SULPHUR (GANDHAKA) PURIFICATION METHODS W.S.R. TO RASA CLASSICS

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Article Info: Received 10 November 2019; Accepted 20 December. 2019
DOI: https://doi.org/10.32553/jbpr.v8i6.698
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Conflict of interest statement: No conflict of interest

ABSTRACT:
Gandhaka is one of the materials that are in extensive use in the past and also in the present era. It can be equated with Sulphur in modern chemistry. All most all the Rasa literature have included it under UpaRasa group, however in the periodic table it belongs to VI – A. It has a great role mainly in the preparations of Rasa and Rasayana drugs. As such the material in crude form can’t be used in drug manufacturing and therefore the crude materials are to be subjected to certain pharmaceutical measures to render them suitable for conversion into medicine and among such procedures the Shodhana is one. Historically Shodhana concept was in existence since the time of Smriti grantha Manusmriti and Charak Samhita 1(600-1000 B.C) as while enumerating the fundamentals of Ayurvedic Pharmaceuticals-Saucha(Sudhikarana) is found enumerated as one of the basic necessity for “Gunantaradhana’’(alteration and/or addition of properties in the drugs). This concept was further developed after the development of Rasashastra. In the current article 18 classics of Rasashastra been explored and different Gandhaka Sodhana (purification) methods were analyzed and discussed elaborately.

Keywords: Gandhaka, Sodhana, Dhalana, Bhavana, Prakshalana, Mardana, Nirvapa, Swedana, Galana

INTRODUCTION:

Gandhaka is one of the member of UpaRasa by Rasa vagbhata found described in bible as brimstone. It was found indicated with the name of Lelitak in Kustha treatment in Charak Samhita and later Chakrapani has commented it as Pashana bheda. The sulphur is extensively used in Rasa Shastra especially in various mercurial operations. Shodhan – a concept of purification was existed and started as simple process since Smriti and Samhita literature was later flourished and included several processes into its fold. As such Shodhana can be compared with purification process, however when a drug was subjected to Shodhana following traditional methods the material is no longer retains original purity of the starting material.

There are several methods for the Shodhana of Gandhaka has been found mentioned in different texts. Among them the commonest method consists of heating of sulphur up to melting stage with ghrita on fire and then pouring through a cloth into cow milk taken in a container and then washing it with hot water. The process should be repeated for 3 to 7 times and every time taking fresh Dugdha and Ghrita.

Table 1: Showing Gandhaka Shodhana procedure & media with reference

<table>
<thead>
<tr>
<th>Procedure</th>
<th>No. of methods</th>
<th>Media used for Shodhana</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dholana using Sthaliyantra</td>
<td>2</td>
<td>Milk, Ghee, milk</td>
<td>Rasadhya\textsuperscript{a}</td>
</tr>
<tr>
<td>Dholana in Karsha or Kundali Patra</td>
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<tr>
<td>Dholana (7 times) Bhavana Bhavana, Prakshalana Dholana Dholana in milk and Bhavana in other media</td>
<td>5</td>
<td>Karanja tailed, Eranda tailed, Goat milk, Dhatura swaRasa Jalini seed, matsya pitta Bhringaraja swaRasa, warm water Bhringaraja swaRasa Milk, ginger, Bhringaraja and Nimbu swaRasa</td>
<td>Rasarnava\textsuperscript{3}</td>
</tr>
</tbody>
</table>
| Melting & pouring (Laghu putta). Melting & pouring, Bhavana & Drying (Two times). | 6 | • Ghee Milk
   • Kanguni/Sarshapa/Eranda/ Kusumbha Tailam/Goat milk/Ghrita/Godugdha/Kanjī, Dhatura swaRasa.
   • Tilaparni, Ajamoda, Brahmi, Bhringaraja & Dhatura swaRasa, Ghrita (equal quantity) and Ajadugdha, Ghrita, Tilaparni SwaRasa, Matsyapitta, Jwālinī bija churṇa, Bhringarajā swaRasa, Ghrita and Bhringaraja swaras.
   • Bhrati, Ajagandha, Bhringaraj, Dhatu & Tilaparni drava, Ghrita (equal quantity) and Ajadugdha.
   • Dhatura swaRasa & Karanja taila, Eranda taila, Chhagidugdha, Dhatura swaRasa, matsya pitta, koshataki Bijā churṇa, Bhringarajā swaRasa, Jala, Ghrita & Bhringaraja swaRasa.
   • Brahmi, Ajagandha, Bhringaraja, Dhatu or Tilaparni Rasa, Ghrita and Meshidugdha. | Anandakanda⁴ 

