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Research Article

PHARMACEUTICAL AND ANALYTICAL STUDY OF *ABHRAK BHASMA*

Nandurkar Vishal Marotrao
Associate Professor, Department of Ras shastra & Bhaishajya Kalpana, Shri K. R. Pandav Ayurved College, Dighori, Nagpur, Maharashtra, India.

KEYWORDS: Pharmaceutical, Analytical, *Abhraka Bhasma*, *Shodhan, Dhanyabhrak Nirman*, *Maran*.

***Address for correspondence**
Dr Nandurkar Vishal Marotrao
Associate Professor,
Department of Ras shastra & Bhaishajya Kalpana, Shri K. R. Pandav Ayurved College, Dighori, Nagpur, Maharashtra, India.
Email : vishalnandurkar60691@gmail.com
Contact: 9545326229

ABSTRACT

Bhasma are the unique and important organometallic preparations used in Ayurveda Therapeutics. *Bhasma* are complex structures generally prepared by repeated incineration of metals and minerals with medicinal herbs decoction or juices. *Abhrak Bhasma* is an excellent cellular regenerator and nervine tonic. It is indicated in various chronic diseases such as tuberculosis, COPD and many types of cardiac diseases. Considering the principles of *Ras-shastra* and *Bhaishajya Kalpana* and also the importance of their standard method of preparation, it is decided to carry out pharmaceutical and analytical study of '*Abhrak Bhasma'*. Preparation of *Abhrak Bhasma* involves the procedures *Vajrabhrak Shodhan, Dhanyabhrak Nirman* and *Maran* of *Abhrak*. Prepared samples of *Abhrak Bhasma* tested on the basis of organoleptic and physico-chemical parameters. Prepared samples of *Abhrakabhasma* (AB-1, AB-2, AB-3) were *Nishchandra, Sindurabha* coloured, *Sookshma, Rekhapurna, Sparshakomal (Mrudu, Shlakshna), Nirdhum* and *Niswadu.* Along with Ayurvedic parameters modern parameters such as L.O.D., L.O.I., pH, conductivity, successive solubility, elemental assay of Fe^{2+} and Fe^{3+} etc. were applied to the samples of *Abhraka Bhasma*. Analytical study of *Abhraka Bhasma* revealed the uniformity of the procedures in the three samples of *Abhraka Bhasma*, as evidenced by the observations of the analytical values of the three samples were not much variation found.

INTRODUCTION

Rasashastra is a specialized branch of *Ayurveda* dealing mainly with materials which are known as '*Rasadravyas*'. It mainly revolves around "Mercury" and its preparations. The products dealt under this discipline are an important component of *Ayurvedic* therapeutics.

Standardization is a measurement for ensuring the quality and is used to describe all measures, which are taken during the manufacturing process and quality control leading to a reproducible quality. *Bhasma* are the unique and important organometallic preparations used in *Ayurveda* Therapeutics. *Bhasma* are complex structures generally prepared by repeated incineration of metals and minerals with medicinal herbs decoction or juices. In view of high demand for the use of *Bhasma*, the herbomineral *Ayurvedic* formulation, there is an urgent need to bring about standardization of their preparation process and the end product.

Abhrak Bhasma is an excellent cellular regenerator and nervine tonic. It is indicated in various chronic diseases such as tuberculosis, COPD and many types of cardiac diseases. Preparation of *Abhrak Bhasma* involves the procedures *Vajrabhrak Shodhan, Dhanyabhrak Nirman* and *Maran* of *Abhrak.* Prepared samples of *Abhrak Bhasma* tested on the basis of organoleptic and physico-chemical parameters.

Considering the principals of *Ras-shastra* and *Bhaishajya Kalpana* and also the importance of their standard method of preparation, it is decided to carry out pharmaceutical and analytical study of *Abhrak Bhasma*.

There are many methods of *Shodhan* and *Maran* of single drug, hence it is important to lead

down some specific methods for better accuracy, efficacy and batch to batch consistency in the final product. This is possible through pharmaceutical Standardisation and analytical study.

The present study 'Pharmaceutical and analytical study of *Abhrak Bhasma* was undertaken to understand and prepare them according to text and analyze them in terms of *Ayurvedic* and modern parameters to know their significance.

AIMS AND OBJECTIVES

The aim of the present work was to study the Pharmaceutical and Analytical Study of *Abhrak Bhasma*.

1. Preparation of *Abhrak Bhasma* as per scientific concepts mentioned in Classical Texts of *Rasshastra*.
2. Study of Prepared drug for Organoleptic and Physico-chemical parameters.

