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Pharmaceutical Study of Vanga Bhasma

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ABSTRACT

Vanga bahasma is a type of herbo-mineral preparation. Usage of herbo minerals as therapeutic agents has been in practice since centuries. Ayurvedic system of medicine should be considered the pioneer regarding the pharmaceutical processing and therapeutic application of metals. Herbo mineral formulations of Ayurveda constituting bhasma as an ingredient are as superior as it is even today. Manufacturing methods of bhasma preparations are in tune with nanotechnology of contemporary era and proved the advancement of Rasashastra, which may cover scientific validation of today.

KEYWORDS

Vanga Bhasma, Bhasma, Herbo-mineral
INTRODUCTION
Good manufacturing practice is very important in the field of ayurveda that leads to quality assurance of ayurvedic physician. Most of drug used in ayurvedic system of treatment are of herbo–mineral medicines. The formulations are also either herbal drug or herbo mineral drugs. The substances of herbal and mineral origin cannot be used in their crude form and need proper processing to convert them into suitable form for internal administration.

Manufacturing methods of bhasma preparations are in tune with nanotechnology of contemporary era and proved the advancement of Rasashastra, which may cover scientific validation of today.

Ayurvedic pharmaceutics are receiving a new thrust through a reappraisal of bhasma preparations as novel nano-technological application.

Hence pharmaceutical study of formulations utilizing the tools and technique presently available has become a necessity for producing quality drug as well as revalidating the claim of ancient Acharyas.

MATERIALS AND METHODS
In this present study the Pharmaceutical processes carried out during the preparation of Indravati had been dealt under various sections as follows:

1. Preparation of Vanga bhasma
Materials and methods used in this preparation are based on availability, feasibility in classical indication of Rasashastra, traditional value and expert opinions.

   Materials include:
   1. Major raw drugs
   2. Associated drugs

   Major Drug:
Ashudha Vanga was the major raw material used in this study. For the preparation of bhasma, Vanga was procured from NIA pharmacy, Jaipur. That was in the form of a solid mass.

   Associated Drugs:
   ➢ Drugs for samanya shodhana of Vanga

<table>
<thead>
<tr>
<th>S. No</th>
<th>Ingredients</th>
<th>Quantity per shodhana</th>
<th>Total quantity used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tila taila</td>
<td>200 ml</td>
<td>1400 ml</td>
</tr>
<tr>
<td>2</td>
<td>Takra</td>
<td>200 ml</td>
<td>1400 ml</td>
</tr>
<tr>
<td>3</td>
<td>Gomutra</td>
<td>200 ml</td>
<td>1400 ml</td>
</tr>
<tr>
<td>4</td>
<td>Kulattha kwatha</td>
<td>200 ml</td>
<td>1400 ml</td>
</tr>
<tr>
<td>5</td>
<td>Tila taila</td>
<td>200 ml</td>
<td>1400 ml</td>
</tr>
</tbody>
</table>

Tila taila, Takra, Gomutra, Kanji, and Kulattha Kwatha, were used for Samanya shodhana of Vanga. Tila taila was procured from the NIA Pharmacy Takra was procured from Saras dairy, Jaipur. Gomutra was freshly collected from
the local cow shed. *Kanji* (Sour gruel) were prepared in departmental lab.

*Kulattha Kwatha* (decoction of *Dolichus biflorus*) was prepared freshly in departmental lab.

- **Drugs for Vishesha Shodhana**

*(Table-2)*

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Ingredients</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Samanya shodhita vanga</td>
<td>182 g</td>
</tr>
<tr>
<td>2</td>
<td>Nirgundi patra swarasa</td>
<td>200ml for each dhalana.</td>
</tr>
<tr>
<td>3</td>
<td>Haridra churna</td>
<td>12.5g for each dhalana.</td>
</tr>
</tbody>
</table>

- **Drugs for Vanga jarana**

*Haridra Yavani Jeerak Chincha* and *Ashwattha* (Fig-5).

