PHARMACEUTICAL AND ANALYTICAL STUDY OF ABHRAKA BHASMA

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ABSTRACT

In *Rasashastra* the concept of *Dehavada* and *Lohavada* persists which includes various metals and minerals for the execution of the procedures. *Abhraka* plays an important role in both of them. For *Dehavada Abhraka* is used in medicinal form for the treatment of various diseases. This *Abhraka* needs to be converted into *bhasma* form to be used in formulations. *Bhasma* preparation is one of the tedious procedures mentioned in the classics. For preparation of *Abhraka bhasma Shodhana* followed by *Dhanyabhrikarana, Marana* and *Amritikarana* should be done. Different procedures are described for *bhasma* preparation and standardisation of these procedures is the need of the hour along with different parameters have been formulated to express the qualities of *Bhasma*. In this study an attempt is made to prepare *Abharaka bhasma* by two different procedures and the *bhasma* obtained by both the methods are subjected to physio-chemical analysis and the result were obtained. On analysing the physico-chemical properties of the two samples almost similar results were observed. They had 7.38pH, 97.18% of Ash content, 19.24% of Acid insoluble Ash and 0.29% of water-soluble Ash. XRD report showed Fe_2O_3 and SiO_2 as the major component and traces of CaO, MgO and K_2O were seen in the two samples of *Abhraka Bhasma*. It was concluded that both the methods helped in the preparation of good quality of *Abhraka Bhasma*. The properties of both the samples were almost similar and it could be predicted that both the samples may have similar clinical effects.

KEYWORDS: *Abhraka, Bhasma preparation, physio-chemical analysis*

INTRODUCTION

Abhraka is one of the most important and widely utilised drugs mentioned in *Rasa Shastra* which is considered as a *Rasayana*. It is placed in *maharasa varga*[1]. *Abhraka Bhasma* is most commonly used medicament as far as Ayurvedic clinical practice is taken into consideration. *Rasa Shastra* is mainly exhibited by *Dehavada* and *Lohavada*. Both *Dehavada* and *Lohavada* utilises various metals and minerals for the execution of the procedures. *Abhraka* plays an important role in both of them. In the present scenario *Chikitsavada* is practised and again *Abhraka* is yet another mineral which after proper pharmaceutical procedures finds its abode in the treatment of various disorders.

Abhraka is used in the management of various disorders after converting it into a suitable dosage form which is none other than *Bhasma*. *Abhraka Bhasma* prepared by following standard operative procedures as mentioned by the classics is said to have properties like *kapha* and *pittahara,balya, medhya, veeryavardhak, pandu* and *pramehaghna*.[2, 3]

Bhasma preparation is one of the tedious procedures mentioned in the classics and different procedures are described for the same. Standardisation of these procedures is the need of the hour. Different parameters have been formulated to express the qualities of any *Bhasma*. Few of the tests explain about the particle size while few others explain the chemical composition. Even the physical state of the elements present in the *Bhasma* can also be judged with the help of sophisticated techniques.

The present study deals with the processing of *Abhraka* which has been prescribed to make it suitable for internal administration. Two different methods were selected for the Marana of the *Abhraka*. Samples were collected and analysed at different stages so as to evaluate the changes which occur at different instances. The data obtained by the study was compared to evaluate the better way of preparing the *Bhasma.*

MATERIAL AND METHODS

[I] Method of preparation:

Abhraka patra were collected in accordance to the *grahya–agrahya lakshanas* mentioned in *Rasa Shastra* classical texts. Along with this, other parameters regarding the purity percentage were also taken into consideration. These all were first authenticated by the subject experts.

Shodhana [4] - *Godugdha* (Cow's milk) was used for the *Shodhana* of Raw *Abhraka Patra*. *Godugdha* was freshly collected from local market.

Dhanyabhrikaran [5] - *Kanji* (Sour gruel) was used for the preparation of *Dhanyabhraka*.