MATERIALS AND METHODS

In this topic following studies are included.

1) Pharmaceutical Study

In this study right from the collection of raw material, their *Shodhan*, *Maran*, and the preparation of '*Abhrak Bhasma*' was done and procedure was repeated thrice.

2) Analytical Study

In this study Ayurvedic and modern parameter regarding to *Abhrak Bhasma* are studied.

Pharmaceutical Study

The following processes regarding to *Abhrak Bhasma* are studied.

A) Collection of Raw material

Raw materials were collected from authorized market according to their description mentioned in the texts, further authentified by the experts.

B) *Shodhan*:

***Vajrabhraka shodhan*[1]**

Equipments: Steel vessel, *Bhatti*, metal tongs, cloth, measuring jar, weighing machine, iron pan etc.

Ingredients

1) *AShuddha Abhraka*- 500 gm

2) *Triphala Kvatha*- 1000 mL.

Procedure

Required amount of *Triphala Kvatha*[2] was taken in a steel vessel. Raw *Abhraka* chips were kept in Bhatti till they became red hot. The *Abhraka* chips were turned up and down with metal tongs, when the *Abhraka* chips became completely red hot, they were quenched (*Nirvapana*) into the *Triphala Kvatha*. After few minutes the *Triphala Kvatha* was separated and pieces of *Abhraka* were collected in an iron pan to subject it for next *Nirvapana.* Same procedure was repeated for 7 times. The entire procedure was repeated for another two samples.

Duration- 3 days

C) *Dhanyabhraka Nirmana*[3]

Equipment: Jute cloth, Jute yarn, steel vessels, tray, spatula, plastic pot etc.

Ingredients

1) *Shuddha Abhraka*	-	465 gm
2) *Dhana*	-	120 gm
3) Water	-	q.s.

Procedure

Firstly *Shuddha Abhraka* was transferred to a tray and ¼ quantity of *Dhana* with respect to *Abhraka* was added layer by layer. Then a jute cloth was spread on a table and mixture of *Dhana* and *Abhraka* was transferred on it. After covering it, a *Pottali* was tied by a jute yarn. Then required amount of water was taken in a plastic pot and the *Pottali* was dipped in it completely for 72 hours. More water was added when the quantity of water was reduced, so as to keep *Pottali* completely dipped in it. On the 4th day, *Pottali* was taken out. A large plastic vessel containing water was taken. A *Pottali* was dipped in it and rubbed. When the colour of water changed to black, a new pot with water was taken to give fresh media. The process is continued till the extraction of *Dhanyabhraka*. The upper clean water in the pot was separated after sedimentation and the residue was allowed to soak. At last lustrous black coloured fine powder of *Dhanyabhraka* was collected.

Duration- 7 days

D] Preparation of *Abhrak* bhasma[4]

Equipments: Weighing machine, spatula, *Mruttika Sharava*, cloths for *Sandhibandhan*

Ingredients: *Dhanyabhrak*-200 gm

Jaggery- 200 gm

Eranda patra swaras- q.s.

Procedure

Dhanyabhrak and *Guda* taken in *Khalva yantra* and triturated well together. *Eranda patra swaras* was added in it and triturated for 3 hours. Similar sized small circular cakes (*Chakrika*) were made. *Chakrika* were kept in *Sharava* and another *Sharava* was covered over it, *Sandhibandhan* was done in three layers. This *Sharava samputa* were shed dried and subjected for *Marana sanskara*. In cuboidal pit cow dung cakes were filled 2/3 then *Sharava Samputa* kept and remaining 1/3 covered with cow dung cakes. After cooling down the *Sharava* were collected and observations noted.

This procedure was repeated for 40 times. Same procedure was done for all 3 batches.

***Puta Upala* (Cow dung cakes)**

Cow dung cakes were collected from the same place to avoid variations about size and weight.

Calculation of cow dung: Average

Weight of cow dung =220 gm

Analytical Study

Ayurvedic Parameters

For *Abhraka Bhasma*

1) *Nishchandra*

Nishchandra is the specific parameter for *Abhraka Bhasma*. A portion of prepared *Abhraka bhasma* was rubbed in between fingers and thumb and the rubbed portion were examined in sun's rays. This test was performed with the naked eye and microscopically.

The prepared samples of *Abhraka bhasma* were found to be *Nishchandra*.