| Bhavana & Dhalana (3 times) | 1 | Bhringaraja swaRasa | Chakradatta⁷ 

| Melting & pouring Nirvapa | 2 | • Milk
   • Milk | Rasa Paddhati⁵ 

| Swedana in dolayantra, Prakshalana, Dhalana Nirvapa / swedana in dola yantra (7 times) | 3 | • Milk, warm water & Ghrita
   • Milk, warm water
   • Bhringaraja swaRasa | Rasendra chudamani⁷ 

| Dhalana & swedana Dhalana & swedana (7 times) Melting & pouring | 3 | • Milk
   • Bhringaraja swaRasa
   • Milk | Rasa Ratna Samucchaya⁸ 

| Melting & pouring, Prakshalana | 1 | • Milk | Rasa prakash sudhakara⁹ 

| Dhalana in kurmaputa Dhalana Bhavana | 3 | • Milk / Kanji with Ghrita
   • Ghrita(equal quantity), milk
   • Tankana(1/4th), nimbu swaRasa, eranda taila | Rasendra chintamani¹⁰ 

| Swedana | 1 | • Rakta , sneha, vasa, milk | Rasa kamadhenu²² 

| Laghu puta Dhalana | 2 | • Milk, Ghrita
   • Milk, Ghrita | Rasendra sara samgraha¹² 

| Dhalana | 1 | • Ghrita, Milk (equal quantity) | Sharangadhara samhita¹³ Bhava prakashā¹⁴ 

| Kachapa puta or kurma puta, Prakshalana | 1 | Milk | Ayuveda prakash¹₅, Yoga ratnakar¹₆ 

| Swedana in dola yantra, Prakshalana Melting & pouring Nirvapa / swedana in dola yantra (7 times) | 3 | • Milk, warm water
   • Ghrita, Milk, warm water
   • Bhringarajā swaRasa / kanji | Br. Rasa Raja sundara²₇ 

| Laghu puta, Dhalana. Dhalana Swedana & Dhalana Dhalana Dhalana / swedana (7 times) | 5 | • Ghrita, Milk
   • Ghrita (equal quantity), Milk
   • Milk & Ghrita
   • Ghrita, Trifala kwath
   • Bhringarajā swaRasa | Rasayana sara²⁹ 

| Dhalana & nirvapa Melting & aavapa (3 times) Galana, dhalana (3 times for yoga & 5 times for sevana) is the | 4 | • Ghrita, takra
   • Bhalltaka taila, trifala kwath/guduchi swaRasa
   • Ghrita (1/4th), milk (2 times)
   • Ghrita (1/4th), Pandalu swaRasa | Rasayana sara²⁹ |
Table 2: showing Procedures referred by various classics

<table>
<thead>
<tr>
<th>Procedure →</th>
<th>Reference ↓</th>
<th>Dhana</th>
<th>Swedana</th>
<th>Bhavana</th>
<th>Patana</th>
<th>Aavapa</th>
<th>Mishrita (Mixed procedures)</th>
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<tbody>
<tr>
<td>Rasadhaya</td>
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<tr>
<td>Chakradatta</td>
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<td>Rasa Paddhati</td>
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<td>Rasa Ratna Samucchaya</td>
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<td>Rasa prakash sudhakara</td>
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<td>Rasa kamadhenu</td>
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<td>Rasendra sara samgraha</td>
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<td>Laghu Puta</td>
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<td>Sharangadhara samvita/ Bhava prakasha</td>
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<td>Kacchapa /Kurma Puta</td>
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<tr>
<td>Br. Rasa Raja sundara</td>
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<tr>
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<tr>
<td>Rasa Tarangini</td>
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<td>Galana</td>
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From the above Table, it can be summarized that Rasashastra classics have adopted following 6 types of methods (procedure) for Gandhaka Shodhana.

1. Dhalana

In this procedure, there are also two sub procedures- a) By melting Ashuddha Gandhaka in container and pouring immediately in container having milk, etc liquid. This procedure is termed as 'Dhalana' in above table. This procedure has been mentioned first by Chakradatta. Later this Patha from Chakradatta is also adopted by Rasendra sara samgraha in Amlapitta Chikitsa Prakarana. The second procedure of Gandhaka Shodhana of Rasa ratna samucchaya has also get mention by authors of Ayurveda prakash, Rasendra purana, Br. Rasa raja sundara, Rasa chandanshu and Rasa jala nidhi.

Use of different liquids and Sneha drava in Gandhaka Shodhana have been first mentioned in Rasayana Sara.