Marana - Two different methods were followed for *Abhraka Marana.*

i. In first method *Kasamarda* (Cassia occidentalis) *Swarasa* was used to give *bhavana* to the *Dhanyabhraka* during *Marana*.[6]

ii. In the other method *Eranda Patra swarasa* was used along with *Gura* (jaggery) and *Vata Patra*.[7]

Kasmarda, Eranda and *Vata Patra* were procured from the Herbal Garden of Major S.D. Singh P.G. Ayurvedic Medical College and Hospital, Bewar Road, Fatehgarh, Farrukhabad. *Gura* was procured from the local market.

Amritikarana[8] - *Goghrita* (Cows ghee) was used for the *Amrutikarana* of *Abhraka Bhasma.*

[II] Physico-chemical analysis:

1. Loss on drying: This test was conducted to find out the moisture content of the drug.

Procedure:

Initially the Petri dishes were cleaned with water and dried in oven at 105°Cfor 2 hrs. Then 1 gm of the drug sample was taken in a pre-weighed dried petridish and it was dried in an oven at 105°C till constant weight is achieved. Then the Petridish was taken out and weighed after self-cooling and from the weight loss the percentage of loss on drying was calculated and expressed as % w/w.

2. Ash value: This test was carried out to evaluate the ash content of the sample drug.

Procedure:

For this the crucibles were initially cleansed with water and then dried in oven at 105°C for 2 hrs. 1 gm of accurately weighed sample was taken in a pre-weighed dried crucible and was incinerated in a muffle furnace up to 600°C. Then crucible was taken out and self-cooling was allowed. The crucible was weighed and from the weight of the ash obtained, the percentage of ash was calculated.

3. Acid insoluble Ash: The acid insoluble ash content test was conducted to assess the percentage of inorganic content of the sample which insoluble in dilute acid.

Procedure:

Ash was taken with 25 ml dilute hydrochloric acid in a beaker of 100 ml capacity and boiled for few minutes and cooled. Then it was filtered through 41numbers Whattman filter paper and washed with distilled water repeatedly till it becomes chloride free. Then the filter paper along with residue in a glass funnel was kept for drying in the oven. Later that dried paper along with the residue was shifted to pre-weighed crucible and kept in muffle furnace and heated upto 600°C. After cooling it was weighed and from the weight of residue obtained, acid insoluble ash was calculated.

4. Determination of Aluminium and Iron Content:

0.5 gm of *Abhraka Bhasma* was weighed and 20 ml of 6N HCl was added to it and filtered. The filtrate was diluted with water to make the volume upto 250 ml (stock solution / S.S.). 50 ml from the S.S. was taken and mixed with NH_4Cl and NH_4OH to obtain the precipitate of $Al_2O_3 + Fe_2O_3$. The precipitate was filtered and washed with water. After drying it was ignited at 600°C in furnace. Later it was cooled and weighed. The weight of residue obtained gave the combined weight of $Al_2O_3 + Fe_2O_3$.

5. Determination of Iron Content:

From the S.S., 5 ml aliquot was taken and titrated against $KMnO_4$ (1 ml N $KMnO_4$ = 0.05585 gm Fe). From the amount of Fe, value of Fe_2O_3 was calculated. The amount of Fe_2O_3 was subtracted from the combine amount of $Al_2O_3 + Fe_2O_3$ which gave us the Al_2O_3 content.

6. Determination of Calcium:

The filtrate obtained was treated with 2 ml of concentrated hydrochloric acid and concentrated to about 200 ml. 50 ml of 10% solution of ammonium oxalate was added to it and boiled. Dilute ammonia solution was added to the hot solution, till it was slightly alkaline. After one hour, precipitate of calcium oxalate was filtered, washed with water till it becomes free from chloride. The filtrate contains magnesium, so that the precipitate of calcium oxalate was dissolved in 25% sulphuric acid. The solution was heated at 70°C and titrated with 0.1 N potassium permanganate solutions. The percentage of Ca was calculated as CaO.1. ml 0.1 N $KMnO_4$ = 0.0028039 g. CaO.

