled it in desiccators and weighed. Again the procedure of heating, cooling and weighing was repeated until the constant weight was obtained. The loss on drying was calculated.

Importance: Loss on drying gives information about moisture content of the samples.

2. pH of 1% and 10% solution: pH is the measure of acidity or alkinity. It is the logarithm of the reciprocal of the hydrogen ion concentration or is equal to the logarithm of hydrogen ion concentration with negative sign.

This method has the advantage that all scales of acidity and alkality between those of solution molar (or normal) with respect to hydrogen or hydroxyl ions, can be expressed by a series of positive numbers between 0 to 14.

The plant material, in general contains many alkaline or acidic compounds.

Procedure: 5 gm sample was suspended in 100ml of chloroform water in conical flask with their mouth closed. The flask was shaked for 1 hr and then left for 6hrs and filtered. pH of filtrate (1% and 10% of aqueous extracted) was measured by Ph meter calibration of electrode. (Toschon-Toshniwal Instrument)

3. Conductivity of Aqueous extract of 1% and 10% of solutions

Procedure: 5 gm of sample was suspended in 100ml of conductivity water in conical flask with their mouth closed. The flask was shaked for 1 hr and then left for 6 hrs, and filtered. Conductivity of each filtrate (1% and 10% of aqueous extract) was measured by conductivity meter.

4. Total Ash: About 2 gm sample was taken in silica dish incinerated at temperature not exceeding 450°C until become free from carbon(for 1.5 HR), cooled in dessicator and weighed.

Again sample was heated, cooked and weighed till the constant weight was obtained.

$$\text{Total Ash} = \frac{(100 \text{ x weight of Ash})}{\text{Weight of sample taken for the test}}$$

5. Acid Insoluble Ash: Acid Insoluble Ash gives information about silicate or sand present in the sample.

About 2 gm sample was taken in silica dish. Incinerated at a temperature not exceeding 450°C until become free carbon, cooled in dessicator and weighed samples were heated, cooled and weighed till constant weight was obtained.

Thus obtained ash of sample was treated with dil. HCL The insoluble matter was collected on an ashless filter paper and washed with hot water until the filtrate becomes neutral. Then this filter containing insoluble matter was transferred to original crucible dried on hot plate and ignited to constant weight.

$$\text{Acid Insoluble Ash} = \frac{(100\text{x wt. of acid insoluble ash})}{\text{Wt. of sample taken}}$$

6. Water Soluble Extractive: The sample was taken about 2 gm in a flask. 100ml of chloroform water added to it; the mouth of flask was closed. It was then shaken frequently for 6 hours then allowed to stand for 10 hours and filtered. 25 ml of filtrate evaporated in a tarred flat bottom shallow dish, dried at 105 °C in oven to constant weight.

7. Alcohol Soluble Extract: The sample weighing

about 2 gm was treated with 100ml of alcohol in closed flask for 24 hours, shaking frequently during 6 hours and allowed to stand for 18 hours. Then it was filtered 25ml of filtrate evaporated in tarred flat bottomed shallow dish at 105 °C until constant weight obtained. The presence of alcohol soluble extract was then calculated.

Bhallataka Shodhana[22,23]:

References: Rasatantrasara and Siddhayogasangraha (Part –I), (Page No.38)

Equipments - Gas stove, *Mritpatra, Dolayantra,* steel plate, knife, etc.

Ingredients

1.	*Ashuddha Bhallataka*	-	500 gm
2.	*Ishtika choorna*	-	q.s.
3.	*Buffelo* dung	-	q.s
4.	*Gomutra*	-	q.s.
5.	*Godugdha*	-	q.s.
6.	*Narikela Jala*	-	q.s.
7.	Hot water	-	q.s.

Procedure:

1. With *Ishhtika Churna:*

- The fruits which were submerged in the water, were selected for *Shodhana Sanskar* while the floating fruits were discarded.
- Receptacles of selected *Bhallataka* fruits were drawn out after three days and all fruits were cut near receptacle under water with sharp cutter in two pieces. The weight of *Bhallataka* fruit was 350 gms.
- These fruits were rubbed with brick powder (5 times more than *Bhallataka* fruits).
- This cloth bag was kept under observation for next 24 hours. After 24 hours colour of brick powder turned black.
- *Bhallataka* fruits were then separated and further rubbed with same quantity of brick powder.
- The process was repeated on second and third day, where the change in colour of brick powder was dark maroon and as original brick powder respectively.
- Hence the process was stopped here. *Bhallataka* fruits sorted, rinsed with water and dried.