Almost all authors use Lauhapatra for melting of Gandhaka, while Kanta Patra used by Anandakanda, Lauhapatra & Hansatika by Rasa Taragini and Katah, Darvi & Mrivpatra by Rasayana Sara. Almost all authors quoted 'Sthali' or 'Bandha' as a container and used 'Kharpara' or 'Shravaka' above Gandhaka & 'Vanyopala' as fuel.

b) By giving Laghupata, melting, and self pouring of Gandhaka through a cotton cloth into the container having Dugdha etc. liquid in it. This
procedure is here mentioned by the term ‘melting & pouring’. This procedure has been mentioned first by Anandakanda and Rasa prakash sudhakara.

For Puta, author of Rasa prakash sudhakara used 20 Upalas and the number of Upalas was mentioned for the first time. How much time heat should be given has been mentioned first by Rasadhyaay as ‘Jwalayet ghatika dvayam’. Author of Rasendra Chintamani termed Laghuputa as ‘Kurmaputa’ and used Kanji instead of Dugdha first. The mouth of liquid containing container has been tied by woolen cloth by Rasa paddhati.

2. Swedana

In this method, Dolayantra has been recommended for Gandhaka Shodhana. By making Pottali of Ashuddha Gandhaka in cloth, do Swedana in Dolayantra containing liquids like Dugdha, Vasa, Sneha, Rakta, etc. This method is first described by Rasendra chudamani. Rasa manjar23 only mentioned Dugdha for Swedana.

It is not so common method for Gandhaka Shodhana. Instead of Pranij Dravya, author of Rasa dhatu prakash24, used Audbhiha swaRasa as Nimba swaRasa/ Bhringaraja swaRasa for swedana of Gandhaka.

3. Bhavana

This procedure of Gandhaka Shodhana is first depicted by Rasarnava.

4. Patana

In this procedure, Damaru yantra has been used for Gandhaka Shodhana. It is first quoted in Ananda kanda and later in Rasa tarangini. For this, the author advised to make a fine powder of 4 pala. Gandhaka, placed it in a lower container of Damaru yantra and do paka for 4 Yama. Then, after cooling, evaporated Gandhaka crystals scraped from the upper container. This Shuddha Gandhaka is devoid of Pashanadi doshas.

5. Aavapa

This procedure is also depicted first by Rasa Tarangini. For this, take Sudhajala 13 parts and Ashuddha Gandhaka 2 parts, melt them till Gandhaka become ‘Kapilabha varna’, and then filtered it by cloth and place in glass container.

After cooling, do Aavap of Lavanadravak till Gandhaka gets settled. Then the liquid spilled out and do Prakshalana of Gandhaka, dry and powder it.

These Patha of Patana and Aavapa is then only mentioned by Rasa dhatu prakasha.

6. Mishrita (Mixed procedures)

From the above procedures, Anandakanda, Rasarnava, and Rasa ratnakara have mentioned mixed procedures i.e. 2, 3 or 4 procedures for Gandhaka Shodhana. These mixed procedures seem to be useful in Dhatu vada.

From all these Gandhaka Shodhana procedures, nowadays the most common method generally adopted practically and commercially, is the 1st procedure of Dhalana i.e. Dhalana followed by galan.

INSTRUCTIONS REGARDING GANDHAKA SHODHANA BY DHALANA PROCEDURE

1. Gandhaka

Before melting Gandhaka, it should be powdered first as ‘Rajawata’ according to Chakradatta, Ayurveda praksha, Rasa tarangini, and Rasayana Sara samgraha.

2. Patra

Almost all Rasashastra classics mentioned Lauha patra for Gandhaka melting. Anandakanda has used Kantapatra. Especially Lauhapatra having broad base should be used. Tamra patra should be avoided.

3. Agni

Use of Mridu agni instructed for the melting of Gandhaka, Gandhaka should be melted upto ‘Tailanibha’ according to Rasadhyaay, Rasa chandanshu, Rasa tarangini, and Rasendra chintamani.

4. Sneha

Karanja, Eranda, Sarshapa, Tila, Kusumbha, Bhallataka, Jayapala & Bibhitaka taila, and Ghrita should be used as Sneha dravya according to Rasarnava, Rasa ratnakar, Rasa tarangini, and Rasayana Sara. Generally, Ghrita should be used.
5. **Sneha matra**

Regarding *Sneha matra* got following 5 instructions

a. Melting of *Gandhaka* without *Sneha* is instructed by authors of *Chakradatta*, *Rasendra Sara samgraha*, *Ayurveda prakash*, *Rasendra purana*, *Br. Rasa Raja Sundara*, *Rasa dhatu prakash* and *Rasa chandanshu*.

b. Melting of *Gandhaka* in *Ghirayukta patra* is mentioned by *Rasarnava*, *Anandakanda*, *Rasa ratnakara*, *Rasadhyaya* and *Rasamritam*.


d. 1/4th *Sneha* for *Gandhaka* dravana has been quoted by *Rasayana Sara*.