7. Determination of Magnesium:

To the filtrate from the calcium determination, 50 ml. of concentrated nitric acid was added and evaporated carefully to dryness on a hot plate, till only a small residue (largely magnesium salts) was left. To it, 2-3 ml of concentrated hydrochloric acid and 20 ml of water were added, warmed for few minutes until the solid was dissolved. It was cooled

and a few drops of methyl red indicator followed by 10 ml of 20% diammonium hydrogen phosphate reagent were added. Then conc. ammonia solution was added to it with stirring until the solution turns yellow. Stirring was continued for 5 minutes adding ammonia solution drop by drop. Finally 5ml conc. ammonia in excess was added to keep the solution alkaline and stirred again. The solution was kept at room temperature for at least 4 hours, filtered through Whattman no. 1 filter paper, washed with cold dilute ammonia solution (1.20) until free from chloride. The precipitate was dried at 110°C and weighed as magnesium ammonium phosphate $MgNH_4\ PO_4,\ 6H_2O$. From its weight the percentage of Mg was calculated as MgO. (1 g $MgNH_4\ PO_4,\ 6H_2O$ = 0.1643 g MgO)

[III] Particle size analysis:

To evaluate the effect of *Putas* on *Abhraka Bhasma* w.s.r. to its particle size analysis was done. For this purpose, the Scanning electron microscope was used to determine the frequency of particle in the specific range of size expressed in microns (μm).

[IV] UV-visible spectrophotometry:

Absorption spectrometry is the measurement of selective absorption by atoms, molecules or ions of electromagnetic radiation having a definite and narrow wavelength range, like UV and visible absorption bands are due to electronic transition in the region of 200 nm to 780 nm.

The basic theory behind it is as follows:

When electromagnetic radiation travels through a medium containing atoms, molecules, or ions, a number of events may take place

1. Intensity of = Intensity of → indicates no absorption emergent energy incident energy or radiation has occurred
2. Reflection, refraction and / or scattering may occur.
3. Intensity of < Intensity of → Indicates that some emergent energy Incident energy absorption has taken place (Absorption spectrophotometry) As a result of this absorption, the species involved are activated from their lowest energy state (ground state), to higher energy states (excited states) For absorption to occur, the energy of the exciting radiation must match the quantized, energy difference between the ground state and one of the excited states of that species.

In visible and UV spectrometry, radiation energy can excite only the outermost valence electron. A typical UV absorption spectrum is the result of plotting wavelength versus absorptivity. The wavelength corresponding to maximum absorptivity, ε – max isdenoted by λ max.

Utility:

One of the major uses of UV - visible spectrometry is for quantitative measurement. An unknown concentration of a known compound, if it confronts to Beer's law, can be determined by using following equation –

$\log (I0/I) = \varepsilon c\lambda$ where,

I0 = Intensity of incident energy
I = Intensity of emergent energy
C = Concentration
λ = Thickness of the absorber (in cm)
ε = Molar absorptivity

Normally, UV-visible spectra do not show high degree of specificity, they are recorded in conjunction with other data and act as supplementary to other data for identification or analysis of a product. UV-spectra of inorganic compounds are also reported to be useful in identification e.g. All permanganates show the same bond characteristic of the ion MnO_4. In the case of nitrates, each salt shows a characteristic UV absorption spectrum, differing according to metal present (Partington 1946) An Attempt has made to find out whether UV spectral data can be of use for analysis/identification of *Abhraka Bhasma.*

Procedure followed:

10 ml of the dilute hydrochloric acid was added to 1 gm sample and kept overnight. Next day it was filtered and the spectra of the filtrate, after suitable dilution, if required were recorded in a UV visible recording spectrophotometer (Shimadzu UV 160 A model).

Solutions of samples of *Abhraka Bhasma* were scanned through 200-400 nm.