2. *Shodhana* in *Buffelo dung* mixed with water:

- Receptacles of selected *Bhallataka* fruit were drawn. *Bhallataka* fruits total weight was near about 325 gm.
- *Dolayantra* was assembled in earthen pot having capacity 5 liter.
- The *Pottali* of *Bhallataka* was suspended to a iron rod on the mouth of pot in such a way that it did not touch the bottom of pot and swinging and submerged in liquid media.
- The pot was heated to boil gently in *buffelo dung* mixed with water for 3 hours.
- *Buffelo dung* mixed with water was added frequently to maintain level.
- This in turn increase the heating by ½ hour as it decreases the temperature of *Shodhana dravya.*
- Hence total 3 ½ hours heating was given. After this *Bhallataka* fruits were drawn out, washed with hot water and dried.

- Same method was applied for the *Bhallataka Shodhana* by using *Gomutra, Godugdha and Narikela Jala* as a *shodhana dravya*.
- At last they were washed with hot water and dried in sunlight. Dried fruits of *Bhallataka* crushed to make powder and filtered through piece of cloth to get fine powder.
- All above mentioned processes detoxified *Bhallataka* fruits by removing its poisonous oil and making it more suitable for medicinal use.

Observation:

- Consistency - Soft
- Colour - Black powder
- Odour - *Gomutragandhi*
- Weight after *Shodhana* - 275 gm
- Total loss of Weight - 225 gm

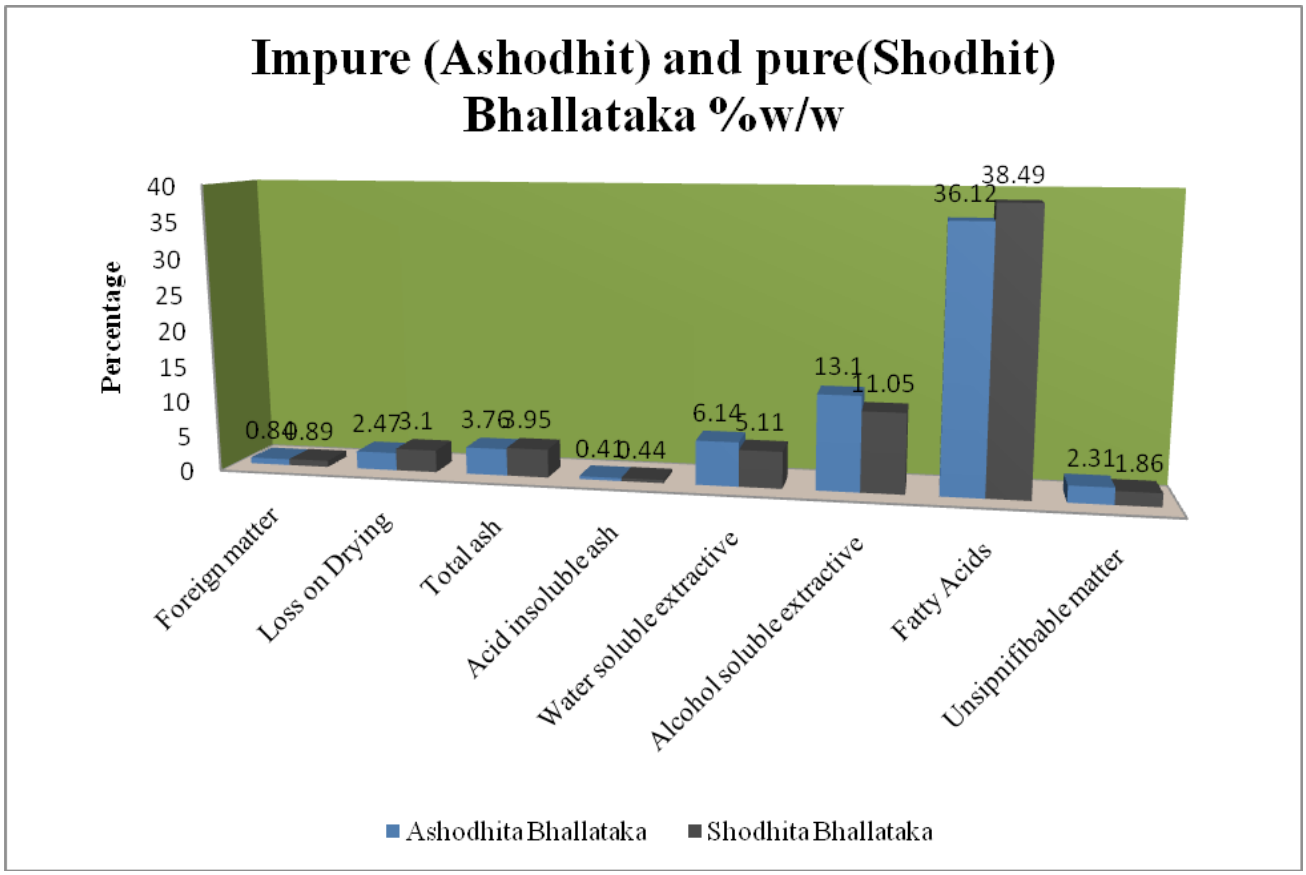
Causes of weight loss:

- Floating *Bhallataka* fruits was not taken for *shodhana.*
- Receptacles of *Bhallataka* fruits was removed during *shodhana.*
- Because of removal of external layer.
- While cutting, the damaged portion was removed.
- maximum amount of oil excretion takes place during *shodhana* in *Ishtika choorna and Gomutra.*

Precautions:

- *Pottali* should be dipped completely in each liquid media, but should not touch the bottom.
- The level of *shodhana dravya* in *Dolayantra* should be maintained as it goes down during heating.
- *Shodhana* was done on *mandagni*.
- All body should be covered during *shodhan*

Observations and Results



Sr.No.	Analytical Tests	Impure sample of Bhallataka	Pure sample of Bhallataka
1	Foreign Matter (%w/w)	0.84	0.89
2	Loss on drying (%w/w)	2.47	3.10
3	Total Ash (%w/w)	3.76	3.95
4	Acid Insoluble Ash (%w/w)	0.41	0.44
5	Water soluble extractive (%w/w)	6.14	5.11
6	Alcohol soluble extractive (%w/w)	13.10	11.05
7	Fatty Acid (%w/w)	36.12	38.49
8	Unsaponifiable matter of oil by weight (%w/w)	2.31	1.86
	Identification Test for Phenolic Constituents (%w/w)	Positive	Negative

Discussion

Analytical study of the drug means its physical and chemical analysis. It is carried out to check quality, identity and purity of the drug. For this purpose some analytical tests are performed. Till recently *Ayurvedic* medicines used to be prepared and practicing physician himself for the use of the patients. He was well qualified for identifying the single drugs and trained in the various processes of preparing compound. *Shodhana of Bhallataka* was done in Ishtika choorna, Buffelo dung, Gomutra, Godugdha and Narikela jala which removes thetoxic oil percentage in Bhallataka and make it therapeutically useful.When such *shodhana* sanskara carried out, Bhallataka posses properties like Rasayana, Yogavahi, Tridoshaghna. After *Shodhana Bhallataka* becomes soft, *Gomutra Gandhi* and black in colour. The fatty acids in *impure Bhallataka* were found in 36.12%w/w which was within normal limits. Maximum weight loss of *Bhallataka* takes place during *shodhana* in *Ishtika choorna* and *Gomutra.* The water soluble, alcohol soluble extractive and unsapnifibable matter was less in pure *Bhallataka* than *impure Bhallataka*. Identification Test for Phenolic Constituents(%w/w) positive in impure sample of Bhallataka which gets negative after purification of Bhallataka.

Conclusion

Nowadays there are various complaints about market prepared Ayurvedic Herbal Preparations . Indian market as well as global market also suffering by this thought that the market prepared drugs are not prepared well or not following the norms of Ayurvedic text described by our *Acharyas.* It affects the drug quality and patients also due to adulteration and unscientific process of preparing any Herbal preparation. In recent time, adulteration becomes very serious problem, the requirement of *Ayurvedic* formulization increased so that the quality gets decreased to fulfill the demand. To prepare quality drugs, authentification and analysis of drugs needed. In analytical study chemical configuration of raw material, physio-chemical changes during process and effect of different *Shodhana Sanskara* and configuration of *Bhallataka* were studied in terms of *Ayurvedic* as well as Modern Science. Fatty acids increases by 2.37 % in pure *Bhallataka* than impure *Bhallataka* concludes that, the *Shodhana* carried out in *Godugdha* successfully. It concludes that the principle of *Vishadravya shodhana* is to reduce its poisonous properties up to needed extent, where it does not show any unwanted and hazardous effect therapeutically.

Ethical Clearance: Taken from institutional ethics committee.

Source of Funding: Self.

Conflict of Interest: Nil.

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