6. **Drava**

Besides *Dhatuvada Granthas*, mostly *Dugdha* and then *Bhringaraja swaRasa* is indicated.

a. *Dravya Matra* – Instruction of *Dravyamatra* has not mentioned generally in all classics expect *Rasayana Sara*, here 2 times of *Drava* (of *Gandhaka*) is indicated.

b. *Dravavastha* – According to *PRasadini Sanskrit* commentary on *Rasa tarangini*\(^2^6\), the *drava* i.e. *Dugdha* should be taken hot. If taken cold, the *dugdha* and *ghrita* enter into pores of *Gandhaka* making it flavored (*Gandhayukta*).

7. **Vastra**

*Rasashastra* classics instructed to use 'Tanu vastra'.

8. **Dhalana matra**

*Rasarnava*, *Rasa Ratnakar*, *Ayurveda Prakash*, *Rasa tarangini*, *Rasamritam*, and *Rasayana Sara* have instructed *Dhalana of Ghandhaka* (melted) once or thrice and for internal administration, *Dhalana* should be done 3, 5 or 7 times. According to *Ayurveda prakash* and *Rasa tarangini*, *Drava* should be taken fresh each time.

9. **Prakshalana**

Ayurveda *praksha* and *Rasa tarangini* instructed *Prakshalana* by water (hot) after *Gandhaka Shodhana*.

**Note**

Before *Shodhana* of *Gandhaka*, to remove its physical impurities like dust, etc. it should be washed with *Nimbu swaRasa*. Like *Gandhaka*, *Tankana* should also be washed, as per *Rasendra chintamani*\(^2^7\).

After delving through the *Rasashastra classics*, we can find that particular *Gandhaka Shodhana* procedures have also been mentioned randomly for preparation of particular formulations, besides under heading 'Gandhaka Shodhana'. As per *Chakradatta*\(^2^8\), for the preparation of *Rasa parpati*, *Parada* and *Gandhaka Shodhana* should be done which is mentioned in *Kshudhavati Gudika* preparation in *Amalpitta Chikitsa Prakarana*. In this context, *Bhaishajya ratnavali*\(^2^9\) also suggests special *Gandhaka Shodhana* procedure for preparation of *Rasa parpati*. In this method, *Gandhaka* is subjected to 7 *bhavanas* of *Bhringaraja swaRasa*, dry & powder it. Then by melting, pour into *Bhringaraja swaRasa* once, dry in sunlight and make *churna* like *Ketakirajasa*, melting done on 'Badarakasthangara'.

In this way, *Rasendra chintamani*\(^3^0\) also mentions 'Rasa shodhita Gandhaka' for the preparation of *Br. Somnatha Rasa* (Bahumutra Soma Rogadhikara). As per *Vaidya Maniram Sharma*, ('Maniprabha' Sanskrit commentary on *Rasendra chintamani*) – 'Mushakpani Rasen Shodhito Gandhkah'.

**Discussion:**

Literature regarding the *Shodhana* reveals that *Rasashastra* classics have adopted 6 types of procedures viz. *Dhalana*, *Swedana*, *Bhavana*, *Patana*, *Aavapa*, and *Mishrita* (i.e. mixed procedures). Out of these, *Dhalana* procedure can also be divided into two types i.e. melting *Ashuddha Gandhaka* with *Ghrita* in a container and pouring in the container through cotton cloth smeared with *Ghrita* having *Dugdha*, etc. liquid which is the most common method. The classics have given scientific explanation stating that the
poisonous principles associated with Gandhak will bound to ghee and the stones and gravel, sand etc get disassociated and remained in cloth. Second Dhalana procedure mentioned, by giving Laghuputa, involving melting and self pouring of Gandhaka through the cotton cloth into the container having liquid in it. The former one is the contribution of Chakradatta and later’s is of Anandakanda and Rasa Prakash Sudhakara.

Besides under heading Shodhana, special methods of Gandhaka Shodhana have also been mentioned for preparation of particular formulation.

Mostly the media used for Gandhaka Shodhana, Anupana of Shuddha Gandhaka and dravya used for management of complications caused by Gandhaka Sevana quoted same as Godugdha and Goghrita. It shows that Rasacharyas wanted to slow down its ‘Agnikari’ guna and also to reduce its toxic or adverse effects. It also throws light on Rasahsatriya principles.

Conclusion

The process of Shodhana can be found in every Rasashastra classics which removes the physical, chemical impurities and reduces the toxic effects. Chemical impurities are eliminated through evaporation, dissolution and binding with ghrita, milk, whereas physical impurities are removed by filtering through the cloth. Though “Dhalana” method of Sodhana is very common, choice of the method of Shodhana is dependent on the potential usage of Gandhaka.

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<th>Journal of Biomedical and Pharmaceutical Research</th>
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