2) *Varnotapatti*

It indicates the the colour of the *Bhasma*. A specific colour is mentioned for each *Bhasma* and alternation in this specific colour suggests that the *Bhasma* is not prepared properly. Because a particular compound is formed during *Bhasma* preparation and every chemical compound possess specific colour.

As per *Rasaratnasamuchaya Abhraka bhasma* should be *Sindurabha* coloured. All the prepared 3 samples of *Abhraka bhasma* were *Sindurabha* coloured.[5]

3) *Sookshma (Anjana-sadrusha*)

The *Bhasma* on application to eyes as *Kajal*, which does not cause any irritation proves the maximum fineness and softness of *Bhasma*.

4) *Rekhapurnatva*

This test indicates the fineness of a *Bhasma*. The *Bhasma* was rubbed in between the thumb and index finger. The particles of the *Bhasma* attained such a state that the *Bhasma* could settle in the ridges of the fingers.

All the 3 samples of *Abhraka bhasma* possessed this character.

5) *Sparshakomal/ Mrudutva* and *Shlakshnatva*

The softness and smoothness of the *Bhasma* is also due to its fineness. Touching *Bhasma* by fingers and feeling of touch was noted.

All the 3 samples of *Abhraka bhasma* were found *Mrudu* and *Shlakshna* i.e. *Sparshakomal.*

6) *Nirdhoom*

When there is any moisture or organic content or sulfur present in *Bhasma*, fumes are produced on its burning.

Hence this test of *Bhasma* was performed by taking it in small quantity in silica crucible and ignited. The ignition of *Bhasma* was observed carefully and observations noted. Fumes did not produce hence *Bhasma* found *Nirdhoom*.

7) *Niswadu*

The properly prepared *Bhasma* attains tastelessness. The presence of taste in *Bhasma* indicates the imperfectness of *Bhasma*.

All the three prepared 3 samples of *Abhraka Bhasma* were found tasteless (*Niswadu*).

Physico-Chemical Parameters

B-1: Loss on Drying

B-2: Loss on Ignition (L.O.I.)

B-3: Determination of Conductivity

B-4: Determination of Ph

B-5: Successive Solubility

Successive solubility of *Abhraka bhasma* was carried out in H_2O, Dilute HCL, Moderate concentrated HNO_3 and Aquaregia.

B-6: Elemental Assay

A) Estimation of Ferrous ions in *Abhraka bhasma*:

B) Estimation of Ferric ions in *Abhraka bhasma*:

OBSERVATIONS AND RESULTS

Pharmaceutical Study

a) Vajrabhraka shodhan

After quenching of *Vajrabhraka* into *Triphala kvath* colour of the media was changed from brown to blackish brown. At the end of procedure larger sized *Vajrabhraka* get converted into smaller sized pieces of *Vajrabhraka*. *Shodhit abhraka* was brittle in nature with decreased lustre.

Results

Samples	**A-1**	**A-2**	**A-3**
Initial weight	500 gm	500 gm	500 gm
Final Weight	465 gm	460 gm	456 gm
Weight loss	35 gm	40 gm	44 gm

b) Preparation of *Dhanyabhraka*

The prepared *Dhanyabhraka* was uniformly fine powdered form with decreased lusture. The particles of the *Dhanyabhraka* were so fine that it moves with water and were suspended in the water. Silica and stones along with *Dhana* were trapped in the *Pottali*.