[V] N.P.S. TEST (Namburi Phased Spot Test): [10]

Introduction:

Namburi phased spot test was introduced in 1970 by Dr. Namburi Hanumantha Rao. This technique is based on the principles of liquid chromatography, which helps for the differential identification of each *Bhasma* from the other *Bhasmas* having same element as the main constituent. The main aim behind commencing this innovative method is

the identification of *Bhasmas* and *Sinduras* by their specific names as known in Ayurveda by virtue of their quality difference and not by their chemical names alone. This test provides a differential qualitative identification of each *Bhasma* by a specific coloured spot which is unique for only that *Bhasma*. Thus, a prototype for each *Bhasma* is established as a standard in the form of a specific coloured spot and will be useful for the people who are doing research on *Bhasmas.*

N.P.S.T. of Abhraka Bhasma:

Equipments and material:

1. Reagents
   - 10% Potassium iodide (10%KI)
   - 2.5% Potassium ferrocynide (2.5% KCN)
2. Whattman paper No. 41 - Small pieces, (14 cm x 8 cm) of filter paper unwrinkled paper
3. Distilled water - For regents preparation
4. Capillary or pipette - For putting the spot on paper
5. Centrifuge and simple test tubes - For the preparation of drug solution
6. Glass rods and sheet - For drying of paper and to create a platform during test.

Preparation of reagents:

1. 10% Potassium iodide:

10% Potassium iodide was dissolved in 100 ml distilled water.

2. 2.5% Potassium Ferrocynide :

2.5 g of opaque, light yellow coloured flat crystals of KCN were weighed, powdered and mixed with 100 ml of distilled water, followed by stirring till the formation of a slight turbid or translucent solution of 2.5% KCN.

Preparation of impregnated papers:

The cut pieces of Whatman paper of size 14 x 8 cm were held between two fingers vertically and dipped in respective solution one at a time till they get soaked in it completely. Then those pieces were collected carefully to avoid tearing and shifted to the glass sheet and spread for drying, avoiding the formation of air bubbles. The drying was completed within 2 hrs and then the papers were collected and stored in a sealed plastic bag.

Procedure followed:

Cynosure:

- Quantity of *Bhasma* - each sample 0.25 gms
- Reagent - 0.5 ml conc. HCl
- To be heated - each sample should be heated for a minute before adding reagent to it.
- Time allowed to react - The *Bhasmas* are allowed to react for 8 hrs shaking now and then.

Procedure:

1. 0.25 g of sample was taken into a centrifuge test tube and heated for a minute.
2. After 30 minutes, drop by drop addition of 0.5 ml of conc. HCl was done followed by the application of a gentle heat for a minute.
3. The sample and reagent were allowed to react for 8 hrs with occasional shaking.

4. Later, the solution was allowed to settle for 5 hrs until a clear layer of supernatant liquid was obtained.
5. Then few drops of clear fluid were collected by a pipette.
6. 2 drops were put on the 10% KI and 2.5% KCN papers, from the distance of 1 cm, one after other, exactly on the same position.
7. Spreading of the spots were carefully observed for changes occured.
8. The colour chart of the camlin standard colour was used for the comparison of different colours and pattern of the spot at three different time intervals. These spots were observed in natural light with the help of the lens and for documentation photographs were taken.

(1) Phase I:

This phase extended from the moment the solution is dropped till the end of the 5th minute. This phase is also called as **"phase of immediate reaction".**

(2) Phase II:

The second phase extends upto next 15 minutes after the end of 1st phase. It is called or labeled as **"Phase of delayed reaction".**

(3) Phase III:

This last phase extends from the end of the 2nd phase to few hours or days labeled as **"stage of late reaction".**

Division of spot areas:

It can be divided into 3 main imaginary areas based on the difference of colours.

(a) Central spot: The central area of the spot.

(b) Middle segment: The area between periphery and central spot.

(c) Peripheral segment: Includes the periphery of the spot and surrounding area.

These 3 segments are studied carefully and recorded, thereafter comparing with standard colour charts.

Solid spot: A solid spot is a term applied to the spot, in which there is no clear margin or periphery of the central spot but only the complete solid spot is visible without any margin.

(VI) Inductively coupled plasma atomic emission spectrometry (ICP-AES):

The Inductively coupled plasma atomic emission spectrometry (ICP AES) analysis is an excellent technique for the determination of various elements. The sensitivity of the instrument being high, it is very useful particularly for determination of micro quantity of elements present in a sample. The analysis of the two samples of *Abhraka Bhasma* was carried out to trace the following elements namely - Fe, Al, Si, Ca, Mg, K, Na, Li, PO_4, Cl, SO_4, NO_3. For this purpose, Fusion method was followed which includes the used of Lithium tetra borate ($Li_2B_4O_7$) and Lithium meta borate ($LiBO_2$).

