EFFECT OF DIFFERENT SHODHANA MEDIA ON GANDHAKA

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ABSTRACT
Sulphur is a most important drug to convert mercury into its therapeutically effective form, as mentioned in Rasashastra. It gets medicinal value soon after it is purified. Various gandhaka shodhana methods are mentioned in classics. A qualitative (organoleptic characters) and quantitative estimation (temperature, quantity of media, weight of sulphur and elapsed time) of Gandhaka was carried to assess the effect of different media and the results are discussed.

Keywords: Sulphur(Gandhaka), Shodhana, Purification, Media

INTRODUCTION
Sulphur1 is the most important non-metallic element that occurs in both combined and free states and is one of the most abundant elements found in a pure crystalline form. In mineralogy Sulphur is called as "Brim stone". In Latin it means "burning stone and was used almost interchangeably with the term fire. Because of its combustibility, Sulphur was used for a variety of purposes at least 4,000 years ago (Cunningham 1935). In Rasashastra Gandhaka holds an important place next to Parada(Mercury) and is extensively used to prepare sagandha Paradeeya kalpas (Sulphur supplemented Mercurial formulations). Shodhita Gandhaka (therapeutically purified Sulphur) is directly put to therapeutic use and does not need any marana or satvapatana as it is the only biologically active chemical ingredient present. There are various shodhana procedures mentioned for processing Sulphur, however characteristic features of therapeutically purified Sulphur are not described anywhere in classics. An attempt is made to assess the effect of different media in various methods; qualitatively and quantitatively with available resources.

SELECTION OF RAW DRUG FOR SHODHANA
Though in classics four varieties of Gandhaka are mentioned but the available varieties are only shweta and peeta. For medicinal purpose, the peeta (yellow variety) Gandhaka is mainly used. The Gandhaka which is clear (transparent or translucent), yellow in colour just like Shukapiccha and as smooth and glistening as butter (navaneeta samaprabha) is known as "Amalasara Gandhaka (pakwa Amalakiphalawat)" and is recommended for Rasakarma and Rasayana karma.

NECESSITY OF SHODHANA
According to ancient and modern texts Gandhaka contains two types of impurities:
a. *shila churna* (stone powder) b. *visha* (arsenic). The greatest quantity of naturally occurring Sulphur by far is combined with other elements, most notably the sulfides of copper, iron, lead, and zinc, and the sulfates of barium, calcium (commonly known as gypsum), magnesium, and sodium. Practically pure Sulphur may contain traces of selenium, tellurium and arsenic sometimes mixed with bitumen and clay. If these impurities are not removed before use, *Gandhaka* is likely to produce many diseases. Hence, *Shodhana* should be adopted.

**MATERIALS**

**Drugs:** Gandhaka, Goghruta, Godugdha, Bhringraj, Tila taila, Kusumbha taila and Sarshapa taila.

**Equipments:** Loha Darvi, Paatra, Gas stove, Cloth, Damaru yantra, Bhudhara yantra.

**METHODS OF GANDHAKA SHODHANA:** Based on the classical references, various procedures of Gandhaka shodhana were adopted for the study;

**METHOD I**\(^2\):  
1. 100 grams of *ghruta* (cow’s ghee) was taken in a lohadarvi (iron vessel) and heated on mild fire.  
2. Equal quantity (100 gms) of *Gandhaka* was added and continued heating till it liquefied.  
3. Liquefied *Gandhaka* was poured in *Godugdha* through a cloth.  
4. The same procedure was repeated for two more times.

**METHOD II**\(^3\):  
1.100gms of *goghruta* (cow’s ghee) was taken in a new and clean mud pot, containing 300ml *Godugdha* (cow’s milk).  
2. A thin clean cloth was tied to the brim of the vessel.  
3. Powdered *Gandhaka* was placed on this clean cloth and covered with a mud lid of equal diameter and *sandhi bandhana* was done.  
4. The vessel was placed in a pit up to its neck and covered with 16 vanopalas (cow dung cakes) and lit.  
5. *Gandhaka* liquefied and dripped into the cow’s milk.  
6. After *swanga sheeta* (self-cooling) it was taken out and washed with hot water.