- **Drug for Marana of Vanga**

*Kumari swarasa* (Fig-4)

**Preparation of Kanji (Sour gruel)**

*(Table-3 & 4)*

<table>
<thead>
<tr>
<th>Wt. of Rice</th>
<th>Water added (5 times)</th>
<th>Wt. of cooked rice</th>
<th>Water added to it (3 times)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500g</td>
<td>2.5 Liter.</td>
<td>1.950 Kg.</td>
<td>5.850 Lt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Test</th>
<th>Initial phase</th>
<th>Terminal phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Colour</td>
<td>Cream</td>
<td>Yellowish</td>
</tr>
<tr>
<td>2</td>
<td>Odour</td>
<td>Non-specific</td>
<td>Strongly acidic</td>
</tr>
<tr>
<td>3</td>
<td>Test</td>
<td>Salty</td>
<td>Sour</td>
</tr>
<tr>
<td>4</td>
<td>Ph</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Transparency</td>
<td>Turbid</td>
<td>Transparent</td>
</tr>
<tr>
<td>6</td>
<td>Effervescence</td>
<td>-ve</td>
<td>-ve</td>
</tr>
</tbody>
</table>

**Showing Ingredients of Kanji:**

**Material required:**

- Rice - 500gm.
- Water -2.5 Lt.
- *Muli*-250 gm.
- *Haridra* -50 gm.
- *Saindhava Lavana* - 125 gm.
- Mustard oil - 62 gm.

- **Method of preparation**

  - Rice was cooked in 5 times water.
  - When cooked it was removed from fire, allowed to cool and weighed.
  - Further 3 times of water was added to the cooled cooked rice.
  - The oil was heated by taking it in an iron pan. The mustard and turmeric were added to the hot oil and on crackling of mustard the same was added to the cooked rice.
  - Salt and the Radish which was chopped into small pieces was added to the cooked rice.
  - Whole material was transferred to a sterile storage container.
  - The container was closely packed by *multani mitti* and kept aside for fermentation.
  - After the completion of process the supernatant clear liquid was siphoned out by using tube.

**Date of Commencement:** 12/05/2017

**Date of Completion:** 25/05/2017
Observation was observed during preparation of kanji showing table no 3 and 4.

**Preparation of Kulattha kwatha**: (Table-5 & 6)

<table>
<thead>
<tr>
<th>Material</th>
<th>Water added (16 times)</th>
<th>Water reduced to (1/8 times)</th>
<th>Final yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kulattha</td>
<td>16 Lt.</td>
<td>2 Lt.</td>
<td>2 Lt.</td>
</tr>
<tr>
<td>1 kg.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 6 Properties of Kulattha kwatha**

<table>
<thead>
<tr>
<th>Colour</th>
<th>Odour</th>
<th>Ph</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reddish brown</td>
<td>Pungent</td>
<td>5</td>
</tr>
</tbody>
</table>

**Procedure**:

Kulattha (Dolichos biflorus) was taken, coarsely powdered and soaked overnight, in half of the water meant for making decoction. On next day the remaining water was added and the material was boiled over mild fire till the water was reduced to one eighth. (Table no 5 and 6)

**Preparation of Nirgundi Patra Swarasa**: (Table-7)

**Procedure**:

Nirgundi Patra 800gm were properly washed and was run in a mixer with 300ml of water. After processing in mixer it was squeezed through cloth and the swarasa was collected in a S.S. Vessel. (Table No. 7).

**Extraction of Kumari Swarasa**:

Leaves of Kumari 100gm were washed in tap water; thorny margins and apex were cut by knife. Mucilaginous pulp was separated from the leaves with the help of knife and pulp was used for levigation. (Table No. 8)

- Raw Vanga was taken: 200g
- Samanya Shodhana of Vanga:

**Procedure**:

- Raw Vanga was taken on long handled iron ladle (Loha Darvi) and heated on Gas stove up to melting. (Fig-1)
- After complete melting of vanga, it was dhalana in Tila taila which was kept in the Pithara Yantra. (Fig-2)
- After collection of the Vanga from the media whole process was repeated for 6times.
- The process of heating and dhalana was done in other liquid media viz Takra, Gomutra, Kanji, and Kulattha Kwatha, respectively. Every time fresh and same amount of liquid media was taken.
- Weight, Temperature and Volume of liquid media was noted each time.

**Vishesha shodhana of vanga**:

**Procedure**:

Samanya shodhita Vanga was taken on iron ladle (Loha Darvi) and heated on Gas stove up to melting. When the whole metal was melted, immediately dhalana was done in the liquid media (200ml Nirgundi patra swarasa and 12.5g Haridra churna)
which was kept in the Pithara Yantra. The metal which got settled in the Pithara Yantra, was collected (Fig-3) and the whole process was repeated for two times. Every time fresh and same amount of liquid media was taken.