[VII] Bhasma Parikshas: [9]

a) Rekhapurnata:

A pinch of the two samples of *Abhraka bhasma* was rubbed in between thumb and index finger.

It was observed whether *bhasma* enters the furrows of finger or not. Both the samples of *Abhraka Bhasma* passed this test.

b) Varitara:

Clean water was taken in a glass and allowed to stand. A pinch of the two samples of *Abhraka bhasma* were sprinkled on the surface of water.

It was observed whether *bhasma* floats on the surface of the water or not. Both the samples passed this test.

c) Unama:

This is continuation of the above test where in rice grain is placed on the surface of *bhasma.*

It is observed whether the floating still persists or not. Both the samples passed this test.

d) Niswadu:

A pinch of *bhasma* was placed on the tongue and its taste was perceived. Both the samples were tasteless.

e) Nishchandrata:

A pinch of *bhasma* was taken and observed under bright sunlight.

Both the samples had no shining particles present in them.

f) Nirdhumatva:

A pinch of *bhasma* was sprinkled on the ignited charcoal and observed for any fumes emerging out of it. There was no emerging of fumes when *bhasma* samples after 2nd puta were sprinkled.

g) Apunarbhava:

One gram of *Abhraka bhasma* was triturated with *Guda* (jiggery), *Gunja* (*Abrus pricatorius*), *tankana* (borax), *madhu* (honey) and *ghrita* (ghee) one gram each and a paste was prepared. This paste was kept in a *musha* and *sandhi bandhana* was done. It was then subjected to *teevragni* (1000^0C) for one hour. After *swangasheeta musha* was opened and the charred mass was powdered and observed in sunlight for any shining particles.

Bhasma after 30^{th} *puta* in both the samples did not show any shining particles.

h) Niruttha:

Abhraka bhasma got after 30 puta (5 gm) and a silver piece (5 gm) were kept in a *musha* and *sandhi bandhana* was done. It was then subjected to teevragni (1000^0C) for one hour. After *swangasheeta, musha* was opened and the silver piece was weighed.

There was no increase in the weight of the silver piece which indicated the *bhasma* passed the test.

RESULTS

Abhraka bhasma samples were analysed by employing various techniques like physical characters, chemical analysis, UVspectrophotometric analysis, particle size distribution of *Abhraka Bhasma* samples with the help of electron microscope, ICP-AES and Namburi phased spot test. The data obtained by the analysis has been presented and discussed in this section.

I. Physical characters

TABLE.1. Results of organoleptic evaluation of the two samples

S.No.	Character	B^1	B^2
01.	**Appearance**	Fine powder	Fine powder
02.	**Colour**	Brick red	Brick red
03.	**Taste**	Tasteless	Tasteless
04.	**Odour**	Odourless	Odourless
05.	**Touch**	Fine	Fine

II. Chemical analysis :

The samples of Raw *Abhraka*, *Dhanyabhraka* $B^1$and B^2 were analysed for L.O.D., ash value and acid insoluble ash content. Acid soluble ash content was calculated and the acid soluble portion was analysed for the content of iron, aluminium, calcium and magnesium. The data has been presented in the following tables-

TABLE.2. Results of loss on drying for various samples

S.No.	Sample	Loss on Drying (%)
01.	Raw Abhraka	0.75
02.	Dhanyabhraka	0.85
03.	B^1	0.40
04.	B^2	0.41

The table shows that the results obtained on exposing the different samples to loss on drying analysis are in correspondence with the standard data available. The higher value of loss on drying in case of *Dhanyabhraka* suggests the presence of moisture gained due the presence of *Kanji*.

