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## PHARMACEUTICAL STUDY OF VANGA BHASMA W.S.R. TO RASAMITRAM

Vd Shraddha Panchabhai\*, Vd Manish Bhojar, Vd Sudhir Deshpande

Department of Rasshastra and Bhaishajya kalpana, Government Ayurved College, Nagpur

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### \*Corresponding author:

Dr. Shraddha Panchabhai

### Email:

sanchabhai6@gmail.com

### Present address:

Department of Rasshastra and  
Bhaishajya kalpana,  
Government Ayurved College,  
Nagpur

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### Abstract

**Introduction-** *Vanga bhasma* is the organometallic drug which is successfully treating diseases like *Prameha, Krimi, Pandu, Mutrakrichhra, Shweta Pradara, Rakta Pradara, klaibya* etc. To get the precise quality of drug it is important to manufacture the drug as per its classical reference. There are number of methods of preparation of *Vanga Bhasma* are explained in *rasagranthas*, which includes variation in methods of *vishesh shodhana, jaarana and marana*. This study is aimed to provide a proper preparatory protocol comprising the detailed description of each and every procedure followed during *Vanga bhasma nirman*.

**Objectives-** 1. To prepare *Vanga bhasma* with special reference to *Rasamitram*. 2. To assess the quality of prepared *Vanga bhasma*. 3. To develop standard manufacturing procedure of *Vanga bhasma*.

**Materials and methods-** *Vanga bhasma* was prepared by the steps- 1. *Samanya shodhana* 2. *Vishesh shodhana* 3. *Jarana* 4. *Marana*. The Preparatory procedure and observations were recorded and documented. The final product was then assessed for its quality by carrying out organoleptic, physic-chemical characters.

**Result and discussion-** Total no. *puta* given was 11. No. of cow dung cakes were decreased after 8<sup>th</sup> *puta* consequently from 15 to 12 and then to 10. Average maximum temperature recorded was 587°C. Total weight of *Vanga bhasma* obtained from 400gm of raw *Vanga* was 190gm.

**Conclusion-** The *Vanga bhasma* obtained after 11 *putas* passes *bhasma parikshas* viz. *Varitara, unnama, Nishchandra, Rekhapurnatwa*. Color of *Vanga bhasma* obtained was greyish white. Elemental assay of the *Vanga bhasma* shows tin as an element 65.18% w/w. XRD test shows major phase of SnO<sub>2</sub>.

**Keywords-** *Bhasma, Vanga Bhasma, Pharmaceutical study.*

## INTRODUCTION

*Ayurveda* is thousands of years old holistic system of medical health. Since 8<sup>th</sup> century AD many herbometallic drugs are being used to treat human health. *Bhasmas* are one of those, being prepared by subjecting metals or minerals to the various procedures like *shodhana*, *bhavana*, *jaarana*, *marana* etc. As *rasagranthas* mentioned that improperly prepared *Dhatu bhasmas* create adverse effects to body, it is important to prepare *bhasmas* with their standard procedures. / (Safety and efficacy of medicines depends on many criteria, processing techniques; media used during procedure etc.)

Vanga bhasma is an organometallic compound that has been used in a treatment of various diseases successfully. It is indicated in *Prameha*, *Krimi*, *Pandu*, *Mutrakrichhra*, *Shweta Pradara*, *Rakta Pradara*, *Agnimandya*, *Vrana*, *Aruchi* etc. but popularly used in *prameha*.<sup>1</sup> Either it is used as a single drug or as a constituent of *kalpas* like *Laxmivilas rasa*, *Nityananda rasa* etc.

There are number of methods of preparation of *Vanga Bhasma* explained in *rasagranthas*, which includes variation in methods of *vishesh shodhana*, *jarana* and *marana*. This leads to many practical difficulties in the preparation of *Bhasma*. This study is aimed to provide a proper preparatory protocol comprising the detailed description of each and every procedure followed during *Vanga bhasma nirman*. In this study, the Preparatory procedure and observations were recorded and documented. The final product was then assessed for its quality by carrying out organoleptic, physico-chemical characters.

## MATERIALS AND METHODS

The Raw materials namely *Vanga*, *Nirgundi churna*, *Apamarga churna*, *Haridra churna* procured from local market of Nagpur. All the Ingredients were authenticated as per criteria mentioned in classical texts.<sup>[1,2]</sup>

**Raw Material Authentication-** Assay for Tin was carried out to decide purity, quality of drug. The quality of final product depend on the raw material used. Assay of *Vanga* shows (tin) Sn 99.08 % w/w.