**Jarana of shuddha Vanga:**

**Ingredients:** Shuddha Vanga, Haridra, Yavani, Jeerak, Chincha, Ashwatha.

**Procedure:**

- The specified amount of Shuddha Vanga was taken in an Iron pan and was allowed to melt over the gas stove.
- Weighed quantity of Haridra, Yavani, Jeerak, Chincha, Ashwatha ranging from 2g to 3 g one by one was added to the molten Vanga and stirring continued with iron ladle by applying good amount of pressure.
- When all the metal was converted in to powder form and none of the metal remained in metallic form, the powder
was collected in the centre of pan and covered with an earthen saucer and heat was increased up to maximum (Tivragni 650°C) approximate for 1 hours.

- Intermittently Saucer was slightly lifted to check the color of the powder. When the color changed in to red hot & no melted particles of free metal were observed the heating was stopped and left for self cooling.

Next day, Jarita Vanga was collected and weighed.

**Marana of Vanga:**

**Ingredients:** Jarita Vanga 180 g
Kumari Swarasa 50gm in each Bhavana.

**Procedure:**
- Chakrika were prepared by transferring the whole mass on to a plastic sheet by spreading in thin layer in the form of chakrika with the help of spatula. (Fig 6)

- After the first two puta colour of chakrika were grayish white and consistency soft. Chakrika were found broken in the form of coarse powder and rough in touch.
- After 3rd, 4th and 5th puta the chakrika became hard and colour was just on the outer surface of chakrika which appeared as a coating. When the chakrika were broken inner surface was dull white.
- After 6th puta, chakrika became soft in touch and the colour of the Bhasma became dull white.
- After 7th puta chakrika were again hard and the colour of the bhasma became dull white.
- After 8th, 9th, and 10th puta chakrika were soft and the colour of the bhasma became white.
- After 11th puta, chakrika became very soft and the colour of the bhasma became whiter. (Fig-7)

**RESULTS AND OBSERVATION**

<table>
<thead>
<tr>
<th>Table 7 Properties of Nirgundi Patra Swarasa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield of Swarasa</td>
</tr>
<tr>
<td>635ml</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 8 Properties of Kumari Swarasa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield of Swarasa</td>
</tr>
<tr>
<td>50ml</td>
</tr>
</tbody>
</table>

- Results of samanya shodhit vanga:
  - Initial weight of Vanga: 200 g
  - Final weight: 182 g
  - Loss of weight: 18 g
  - % loss: 9

- Results of vishesha shodhit vanga:
  - Initial weight of Vanga: 182 g
  - Weight after Vishesha Sodha: 182g
  - Weight gain: No loss no gain
Table 9 A Numerical summary of various parameters obtained during the pharmaceutical process of Jarana of Vanga

<table>
<thead>
<tr>
<th>Weight of Vanga</th>
<th>Weight of jarana dravya</th>
<th>Duration (Hrs)</th>
<th>Weight of Jarita Vanga</th>
<th>Weight Increase</th>
<th>Color of Jarita Vanga</th>
</tr>
</thead>
<tbody>
<tr>
<td>175g</td>
<td>125 g</td>
<td>11.30 hours</td>
<td>180</td>
<td>2.8%</td>
<td>Dull white</td>
</tr>
</tbody>
</table>

Results:
Initial weight of Jarita Vanga: 180g
Weight of Vanga bhasma after 11 puta: 181 g
Weight: weight gain 1gm.
❖ Final yield of Vanga bhasma was 181 gm and loss was (9.5%).
❖ Bhasma pariksha:
The prepared sample of Vanga Bhasma was subjected for classical tests and it was seen that the sample complied with the tests.
❖ Rekhapurnatv : +ve (Fig-10)
❖ Varitaratwa: +ve
❖ Unama : +ve (Fig-8)
❖ Nishchandrata: +ve
❖ Niswadu: +ve
❖ Apunarbhava : +ve (Fig-9)

DISCUSSION
Samanya Sodhana of Vanga:
For samanya shodhana the common method of the Dhatu Sodhana was adopted. Hor of dhalana was Tila Taila, Takra, Gomutra, kanji and Kulattha Kwatha, as per the reference of Rasarantasamucchaya. Among the five media only Gomutra is alkaline with the pH of 10 whereas rest of the media are acidic in nature with the order being Kanji (2) > Takra (5) > Kulattha kwatha (6) > Taila(6). The order of dhalana is mentioned differently by different Acharyas. The various liquids used for dhalana served the basic purpose of acidic or alkaline medias which were necessary to bring about the desired changes in the metal. If we look in to the medias mentioned for dhalana it can be not
❖ All these would have been the easily available options of that time which probably served the purpose of acidic and alkaline media.

