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GANDHAKA SHODHANA: A PHARMACEUTICO-ANALYTICAL STUDY

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ABSTRACT

Rasa Shastra is most important and popular branch of Ayurveda related to Herbo-mineral (Rasaushadhis) preparation techniques with their therapeutic uses. Gandhaka (Sulphur) is a non- metallic solid element found in nature. Kupipakwa, Pottali, Parpati, Khalwiye Rasa Aushadhis containing Gandhaka are very popular due to their instant action even in small dose, tasteless, long shelf life. But Gandhaka must be purified first for preparing different Rasaushadhis so as to eliminate its adverse effects on body. **Aims and Objectives-**Purification of Gandhaka was carried as per classical reference of Ayurved Prakash and its organoleptic characters were observed. **Material and Methods-** Different methods by different authors are available for Shodhana of Gandhaka. For present study, Gandhaka was melted with equal amount of Goghrita then poured into vessel containing Godugdha. The same procedure was repeated for 3 times and fresh Godugdha and Goghrita was taken every time. Detailed observations and organoleptic characters were noted during the procedure. **Result and Conclusion-** Ashuddha Gandhaka was taken 475 g and final purified Gandhaka obtained was 355 gm. Crystalline dark yellow Gandhaka turned into granular and lemon yellow colour, tasteless, Goghruta odour and Snigdha touch after Shodhana.

KEYWORDS: *Gandhaka, Shodhana, Dhalana, Ayurved Prakash.*

INTRODUCTION

Gandhaka is included under *Uparasa* by all the *Rasa Granthas. Gandhaka* is the principal material used for making the most important preparations like *Rasalinga, Rasabandhas.*

Gandhaka is known since ages, in *Brahatrayi, Gandhaka* is used in several diseases as a therapeutic agent. Later, after 7th century A.D. *Gandhaka* was used extensively both in *Dehavada* (in maintaining the health and eradicating the diseases) and *Loha Vada* (converting lower metals into gold and silver).[1] It is an essential agent for the various processes of *Parada Samskaras, Marana, Jarana* and *Bandhana* etc. Mercurial preparations without *Gandhaka* are considered to be more toxic. The mythological origin[2] is explained as, the product obtained while churning *Ksheera Sagara / Samudra Manthana* along with *Amrita* (nectar). Different synonyms[3] like *Shulvari, Gandhapashana, Pamari, Kruragandha, Navanita Saugandhika, Gandhi, Bali, Gandhaka, Daityendra, Atigandha, Sugandhika, Balivasa, Gandha, Daityendra and Kushtari* etc. In ancient texts mentioned *Graha Lakshnas* of *Gandhaka* as the colour of genuine *Gandhaka* should resembles that of the tail of parrot (greenish yellow).[4] It should be smooth, hard and unctuous. It should be having the luster of *Kapikacchubeeja* and *Navanita* (soft to touch). For *Rasayanartha* and *Loha Vadartha*, it should be translucent like the fruits of *Amalaki (Amalasara Gandhaka).*

The pharmacological and therapeutic properties explained in *Ayurveda* are[5]

Rasa: Madhura, Katu, Tikta, Kashaya Guna: Ushna, Sara, Snigdha

Virya: Ushna Vipaka: Katu

Karma: Deepana, Pachana, Vishahara, Jantughna Dosha Prabhava: Kapha Vatahara, Pittavardhaka.

Vyadhi Prabhava: Kandu, Visarpa, Krimi, Kustha, Kashaya, Pleeha Roga, Rasayana.[6]

The modern view of *Gandhaka* (Sulphur).[7]

Aryans, Greeks, Romans and Indians used it for fumigation and as medicine. It is estimated as the 9th most abundant element in the universe. The general properties of sulphur are:

Name - Sulphur Symbol - S Hardness - 1.5 to 2.5

Boiling point - 440.60°C Melting point - 112.80° C Atomic Number - 16 Atomic mass - 32.06 Specific gravity - 1.9 to 2.3

MATERIAL AND METHODS

Raw *Gandhaka, Goghruta* (Cow Ghee), *Godugdha* (Cow Milk) were purchased from local market. *Grahya Lakshana* were checked before buying *Gandhaka* and its Analysis was done before and after *Shodhana* at Govt. Drug Testing laboratory, Patiala. *Shodhana* process of *Gandhaka* was conducted at Pharmacy of Govt. Ayurvedic college, Patiala.

***Shodhana* of *gandhaka*[8]**

Principle: *Dhalana* (3 times)

Ingredients

- *Ashuddha Gandhaka* - 475 g
- *Goghrita* - 475gm for 1st *Dhalana* (same as quantity of *Gandhaka*)
  413gm for 2nd *Dhalana* (same as quantity of *Gandhaka*) 375gm for 3rd *Dhalana* (same as quantity of *Gandhaka*)
- *Godugdha* - Q.S. for sub emersion of *Gandhaka* (approx. 4 litre 500ml/1litre 500ml for each *Dhalana*)
- Hot water - Quantity sufficient

Equipments: Mortar pestle, vessels, stirrer, *Palika Yantra*, cloth, burner with cylinder, weighing machine etc.