Preparation of *Vanga bhasma* includes 3 important stages-

1) *Shodhana* A) *Samanya Shodhana* B) *Vishesh Shodhana*

2) *Vanga Jaarana*

3) *Vanga Marana*

### 1) Shodhana

#### A) *Samanya Shodhana*[3]-

Ingredients- *Vanga* 500gm, *tila taila* – 500ml, *takra* – 500ml, *Gomutra* – 500ml, *kanji*- 500ml, *kulattha kwatha*- 500ml. *Vanga* was heated in iron ladle and melting it was poured into 5 different medias for 7 times. Each time fresh liquid media was used. *Pithar yantra* was used to prevent bumping out and loss of *Vanga* during the procedure.

#### B) *Vishesh Shodhana*[4]-

Ingredients – *Vanga* that obtained from *samanya shodhan*- 360gm, *Nirgundi swarasa*- 250ml each time + *Haridra churna* 50gm Firstly to prepare *Nirgundi swarasa* , 750 gm of *Nirgundi churna* was mixed in water of 1500ml kept as it is for 24hrs, then filtered with cotton cloth<sup>[6]</sup>.

250 ml of *swarasa* was taken and 400gm of *Haridra churna* was added, and then *Vanga* was melted and poured into it. Each time new *Nirgundi swarasa* was taken. This procedure was repeated 3 times

### 2) *Jaarana of Vanga*[5]-

Ingredients- *Vanga*- 350gm, *Apamarga churna* – 80gm.

Shuddha *Vangawas* melted in a vessel, slowly *Apamarga churna* was sprinkled and mixture was stirred vigorously for 1hr so that all *churna* get mixed with melted *Vanga*. The heating procedure is continued till *Apamarga churna* gets turn into red color. Then powder was aggregated in the center of pot and *sharava* was put on it and *teevragni* was given for 3 hr. After *swangasheetikarana* the *churna* was sieved through 120 no mesh and washed with water for several times until the pH becomes neutral as that of water.

Figure No. 1.3 *Vanga Jaarana*



Stirring Of Vanga with Apamarga Panchanga Churna



Teevragni for 1 Hr. Prakshalana

#### 4) *Marana*<sup>[5]</sup> –

Ingredients- *Kumari swarasa*- q.s, *Vanga powder*- 200gm

The powdered *Vanga* was treated with *kumari swarasa* and small circular *chakrikas* were made and dried it well. Then these dried *chakrikas* were packed in *sharavas* and *sandhibandhana* was done. This *sharavasamputa* was then subjected to heat i.e. called *putapaka*. (*Ardhagajaputa* 15 cow dunks, each cow dunk measuring 250gm). Core temperature of *puta* was noted after every 30 minutes using a pyrometer. *Agni* was allowed to cool itself. After cooling completely, the Seal was opened and the pellets of *Vanga* was collected, measured and taken in *kharala* for next *bhavana* for same procedure. This procedure was repeated for 11 times.

FIGURE NO. 1.4 VANGA MARANA



KUMARI SWARASA BHAVANA



Chakrika



Sharavasamputa



Putpaka



Maradana



Rekhapurnatva



Varitaratva

**RESULTS AND OBSERVATIONS**

**Table 1: Weight of Materials in gms after *Samanaya Shodhana, Vishesh Shodhana, Jarana and Putpaka***

Pharmaceutical procedure	Media	Initial weight in gms	Final weight in gms
<i>Samanya shodhana</i>	<i>Til taila, takra, Gomutra, kanji, kulattha kwath</i>	400	360
<i>Vishesh shodhana</i>	<i>Nirgundi swaras+Haridra churna churna</i>	360	350
<i>Jaarana</i>	<i>Apamarga churna</i>	350	200
<i>Marana</i>	<i>Kumari swarasa</i>	200	190

**Table 03. Vanga Marana w.r.t Temperature and Time**

Putra no.	No. of cow dung cakes used ( 200gm each)	Maximum temperature attained during <i>puta</i>	Time required in reaching the peak temperature	Time taken to fall temperature upto 40°C
1 <sup>st</sup>	15	660°C	20 min	6hrs 15 min
2 <sup>nd</sup>	15	678°C	16min	5hrs 45min
3 <sup>rd</sup>	15	645°C	15 min	5 hrs 50 min
4 <sup>th</sup>	15	647°C	20min	5 hrs 45 min
5 <sup>th</sup>	15	680°C	20min	5 hrs 35 min
6 <sup>th</sup>	15	637°C	20min	5 hrs 20 min
7 <sup>th</sup>	15	640°C	20min	5 hrs 45 min
8 <sup>th</sup>	15	632°C	20min	5 hrs 20 min
9 <sup>th</sup>	12	435°C	15min	4 hrs 30 min
10 <sup>th</sup>	10	410°C	15min	4 hrs 45 min
11 <sup>th</sup>	10	396°C	12min	3 hrs 55min