Results

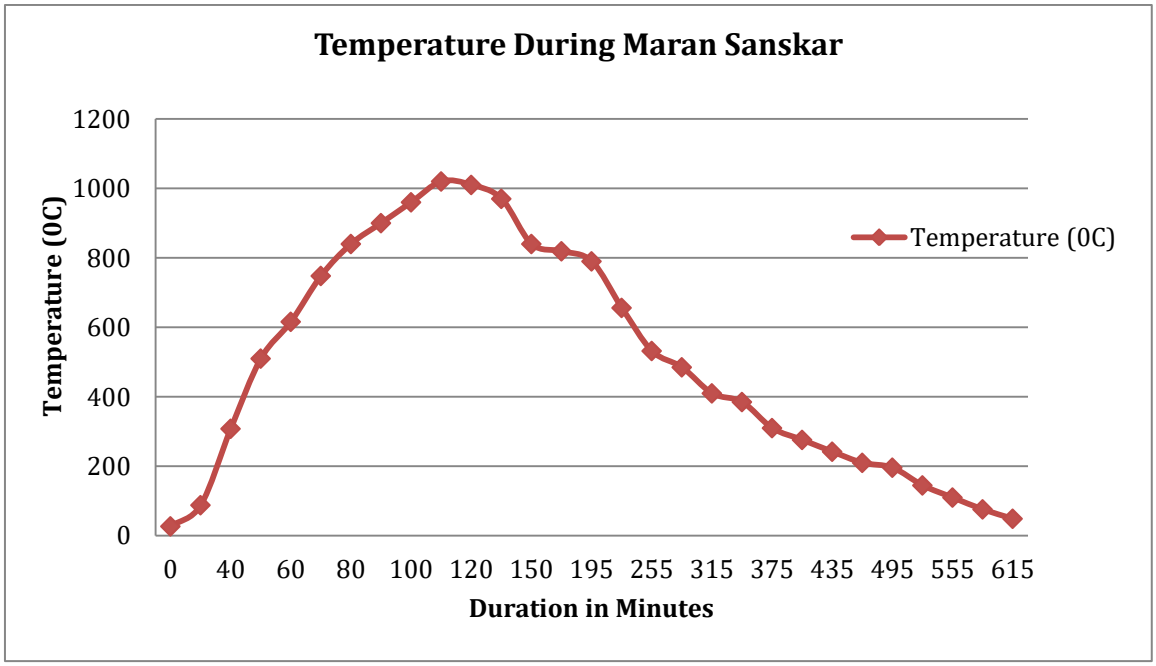
Samples	A-1	A-2	A-3
Initial weight	465 gm	460 gm	456 gm
Final Weight	410 gm	410 gm	415 gm
Weight loss	55 gm	50 gm	41 gm

c) Preparation of *Abhraka bhasma*

In the first 5 *Gajaputa Abhrak bhasma* was black coloured, hard in consistency and there was increase in weight of *Abhrak bhasma*. At the end of 11 *Puta Abhrak bhasma* was black with greyish shade, soft in consistency, complete *Rekhapurnatva* appeared in the *Bhasma*. From *Puta* no.12 to17 *Abhrak bhasma* was gray in colour and soft in consistency. From *Puta* no.18 to 23 *Abhrak bhasma* was brick red in colour, soft in consistency with successive decrease in *Chandrika*. At the end of 24th *Gajaputa* desired colour *Sindhurabha* appeared in the *Abhrak bhasma* with decrease in *Chandrika*. From 25th *Puta* to 34th *Puta sindhurabha* colour present in *Abhrak bhasma* with complete loss of *Chandrika* in successive *Puta*. At the end of 34th *Puta Abhrak bhasma* possessed all the characteristics Ayurvedic parameters. Further *Puta* no.35 to 40 were given for therapeutic potentiating of *Abhrak bhasma*.

Graph:

Showing observations regarding temperature during *Maran sanskar* of *Abhraka bhasma*



Analytical Study

A- Ayurvedic Parameters

Ayurvedic parameters for *Bhasma pariksha* revealed the results as follows

Prepared samples of *Abhraka bhasma* (AB-1, AB-2, AB-3) were *Nishchandra, Sindurabha* coloured, *Sookshma, Rekhapurna, Sparshakomal (Mrudu, Shlakshna), Nirdhum* and *Niswadu.*

Table1: Showing Organoleptic characters of *Abhraka Bhasma*

Sr.No.	Samples	Colour (*Rupa*)	Odour (*Gandha*)	Taste (*Rasa*)	Sound (*Shabda*)	*Sparsha* (Touch)
1	AB-1	*Sindurabha*	Odourless	Tasteless (*Niswadu*)	-	Soft smooth powdered form
2	AB-2	*Sindurabha*	Odourless	Tasteless (*Niswadu*)	-	Soft smooth powdered form
3	AB-3	*Sindurabha*	Odourless	Tasteless (*Niswadu*)	-	Soft smooth powdered form

Physico-chemical parameters

B-1: Loss on drying

Table 2: Showing L.O.D.% of all three samples

Sr. No	Samples	L.O.D. (%)
1	AB-1	0.48
2	AB-2	0.27
3	AB-3	0.053

B-2: Loss on Ignition

Table 3: Showing L.O.I. % of all three samples of *Abhraka Bhasma*

Sr. No.	Samples	L.O.I. %
1	AB-1	o.2
2	AB-2	0.38
3	AB -3	0

B-3: Conductivity

Table 4: Showing Conductivity of all three samples

Sr. No	Samples	Conductivity	
		0.1% (µ mhos)	1% (µ mhos)
1	AB-1	150	990
2	AB-2	135	780
3	AB-3	126	840

