REVIEW ON MUSHA: AYURVEDIC CRUCIBLES

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ABSTRACT

A Musha is defined as the one which removes the dosha (impurities) from Ras Dravya (mineral compound). They are known as Crucibles in the contemporary science. Musha are the special devices mentioned in Rasa Shastra to process the Rasa Dravya. They are mentioned in every text of Rasa Shastra, depicting its equal importance to other devices like Yantra (Instruments) and Kosthi (furnaces). Musha are of different kinds like Samanya Musha, Vrintak Musha, Gostani Musha, and Maha Musha etc. It has got unique synonyms like Krounchika, Karhatika, Pachani and Vahnimitra etc. Their description in Rasa grantha draws attention to know about Musha in a scientific way. Therefore, an attempt to review the different Mushas is made in this article.

Keywords: Musha, Dosha, Samanya Musha, Krounchika, crucible.

INTRODUCTION

In Rasa Shastra, there is description of Yantra, Musha, Kosthi and Puta (quantum of heat) to understand the science of Parad processing and its formulations. The concept behind explaining each separately is to know their functions and necessity as per the particular processing. One among them is MUSHA.

MUSHA is explained after Yantra¹. It shows that Musha is also a form of Yantra which helps to conduct the Rasa Karma (processing of metals and minerals). Musha is defined as the one, which make Rasa Dravya to undergo definite duration of transformation. Therefore, it does the purification of Ras Dravya by removing their Dosha².
There is no definite number of Musha in the texts, because they are mentioned as per situation and necessity.

One can find the interesting synonyms of Musha like Kumudi, Krounchika, Vahnimitra, Karahatika suggesting its versatile features\(^3\). Musha are of different kinds like Samanya Musha, Pakva Musha, Vajra Musha, Vajra Dravini Musha etc

**AIMS AND OBJECTIVES:**

This study is aimed for reviewing the details of Musha in Rasa granthas and analyzing their practical importance.

**MATERIAL AND METHODS:**

Here, the sources of data selected are Ras Ratna Samucchya and Rasa Tarangini. Datos of Musha regarding its derivation, definition, synonyms, types, contributing factors in its preparation and functions are collected. They are analyzed and interpreted to extract the conceptual knowledge of Musha in a simple way.

**OBSERVATION:**

1. **Basic Terminologies**\(^4\):

   While studying about Musha, some important terminologies have been observed.

   **Musha:** A special device which takes away the dosha from Rasa dravya

   **Pidhanak:** The lid or covering which prevents the Rasa dravya from spilling off from the Musha pot and helps in handling or lifting the Musha.

   **Sandhi lepana:** It is application of a mixture of Loha kitta(Iron rust), mud etc which seals the joint of Musha and Pidhanak. It is also known as Sandhibandhan.

2. **Classification of Musha and their Nomenclature**

   Musha have been classified or named as per their shape, the material used in their preparation and the purpose for which they are made.

**Table 1:** Classification of Musha\(^5\):

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Based on shape</th>
<th>Based on material used in their preparation</th>
<th>Based on purpose they serve</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gostani Musha</td>
<td>Gar Musha (mud from lakebed is used)</td>
<td>Samanya musha It serves the general function of Musha</td>
</tr>
<tr>
<td>2</td>
<td>Vrintak Musha</td>
<td>Vid Musha (kshar+amla+lavan etc varg dravya used)</td>
<td>Vajra musha As strong as Vajra Can sustain high degree of heat</td>
</tr>
<tr>
<td>3</td>
<td>Manduk Musha</td>
<td>--------------------------------------------</td>
<td>Vajra dravini musha It is used in liquefaction of Vajra, Abhrak etc</td>
</tr>
<tr>
<td>4</td>
<td>Mall musha</td>
<td>--------------------------------------------</td>
<td>Varn musha They are used to enhance the colour of rasa dravya Used in loha vada</td>
</tr>
<tr>
<td>5</td>
<td>Gol musha</td>
<td>--------------------------------------------</td>
<td>Yog musha They are used to obtain high quality of Parad bhasma.</td>
</tr>
<tr>
<td>6</td>
<td>Pakv musha</td>
<td>--------------------------------------------</td>
<td></td>
</tr>
</tbody>
</table>

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3. **Parts Of Musha**

Structurally, these have two parts ie one *Pidhanak* or the lid which covers the *Musha* and the lower basal part in which *Rasa Dravya* is kept.

The *Pidhanak* is again designed with some purpose. For example, in *Gostani Musha* the *Pidhanak* is with an elevation (*Shikha*) to lift up the lid easily and check for the *Dravan* or *Shodhan* of the *Ras Dravya*.  

In *Vrintak Musha*, the *Pidhanak* is in the shape of *Dhatura* flower with an open tube which helps to introduce the drugs inside the *Musha*.  

4. **Heat Sustainability**

Although being different in structure and function, these have one common feature i.e. to withstand the high temperature. They neither break nor get liquefied till certain degree of temperature.

### Table 2: Heat sustainability of different *Musha*

<table>
<thead>
<tr>
<th>Sl. No</th>
<th><em>Musha</em></th>
<th>Duration of heat sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Vajra dravini musha</em></td>
<td>10-14 hours</td>
</tr>
<tr>
<td>2</td>
<td><em>Pakva musha</em></td>
<td>3-12 hours</td>
</tr>
<tr>
<td>3</td>
<td><em>Gaar musha</em></td>
<td>6 hours</td>
</tr>
<tr>
<td>4</td>
<td><em>Var musha</em></td>
<td>3 hours</td>
</tr>
</tbody>
</table>

5. **Upadana Of Musha** (Base of Musha)

As Per *Rasa Ratna samuchhya, Mrittika* (clay) and *loha churna* (iron powder) are the basic requirements for the *Musha* construction. *Rasa taranginikar* specifies *musha nirmanochita mrittika* as sasarkara, pandura, shthula and vahnitapsaha. In their substitution, Valmika Mrittika (Ant hill mud) or Kaulali Mrittika (potter’s mud) can be used.  