Procedure

Firstly powdered the *Gandhaka* in mortar pestle and then powdered *Gandhaka* (475gm) was taken in a *Palika Yantra* and heated with equal quantity of *Goghrita* (475 gm) over *Mandagni*. *Godugdha* (1litre 500 millilitre) was taken in another steel vessel and the piece of cloth was tied on the mouth of the vessel and cloth was smeared with some amount of ghee. When *Gandhaka* was totally melted in *Goghrita*, it was poured into the vessel containing *Godugdha* through the cloth. A solid mass with some granular part of *Gandhaka* was taken out of the vessel containing *Godugdha* and then washed with hot water and weighed. Same procedure was repeated for 3 times and fresh *Godugdha* and *Goghrita* was taken every time. After drying it was powdered, weighed and kept for further use.

Precautions

- *Gandhaka* should be made into powder form.
- *Gandhaka* should be heated over *Mandagni* to avoid catching fire.
- Cloth should be slightly smeared with Ghee.
- After each *Dhalana*, *Gandhaka* should thoroughly washed with hot water.

Determination of loss on drying of *shuddha gandhaka*[9]

Sample: *Shodhita Gandhaka* - 5 gm

Material required: Silica Crucible, Electronic Balance and Oven etc.

Method: 5 gm of sample was weighed in the silica crucible and dried in the hot oven at 105 degree Celsius for 5 hours. The sample was weighed again. The difference in the two weighing gave the loss on drying and then the percentage of loss on drying was calculated.

Determination of ash value of *shuddha gandhaka*[10]

Sample: *Shodhita Gandhaka* - 2 gm

Material required: Silica Crucible, Electronic Balance and Muffle furnace.

Method: 2 gm of accurately weighed sample was taken in a crucible and subjected to incineration at 450 Degree Celsius in a Muffle Furnace until it got freed from carbon. Later it was cooled and weighed. From the weight of residue the percentage of ash was calculated and expressed as % w/w.

OBSERVATIONS AND RESULTS

Observations of *gandhaka shodhana*

- Average time taken to melt the *Gandhaka* was 10-15 min.
- When melting of *Gandhaka* was done, it turned into orangish colour liquid.
- After each *Dhalana* granular mass of *Gandhaka* was formed when *Gandhaka* was removed from *Godugdha*.
- Crystalline dark yellow *Gandhaka* turned into granular and lemon yellow after *Shodhana*.
- Typical smell of *Gandhaka* was smelt throughout the process.

Results of *gandhaka shodhana*

Weight of *Ashuddha Gandhaka* taken - 475gm

Weight of *Shuddha Gandhaka* obtained - 355 gm

Total weight loss - 120gm

Total % weight loss - 25.26%

Table 1: Results of *gandhaka shodhana*.

No. of *Dhalana*	Wt. of *Gandhaka* taken	Wt. of *Gandhaka* obtained after *Dhalana*	Loss of wt. of *Gandhaka*	% wt. loss of *Gandhaka*
1st	475gm	413gm	62gm	13%
2nd	413gm	375gm	38gm	9.20%
3rd	375gm	355gm	20gm	5.33%

Table 2: Organoleptic characteristics of *shuddha gandhaka.*

Organoleptic characteristics	*Shodhita gandhaka* sample
Colour	Yellowish red
Touch	Smooth
Odour	Characteristic
Taste	Pungent

Table 3: Physio-chemical Analysis of *shuddha gandhaka.*

Physio-chemical analysis	*Shodhita gandhaka* sample
Loss on Drying	0.53%
Ash Value	Nil



Fig. 1:Ashuddha Gandhak. Fig. 2:Goghrita with Gandhak. Fig. 3:Gandhak in Godugdha.


Fig. 4: Washed with hot water. **Fig. 5: Shuddha Gandhak.**

DISCUSSION

Many methods are mentioned in classical texts of Rasa Shastra for *Gandhaka Shodhana* but was done by *Dhalana* (Melting and Filtering) method using *Godugdha* and *Goghrita* as media of *Shodhana* because *Ashuddha Gandhaka* contains *Shila churna, Vishatatva* and may contain Arsenic which get detoxify with hydrocarbons of *Goghruta* and *Godugdha. Mandagni* was given to avoid burning of sulphur. Cloth was smeared with Ghee to avoid sticking of *Gandhaka* to the cloth. Hot *Godugdha* was taken for pouring of melted *Gandhaka*,

it promotes the formation of soft granules whereas cold milk forms hard mass of *Gandhaka.* After each *Dhalana*, *Gandhaka* was thoroughly washed with hot water to remove fat contents of milk and Ghee. In this batch, from 475g of *Ashodhita Gandhaka,* 355g of *Shodhita Gandhaka* was procured with 25.26% loss. The possible reasons for weight loss was removal of fat soluble impurities with the help of *Goghrita* and Water and colloidal soluble impurities were removed by *Godugdha*. Physical impurities like slug got removed by filteration through cotton cloth, some amount of sulphur sticks to cotton cloth. Organoleptic properties of *Shuddha Gandhaka* were yellowish red coloured, pungent taste, characteristic odour and *Snigdha* touch.

CONCLUSION

Shodhana process is main process in preparing medicines and has half weightage to whole procedure of medicine preparation. Change in materials quantity during *Shodhana* process may affect whole process and structural changes in drug. *Gandhaka* is used widely in therapeutics hence it's important to use it after proper purification to get desired therapeutic effect and to lessen the untoward, toxic or harmful effect which can be caused after its internal administration. For *Gandhaka* purification *Dhalana* process is widely used method with *Godugdha* and with equal quantity of *Goghrita.*

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