**Table no 03 Showing Vanga Marana Using Kumari Swarasa Bhavana**

uta no.	Weight of jaarit Vangain gms	Bhavna Dravya kumari swaras in ml	No of cow dung cakes used	Cow dung weight in kg	Weight after Puta in gms	Color after puta
1 <sup>st</sup>	200	100	15	3.75	200gm	Greyish white
2 <sup>nd</sup>	200	100	15	3.50	200gm	Greyish white
3 <sup>rd</sup>	200	100	15	3.75	200gm	White ( dull)
4 <sup>th</sup>	200	100	15	3.75	195gm	White (dull)
5 <sup>th</sup>	195	100	15	3.75	195gm	White ( dull)
6 <sup>th</sup>	195	100	15	3.75	195gm	White ( dull)
7 <sup>th</sup>	195	100	15	3.75	190gm	White ( dull)
8 <sup>th</sup>	190	100	15	3.75	190gm	White ( dull)
9 <sup>th</sup>	190	100	12	3	190gm	Whitish grey
10 <sup>th</sup>	190	100	10	2.5	190gm	Greyish White
11 <sup>th</sup>	190	100	10	2.5	190gm	Greyish white

Table no 04 -Organoleptic Characters of *Vanga Bhasma*

Parameter	Vanga bhasma
<b>Sparsha</b> ( touch)	Soft, no coarse particles by touch
<b>Rupa</b> (appearance)	
<i>Varna</i>	White
<i>Susnigdham</i>	Oleated in consistency
<i>Nishchandravta</i>	No metallic luster
<i>Rekha purnatva</i>	Fills the fine space between finger lines
<i>Varitara</i>	Floats on the surface of water
<i>Unnama</i>	Grains of rice float on the bhasma floating on water
<b>Rasa</b>	Tasteless
<b>Gandha</b>	Not specific

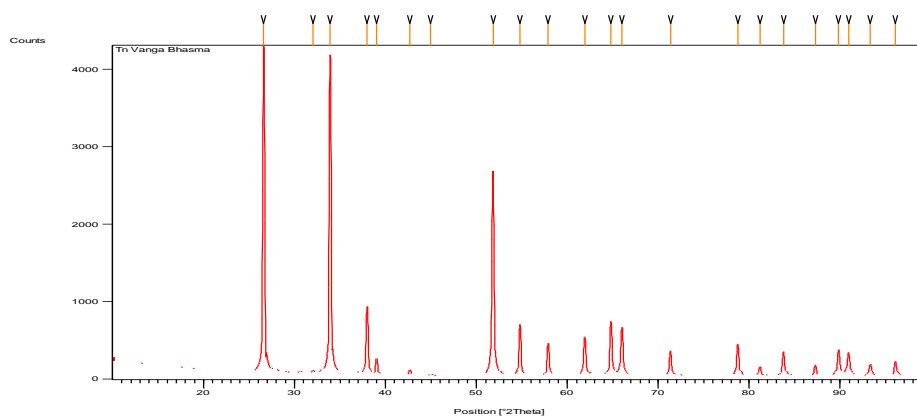
Table No 05 Results of Physico-Chemical Tests

Sr.no	Parameter	Vangabhasma
1.	Loss on Drying ( % W/W )	0.02
2.	Total Ash Value ( % W/W )	99.90
3.	Alcohol Soluble Extractives	6.45
4.	Acid Insoluble Ash ( % W/W )	80.33
5.	Water Soluble Extractives ( % W/W )	3.25
6.	Tin as Sn	65.18

Table no.06 Showing Result of Phase Identification by Diffractogram Using X-Ray

Pos. [ $^{\circ}2\theta$ .]	Height [cts]	FWHM [ $^{\circ}2\theta$ .]	d-spacing [ $\text{\AA}$ ]	Rel Int[%]
25.2210	96.36	0.2448	3.52827	4.25
26.9475	2143.88	0.3468	3.30601	94.56
28.6216	694.72	0.3264	3.11633	30.64
31.6397	2267.24	0.3468	2.82560	100.00
38.2968	149.83	0.2856	2.34836	6.61
44.0177	818.13	0.3264	2.05550	36.08
45.1042	271.53	0.3264	2.00848	11.98
46.1965	738.50	0.3876	1.96350	32.57
48.1709	60.55	0.4896	1.88753	2.67
52.1491	545.80	0.3672	1.75251	24.07
53.1182	571.51	0.3060	1.72280	25.21
54.9976	630.81	0.3060	1.66829	27.82
67.1214	37.26	0.4896	1.39340	1.64
69.4835	147.68	0.2856	1.35169	6.51
70.2830	265.62	0.3264	1.33826	11.72
72.6731	250.04	0.2856	1.30002	11.03
75.1562	118.30	0.3672	1.26311	5.22
75.8819	165.84	0.2040	1.25283	7.31
76.5765	91.43	0.4080	1.24318	4.03
81.1785	86.30	0.3672	1.18393	3.81
82.0032	72.35	0.3264	1.17409	3.19
91.0303	40.42	0.6528	1.07970	1.78

## Diffraction



Graph no. 1 showing the peaks of the sample.