**METHOD III:**  
Same as method I but instead of Goghruta, different tailas were taken such as Tila taila, Kusumbha taila, Sarshapa taila and the procedure was carried out.

**METHOD IV**\(^4\):  
1. Powdered Gandhaka was taken in a well cleaned iron vessel and heated on mild fire.  
2. On liquefying, it was poured into a vessel containing Bhringraj swarasa.  
3. After self-cooling, it was washed with hot water.  
4. The procedure was repeated for 7 times.

**Method V**\(^5\):  
1.4 palas of finely powdered *Gandhaka* was placed in Damaru yantra and *sandhi bandhana* was done.  
2. The Damaru yantra was heated on madhyamagni for 4 yama (12 hours).  
3. After *swanga sheeta* the peeta varna *Gandhaka* adhered to the upper surface was collected.
## OBSERVATIONS OF GANDHAKA SHODHANA (DURING THE PROCESS)

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Method</th>
<th>Temperature of liquid used</th>
<th>Qty of Ghruta/Taila (in ml)</th>
<th>Qty of Dugdha/Kwatha</th>
<th>Time of Swanga sheeta</th>
<th>Weight of Gandhaka (in g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ghruta/Dugdha</td>
<td>60°C</td>
<td>100, 90, 70</td>
<td>200 ml</td>
<td>25 min</td>
<td>88, 75, 66</td>
</tr>
<tr>
<td>2</td>
<td>Tilataila/Dugdha</td>
<td>60°C</td>
<td>100, 90, 80</td>
<td>200 ml</td>
<td>25 min</td>
<td>90, 77, 70</td>
</tr>
<tr>
<td>3</td>
<td>Sarshapa taila/Dugdha</td>
<td>60°C</td>
<td>100, 90, 75</td>
<td>200 ml</td>
<td>35 min</td>
<td>88, 75 71</td>
</tr>
<tr>
<td>4</td>
<td>Kusumbha taila/Dugdha</td>
<td>60°C</td>
<td>100, 90, 80</td>
<td>200 ml</td>
<td>25 min</td>
<td>88, 79, 71</td>
</tr>
<tr>
<td>5</td>
<td>Bhringraj kwatha</td>
<td>50°C</td>
<td>--</td>
<td>200 ml</td>
<td>15 min</td>
<td>100, 99, 98, 97, 96, 93, 91</td>
</tr>
<tr>
<td>6</td>
<td>Bhudhara yantra</td>
<td>--</td>
<td>--</td>
<td>200 ml</td>
<td>75 min</td>
<td>85</td>
</tr>
<tr>
<td>7</td>
<td>Damaru yantra</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1 day</td>
<td>68</td>
</tr>
</tbody>
</table>

## ORGANOLEPTIC CHARACTERS OF SHODHITA GANDHAKA

<table>
<thead>
<tr>
<th>Sl</th>
<th>Method</th>
<th>Odour / smell</th>
<th>Collision sound</th>
<th>Colour</th>
<th>Physical Appearance</th>
<th>Fragile character</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ghruta/Dugdha</td>
<td>Odourless</td>
<td>Metallic</td>
<td>Pale bright yellow with black spots</td>
<td>Thin flake like</td>
<td>Fragile</td>
</tr>
<tr>
<td>2</td>
<td>Tilataila/Dugdha</td>
<td>Typical</td>
<td>Metallic</td>
<td>Pale yellow with occasional black spots</td>
<td>Thin slab like</td>
<td>Fragile</td>
</tr>
<tr>
<td>3</td>
<td>Sarshapa taila/Dugdha</td>
<td>Ghruta</td>
<td>Metallic</td>
<td>Dull yellow with black tinge</td>
<td>Thicker slab like</td>
<td>Hard</td>
</tr>
<tr>
<td>4</td>
<td>Kusumbha taila/Dugdha</td>
<td>Odourless</td>
<td>Stone like</td>
<td>Spotless bright yellow</td>
<td>Thin slab like</td>
<td>Most Fragile</td>
</tr>
<tr>
<td>5</td>
<td>Bhringraj kwatha</td>
<td>Odourless to faintly</td>
<td>Metallic</td>
<td>Pale yellow with</td>
<td>Thicker flake like</td>
<td>Fragile</td>
</tr>
</tbody>
</table>
DISCUSSION:
Sulphur has a property of "Allotropism" This property is its important characteristic. Physical state is same, chemical is same, but forms and physical properties are different. 