B-4: pH

Table 5: Showing pH of all three samples

Sr.No.	Samples	pH of samples	
		0.1%	1%
1	AB-1	7.90	7.72
2	AB-2	8.15	7.32
3	AB-3	8.02	7.58

B-5: Successive solubility

Table 6: Showing percentage of Successive Solubility of *Abhraka Bhasma*

Sr.No.	Samples	In H_2O (%)	In Dil.HCl (%)	In Mod. Conc. HNO_3 (%)	In Aquaregia (%)	Total % of Solubility
1	AB-1	21.16	41.56	0	0	62.72
2	AB-2	9.12	55.36	0	0	64.48
3	AB-3	9.56	55.08	0	0	64.64

B-6 Estimation of Elements

Estimation of Fe^{2+} and Fe^{3+} ions in *Abhraka bhasma*

Table 7: Showing percentage of Fe^{2+} and Fe^{3+} ions in *Abhraka Bhasma*

Sr.No.	Samples	Fe^{2+} %	Fe^{3+} %
1	AB-1	1.2119	4.78
2	AB-2	1.016	5.45
3	AB-3	1.016	5.45

DISCUSSION

Abhraka shodhan was done as per the reference of R.R.S.2/16-17 by quenching the *Abhraka* pieces into *Triphala kvath*. The procedure was repeated for 7 times and observations were noted. Large sized *Vajrabhraka* get converted into smaller sized pieces of *Vajrabhraka*. *Shodhit Abhraka* was brittle in nature with decreased lustre. *Dhanyabhraka* was prepared according to the reference of R.S.S.1/154. The prepared *Dhanyabhraka* was uniformly fine powdered form with decreased lustre. The procedure typically resembled as stated in the literature. This

procedure reduces the elasticity and sharpness of the edges of the *Abhark Lamelia*.

Preparation of *Abhraka bhasma* was carried out as per the reference of R.R.S.2/26-27. Jaggery was added in equal proportion to that of *Dhanyabhraka*. This jaggery acts as an oxidizing agent in the incineration. Total 40 times *Abhraka* was subjected to *Maran sanskar* in *Gajaputa*. At the end *Sindurabha bhasma* was obtained. *Puta* wise observations were noted and procedure was repeated till it fulfills the *Bhasma siddhi pariksha Nishchandratva, Sindurabha, Sookshma, Sparshakomal*. *Nishchandra pariksha* was performed with the naked eyes and microscopically. Samples of *Abhraka bhasma* were tested on the basis of organoleptic and physicochemical parameters. The prepared samples of *Abhraka bhasma* found to possess following characters; *Nishchandratv, Sindurabhavarn, Rekhapurnatva, Sookshma, Sparshakomal (Mrudutva /Shlakshnatva), Nirdhuma, Niswadu*.

Estimation of L.O.D. of samples of *Abhraka bhasma* stated that it has least moisture content. The drug is having least hygroscopic activity with less chances of contamination of drug. L.O.I. of *Abhrak bhasma* showed negligible loss as it is end product of successive *Gajaputa*. *Abhrak bhasma* is slightly alkaline in nature. Determination of conductivity of samples of *Abhrak bhasma* determines the rich concentration of charged ions in the solution. Samples of *Abhrak bhasma* were maximum soluble in dil. HCl and insoluble in mod.conc.HNO3 and aquaregia. Prepared samples of *Abhrak bhasma* contains iron in ferrous (Fe^{2+}) and ferric (Fe^{3+}) forms providing better bioavailability.

CONCLUSION

Shodhan has broader concept other than purification. *Shodhan* is essential for the further pharmaceutical processes. Preparation of *Dhanyabhraka* states the significance of concept used by ancient Acharya. Jaggery and *Eranda patra swarasa* are the best and suitable media for the preparation of *Abhraka bhasma*. Properly prepared *Bhasma* possess all the parameters described in Ayurvedic classics. *Abhrak bhasma* subjected to more *Gajaputa* more will be its therapeutic efficacy. Hence future research is expected to elaborate its therapeutic utility in management of diseases. The standardization of the manufacturing process of *Bhasma* play the crucial role in determining its therapeutic effectiveness which has to be optimized and standardized to improve the potency, reducing the toxic elements which will crucially enhance the usage of it as and medicinal agent against the broad spectrum of diseases.

Analytical study of *Abhrak Bhasma* revealed the uniformity of the procedures in the three samples of *Abhraka bhasma*, as evidenced by the observations of the analytical values of the three samples were not much variations found. Therefore physicochemical parameter serves as a mean for Standardisation of herbomineral preparation.

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