During the process of Samanya Shodhana, Vanga was heated up to melting; then it was poured for 7 times each in Tila Taila, Takra, Gomutra, kanji and Kulattha Kwatha. Every time fresh and same amount of liquid media was taken. The amount of liquid media taken was equal in amount to the quantity of Vanga. It should be noted that the quantity should be sufficient enough for immersing the metal and hence the volume depends on the diameter of Pithara Yantra taken. Initial weight of Vanga was 200g which reduced to 182 gm after shodhana. Vanga melts at
232° C but the duration of Melting was extended after every Dhalana process. On heating, the Sn-Sn bonds get energized and when plunged into liquid media get broken into smaller fragments by reacting with liquid resulting in probably, free Sn radicals. Vanga became more silvery white in colour after first dhalana. Blackish colour was noted in the second and third Dhalana and some part of Vanga change in to greyish powder. A large amount of slag formed and floats on liquid media or seen floating over molten tin. As the Shodhana progressed, more & more Vanga converted in to Blackish powder. Basically during melting of Vanga the conversion into powder indicate the formation of oxide form of Vanga.

- **Vishesha Sodhana of Vanga:**
  Vanga turned to slight yellowish green color, brittle along with fine particles at the end of special purification process. Turmeric powder adhered to tin caught fire during heating, forms carbonaceous material and floats over molten tin. Melting duration of Vanga was extended on every Dhalana procedure due to presence of carbonaceous material. Weight of Vanga was unchanged after vishesha shodhana. The loss was prevent due to addition of particles of Haridra.

- **Procedure of Jarana (Roasting):**
  The Vishesha Shodhita Vanga 175 gm (7 gm was taken separately for Vishesha Shodhita Vanga sample) was taken in an iron pan subjected to heating in open air. To the molten tin the coarse powder of haridra, yavani, jeerak, chincha, ashwattha were added little by little and rubbed with back of iron ladle with pressure. The process continued till it turned to powder form completely. This is known as Jarita Vanga (roasted tin). The jarana drugs was added 125 gm, though the Rasashastra advise to add ¼th jarana dravya to the metal .The process took 11:30 hours for converting 175g Shudha Vanga in to powder form without any free metal and a weight gain of 5gm was observed which may be due to the addition of Jarana dravya ash.

- **Procedure of Marana (Incineration):**
  Jarita Vanga was triturated with Kumari swaras till it turned to semi solid form. Pellets were made, dried and encapsulated and subjected to heating in electric muffle furnace. The same process was repeated for 11 times to get Bhasma as described in Ayurvedic classics. For 1st Puta 180g Jarita Vanga was taken. Bhavana Drava was taken 50 gm & Bhavana was given for 3hrs. During the process, increase in weight was noticed after successive puta with a final weight gain of 1gm which may be due to addition of organic materials of
Bhavana dravya. Vanga fall into those metal in which the intensity of heat should be increased as Puta no. increases. Hence the maximum temperature was increased from 500 to 650 in successive puta. The colour of product turned to white after second heating. Even though the material become soft after two puta the stage of varitaratwa didn’t appeared and hence puta were continued until the bhasma passed the test. It took 11 puta to obtain the bhasma which complies with classical bhasma parikshas.

CONCLUSION

The present study established pharmacological process of vanga bhasma and we do have reference saying that the product obtained after Jarana process can be used therapeutically. But this has been opposed and seems to be irrational as the metal is not completely converted to bhasma form after Jarana. So it finds to completely form of bhasma, necessary to give many putas. Before therapeutically use it should be test various parameter like varitara, rekhapornatwa, unama, apunarbhava etc. After these test we can say the vanga metal completely transform to bhasma form. Vanga bhasma is use for therapeutically without any proper pharmaceutical process it’s harmful to body and occurs many disease like prameha, kushtha etc.
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