TABLE.3. Results of ash value analysis

S.No.	Parameter	Name of the sample			
		Raw Abhraka	Dhanyabhraka	B^1	B^2
01.	Ash Value	98.98	81.22	99.88	98.14
02.	Acid insoluble ash	34.78	27.58	31.00	30.36
03.	Acid soluble ash	64.20	53.64	68.88	67.78

TABLE.4. Results of analysis of acid soluble ash

S.No.	Parameter	Name of the sample			
		Raw Abhraka	Dhanyabhraka	B^1	B^2
01.	Iron as 'Fe'	19.21	17.08	20.87	20.87
02.	Aluminium as 'Al'	11.59	12.73	13.20	14.42
03.	Calcium as 'Ca'	1.57	2.95	4.92	5.91
04.	Magnesium as 'Mg'	1.98	2.18	0.98	1.43

(III) Particle size distribution:

The data of the particle size distribution analysis with the help of scanning electron microscope have been presented here.

TABLE.5. Particle size distribution in two *bhasma* samples

Sample	Size of the Particle				
	0-1 µm (%)	***1-2 µm (%)***	***2-3 µm (%)***	***0-2 µm (%)***	***0-3 µm (%)***
B^1	52.02	36.33	5.03	91.35	97.38
B^2	54.34	37.91	5.14	92.25	97.39

The result shows that both the samples had similar particle size where the maximum particles lied in the range of ***0-3 µm.*** This further shows that the greater number of *putas* are given to any sample, it further leads to size reduction. This also suggests the importance of the media used for the *Bhasmikarana*. The media used may also help in the size reduction and hence has a direct role in the absorption and assimilation of the *Bhasma* in the body.

(IV) UV-spectrophotometry:

The UV-spectra of the two *Abhraka Bhasma* samples were scanned between 200 to 400 nm with an idea to see whether UV-spectra can be useful for detecting the progress of puta and the role of media in *Bhasmikarana*. As could be seen

from the UV-spectra, all the samples give the absorption peak around 209 nm and all of them also show absorption around 335nm. The comparative spectra of the samples are having almost similar spectra both qualitative and quantitatively. So the, UV-spectra of *Abhraka Bhasma* does not vary with the change of media.

(V) N.P.S. test of abhraka bhasma:

TABLE.6. Table depicting the observations during N.P.S. test of various samples when spotted on 10% potassium iodide impregnated paper

Name of the sample	**Region analysed**	**Phases (min)**		
		Phase I (0-5)	**Phase II (0-20)**	**Phase III (0-48)**
Raw *Abhraka*	Central spot	Deep brown	Whitish brown	Yellowish white
	Middle Segment	Brown	brown	Dark brown
	Peripheral segment	Light brown margin with a yellow halo	Dark brown with a halo of light brown and yellow colour	Dark brown with a halo of light brown and slight yellow colour
Dhanyabhraka	Central spot	White with central brown spot	White with central brown spot	White with central brown spot
	Middle Segment	Dark brown	Brown	Dark Brown
	Peripheral segment	Light brown margin with yellow corona	Light brown margin with yellow corona	Dark brown with yellow and brown corona
B^1	Central spot	Brown	Brown	Brown
	Middle Segment	Semilunar white spot partially encircling central most brown spot	Semilunar yellowish spot partially encircling central brown spot	Dark brown
	Peripheral Segment	Dark brown margin with yellow and light brown aureola	Dark brown margin with yellow and light brown aureola	Dark brown margin with brown aureola
B^2	Central spot	Brown	Brown	Brown
	Middle Segment	Dark brown	Dark brown	Dark brown
	Peripheral Segment	Darkest brown margin with light brown halation	Darkest brown margin with light brown halation	Brown with light brown and yellow halation

TABLE.7. Tables depicting the observations during N.P.S. test of various samples when spotted on 2.5% potassium ferocyanide impregnated paper