**DISCUSSION-**

*Vanga bhasma* was prepared by the method described in *Rasamitram*<sup>[9]</sup>. During *shodhana*, liquid media was taken double than the quantity of *vanga*. During this procedure some blackish particles were observed. It happened due to the formation of oxide layer on the surface of the metal and some part of the metal may converting into tin oxide. During *shodhana*, bumping occurred. It may be due to sudden reduction inter molecular space of the molten metal, due sudden fall in temperature from 232<sup>o</sup> to 45<sup>o</sup>c. Total loss during the procedure of *shodhana* was 50gm. *Vanga* purified by the *Nirgundi* decoction and *Haridra churna* turned into greenish yellow color.

An overall review of *jarana* of *Apamarga* shows that the herbals used for this procedure are having alkaline nature. Due to continuous stirring and rubbing, more surface of the metal was exposed to the air, thus concerned oxide was formed and gradually the metal converted to powder form. During *kshalana* procedure, *jarit Vanga* powder was washed with distilled water to eliminate the alkaline substances, which was confirm by electronic p<sup>h</sup> Meter.

Major loss of weight was observed during *jarana* and *prakshlana* procedure. 200gms of *jarit Vanga* was levigated with *kumari swaras* for 3.5 hrs avg. till it became thick paste. *Chakrika* should be in uniform size and directly placed in *sharava* to avoid loss during handling. During *bhavana* procedure grinding is done, which allows friction. This produces heat which helps in the absorption of the *kumari swarasa* into it. After complete drying of *chakrika*, *sharava samputikarana* was done. To measure the temperature a hole is made to the classical *puta* so that tip of thermocouple can reach to the base of *sharava samputa*. Thermometer reading was taken right from room temperature.

*Ardha gajaputa* was prescribed to be used for *putapaka*. Before the use of cow dung cakes in *puta* a single cow dung cake was tested for adulteration by subjecting it to fire. As the cow dung cake burned slowly. (We can say it does not have any other material than cow dung). At each *putapaka* total weight of cow dunk cakes, was measured. 15 cow dunk cakes were used for *putapaka* which were averagely measured 3.7 kg for first 8 putas. Then as the color of bhasma became whitish number of cow dunk cakes were decreased gradually to 12 and then to 10 cow dunk cakes.

*Vanga bhasma* prepared was soft in touch which indicates smoothness and fitness of it. Color of *bhasma* indicates formation of particular chemical compound. *Nicshchandravta* of *bhasma* indicates conversion of particular metallic lustre into lustre-less *bhasma*. *Rekhapurnatva* and *unnama* test can be correlated with modern particle size distribution test. (table no3)

Loss on drying – has very low value of loss on drying. This indicates very less moisture content in the sample of *Vanga bhasma*. Ash value- ash value indicates presence of inorganic contents of the *bhasma*. Very high value of it indicates very high inorganic contents in it. (table no 4)

Water soluble extractives- water soluble extractives indicates that the bio availability of the *bhasma* is more in a media other than water. This may indicates the role of *anupana* while administration of various *bhasma*. X-ray powder diffraction (XRD) is a rapid analytical technique primarily used for phase identification of a crystalline material and can provide information on unit cell dimensions of the molecules present in the sample. (table no 5). A compound could be detected in X- ray diffraction i.e peak of a particular compound only when its concentration is more than 5 %. During *jarana* and *marana* procedure *Vanga* was heated, CO and O were formed from burning plants. This nascent oxygen is ionic in nature and more active than atmospheric oxygen. Then this oxygen may react with metal tin and forms compound SnO<sub>2</sub>.

#### CONCLUSION-

Total weight of obtained *Vanga bhasma* was 190gm. Total no. *puta* given was 11. Initially no. of cow dunk cakes were 15, after 8<sup>th</sup> *puta* no. of cow dunk cakes were decreased to 12 then to 10. So the no. of cow dunk cakes should be manipulated with respect to the color of *bhasma* to avoid extra charring. Color of *Vanga bhasma* obtained was greyish white. Average maximum temperature recorded was 587°C. XRD test shows major phase of SnO<sub>2</sub>. By strictly complying the steps described in above study, one can easily prepare the *Vanga bhasma*. This study definitely helps in standardization of *Vanga bhasma*.

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