Sulphur usually melts at 120°C, but if heated slowly melts at 113° C. It boils at 444.8° C. At temperature above 150°C, Sulphur becomes thick and viscous, above 250°C it becomes more fluid again and its colour changes from yellow to red. It is dark-brown at its boiling point. Sulphur is a very reactive element. At 250°C it ignites with air. As it burns, it combines with oxygen to form SO₂, a colourless gas.

In the procedure, the Gandhaka gets dissolved in the goghruta (cow’s ghee), during which vishas (toxins) get dissolved in ghruta, thereby ghruta simultaneously detoxifies the Gandhaka. The ghgruta pacifies the pittadosha. The substances which are insoluble in ghee are filtered off from the Gandhaka. The vishas present in Gandhaka are lipid soluble (Ghruta, Dugdha, Taila) and have affinity towards protein present in dugdha.

When transferred into dugdha, the temperature of the Gandhaka drops down and it gets solidified again into a solid slab and the traces of ghruta float on the surface of the dugdha. If sheeta dugdha is taken for the nirvapana of Gandhaka, then cavities are formed inside which ghruta and dugdha gets filled. If atyushna dugdha is used, it forms a solid slab without any cavities. The Gandhaka should be heated on mandagni or otherwise kharapaka will destroy the guna, varna of Gandhaka.

After swanga sheeta the snigdhata of Gandhaka, because of ghruta, is washed out with hot water. Similarly in other Dhalana procedures using different Tailas, similar changes do occur along with Gunavardhana of Gandhaka with respect to the Tailas used. Few texts have mentioned to liquefy Gandhaka, in such cases it is directly heated on Mrivagni. In other context it is mentioned that Gandhaka to be poured in the Swarasa of Bhringraj, which alleviates the pittadosha.

The basic concept, to detoxify the Gandhaka and to process it with Pittashamaka substances, remains the same. In II method, 16 vanopalas weighing 1.5 kgs were put around the mud pot to fire. The total time required for swanga sheeta of the mud pot was about 02.05hrs. The temperature ranged between 120-150°C. This procedure separates the pashana etc impurities above
Cloth and the visha in Gandhaka dissolves in the ghruta and dugdha. Rasa texts describe that, Bhringaraja rasadwara shodhita Gandhaka is useful in preparing parpati. In Damaru yantra procedure the texts mentioned to maintain madhyamagni for 4 yamas ranges between 360-380°C. The Gandhaka obtained by this method is bright, devoid of sneha and is useful in preparing swarna vanga and makaradhwaja.

**SCOPE OF THE STUDY**
1. The presence of organic alkaloids has to be evaluated using sophisticated instruments.
2. Analytical studies of Dugdha, Ghruta, Kwatha and Tailas may describe the presence of visham in Gandhaka, to highlight therapeutic attributes of Gandhaka in Rasa yogas; it needs to be evaluated clinically.
3. This study further requires suggestions for Gandhaka shodhana at industrial level.

**CONCLUSION**
This study highlights the shuddha Gandhaka laxanas done in different media through organoleptic and preliminary chemical analysis. Conclusion on this experiment about shuddha Gandhaka laxanas is that, the Gandhaka should be odourless, fragile and should be having thin flakes and metallic sound. At a glance, after shodhana, Gandhaka retains its Peeta varna, Percentage yield of shudha Gandhaka as a final product validates the method to be adopted in Rasa-Rasayana karmas. The quantum of Agni ascribed to Gandhaka as Mandagni falls between 113-120°C. Similarly the Madhyamagni for Gandhaka falls between 360-400°C.

**REFERENCES**

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