Name of the sample	Region analysed	Phases (min)		
		Phase I (0-5)	Phase II (0-20)	Phase III (0-48)
Raw *Abhraka*	Central spot	Solid dark blue Spot	Dark blue	Dark blue
	Middle Segment	Dark blue	White margin encircling blue spot	White margin encircling blue
	Peripheral segment	Dark blue with corona of light blue	Gloriole of light blue colour with dark blue margin	Thick Gloriole of light blue colour with dark blue margin
Dhanyabhraka	Central spot	Solid blue spot	Solid blue spot	Solid blue spot
	Middle Segment	Dark blue	Dark blue	Dark blue with light blue radiance
	Peripheral segment	Dark blue with light blue radiance	Light blue ring of Margin	Light blue ring of margin with greenish blue aura
B^1	Central spot	Brownish blue	Brownish blue	Brown
	Middle Segment	Dark blue	Dark blue	Dark blue surrounded by whitish ring
	Peripheral Segment	Light blue corona	Dark blue	Dark blue margin with light green aura
B^2	Central spot	Brownish blue	Brownish blue	Brown with central blue spot
	Middle Segment	Dark blue	Dark blue	Dark blue colour circumscribed by whitish ring
	Peripheral Segment	Dark blue with Corona	Dark blue with Corona	Blue ring with light green nimbus

TABLE.8. Comparative data of ICP - AES of two samples of *abhraka bhasma*

Contents	B^1	B^2
Fe	15.59	16.31
Na	0.76	0.98
K	5.76	6.17
Ca	2.64	3.87
Al	5.86	4.83
Si	12.17	10.78
Mg	4.97	4.72
S	0.25	0.46
P	0.47	0.53
Li	ND	ND

CONCLUSION

- *Abhraka* has been given prime importance in all the classics.
- *Abhraka* is said to be useful in both *Dehavada* and *Lohavada.*
- *Abhraka* is told to be used in the management of various diseases which shows its utility in *Chikitsavada*.
- *Abhraka* has to be exposed to various procedures before its administration in the body. These could be considered as the samskara which bring it in the form which could easily be absorbed and assimilated in the body.
- Procedures like *Shodhana*, *Marana* and *Satvapatana* are mentioned for *Abhraka.*

- Various methods are mentioned for *Shodhana* of *Abhraka*. Purification can be done in various media like *triphala kwatha, gomutra, badari kwatha* etc. The selection of the media depends upon the utility of the *Abhraka Bhasma*. In the present study, *godughdha* was taken as the media keeping its *Rasayana* properties in mind.
- In the similar manner, we find so many references for the *Bhasma* preparation also. We do find the reference for the preparation of *Shatputi Abhraka Bhasma.*
- The selection of the two processes was done on the basis of the availability and the feasibility of the process.
- *Shodhana* of *Abhraka* was done by heating on fire till they became red hot in colour then *Nirvap* in *Godugdha* for 7 times and washed with hot water.
- Then *Dhanyabhraka* was prepared with the help of *kanji* and *shali dhanya*. Fine particles of *Dhanyabhraka* were collected and given bhavana with the *Kasamard swarasa* and *marana* was done in two batches keeping two different media as the *Maraka Dravya.*
- Total thirty *putas* were given in both the batches and the *Bhasma* obtained in both the batches passed all the classical parameters mentioned for *bhasma* analysis.
- Both the samples were brick red in colour, fine powder, with faint odour and smooth on touch.
- NPST observation shows, Phase-1(0-5 Min.) Wet periphery forms followed by a thick grey circlein the centre of the spot. But wet spot not much wide. Phase-2 (5- 20 Min.) Wet periphery faded with reduction in the brightness of grey circle. Phase-3 (20min-1 day) Grey colour faded away with reduction in the thickness of ring and became slightly yellowish in the other day. Almost similar observations were made for both the samples.
- The analysis report for both the samples showed almost similar results. Both the samples had 29.76% of Fe_2O_3, 30.12% of SiO_2, 12.85% of CaO, 6.43% of Al_3, 4.32% of MgO and 8.60% of K_2O.
- On analysing the physico-chemical properties of the two samples almost similar results were observed. They had 7.38pH, 97.18% of Ash content, 19.24% of Acid insoluble Ash and 0.29% of water soluble Ash.
- XRD report showed Fe_2O_3 and SiO_2 as the major component and traces of CaO, MgO and K_2O were seen in the two samples of *Abhraka Bhasma.*
- Keeping these points into consideration it can be concluded both the methods helped in the preparation of good quality of *Abhraka Bhasma.* The properties of both the samples were almost similar and it could be predicted that both the samples may have similar clinical effects.

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