Apart from these two, some materials specific to particular *Musha* are added, as shown in table no 3.

### Table 3: Specific factors in Musha Preparation:

<table>
<thead>
<tr>
<th>Sl.no</th>
<th><em>Musha</em></th>
<th><em>Upadana</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Samanya Musha</em></td>
<td>Black clay, <em>valmika mrittika</em> (Ant hill mud), burnt husk, jute fibres, charcoal, horse dung</td>
</tr>
<tr>
<td>2</td>
<td><em>Gar musha</em></td>
<td>Mud from lake bed</td>
</tr>
<tr>
<td>3</td>
<td><em>Vajra musha</em></td>
<td>White stone powder</td>
</tr>
<tr>
<td>4</td>
<td><em>Vajra dravini musha</em></td>
<td>Mud from lake bed, excreta of earthworms, buffalo milk</td>
</tr>
<tr>
<td>5</td>
<td><em>Yog Musha, Vid Musha</em></td>
<td><em>Vida</em></td>
</tr>
</tbody>
</table>

6. **Contemporary View; Crucibles**

The term Crucible is derived from a latin word “*crucibulum*” i.e. melting pot for metals. The Crucible is defined as a vessel of a very refractory material used for melting and calcining a substance that requires a high degree of heat.  

Refractory material

A refractory material is a material that retains its strength at high temperature.
materials must be chemically and physically stable at high temperatures. Refractory materials are used in for furnaces, kilns, incinerators, and reactors. They are also used to make crucibles and moulds for casting glass and metals. The oxides of Aluminum (alumina), Silicon (silica) and Magnesium (magnesia) are the most important materials used in the manufacturing of refractories. Another oxide usually found in refractories is the oxide of calcium (lime). Fire clays are also widely used in the manufacture of refractories. Fire clay is a range of refractory clays used in the manufacture of ceramics, especially fire brick. The United States Environmental Protection Agency defines fire clay very generally as a "mineral aggregate composed of hydrous silicates of Aluminium (Al$_2$O$_3$·2SiO$_2$·2H$_2$O) with or without free Silica."

To be referred to as a "fire clay" the material must withstand a minimum temperature of 1,515 °C (2,759 °F). Fire clay is resistant to high temperatures, having fusion points higher than 1,600 °C (2,910 °F), therefore it is suitable for lining furnaces, as fire brick, and for manufacture of utensils used in the metalworking industries, such as crucibles, retorts and glassware.

### Table 4: Types of Crucibles:

<table>
<thead>
<tr>
<th>Sl.no</th>
<th>Crucibles</th>
<th>Can withstand temp. up to</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Vitreous carbon crucible</td>
<td>3000 °C</td>
</tr>
<tr>
<td>2.</td>
<td>Silica crucibles</td>
<td>1600°C</td>
</tr>
<tr>
<td>3.</td>
<td>Platinum Crucibles</td>
<td>1200°C</td>
</tr>
<tr>
<td>4.</td>
<td>Porcelain crucibles</td>
<td>1050°C</td>
</tr>
<tr>
<td>5.</td>
<td>Nickel crucibles</td>
<td>600°C</td>
</tr>
<tr>
<td>6.</td>
<td>Carbon steel crucibles</td>
<td>500°C</td>
</tr>
<tr>
<td>7.</td>
<td>Zirconium crucibles</td>
<td>450°C</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Inventing Musha was to create a special container which can hold Rasa Dravya into it, and when exposed to heat, it can do the Paka of Ras Dravya. The Agni Samskar (processing with fire) taking place here can modify the Ras Dravya physically as well as chemically. For example, in Varna Musha the lower metals are transformed into higher metals. In Musal Musha, Parad Bandh can be achieved. In Yog Musha, best quality of Parad Bhasma can be obtained.

The materials required to make Musha are special. They are selected considering the following features of Musha, i.e. to give them stability in high degree of heat, to provide them good texture so that Musha is dried without any cracks, to bring better mould ability, so that Musha can be shaped into desired shape. For such purpose special quality of clay, burnt husk, jute fibers, charcoal, horse dung and iron powder are mentioned. The more beating is stressed here to make better mould.
In modern days while making crucibles, fire clay has been used. And it comes under refractory range of clay. Such type of clay has the ability to withstand high temperature. They are aggregates of minerals like Aluminum, Calcium, and Magnesium etc.\textsuperscript{28} Similar properties have been found in the Ant hill mud, Potter’s mud or the specific clay mentioned in Rasa Shastra. Also Bhu Nag Satva (Excreta of Earthworms) for Vajra Dravini Musha, contains Copper and Iron which contribute to its heat resistance.\textsuperscript{29}

Now a day, Usage of Musha is limited. It has been replaced by the cup shaped container called Crucibles. They are specially designed for liquefactions of the metals. But the ideology of Musha cannot be ignored. The concept behind them reveals truly scientific theory.

The same principle can be applied in modern days too to conduct the Rasa Karma.

**CONCLUSION**

Explanation regarding Musha told in Ras Shastra is very scientific. Its properties have important applications. Its utility in Rasa karma is vast. This review helps to understand the concept of Musha in clear way.

**REFERENCES**


Chaukhamba publication Varanasi, 2011;238.

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