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Quality Improvement of Bhasmas with special reference to "Abhraka Bhasma"

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ABSTRACT

In the matter of standardization Ayurveda lags behind seriously. So far as the Ayurvedic pharmaceutics is concerned it can be said that though it was quite rational at ancient time but in the present time it definitely requires a through reorientation. Because of lack of standardization nobody knows about the nature of metallic bhasmas and presence of free metals in them. However, it is well known that when the Ras-aushadhis are prepared as per the texts they don't produce any side effect. Also the pharmaceutical process of bhasma preparation is not uniform all over India, hence the quality of bhasmas varies from place to place, and reproducibility of the results becomes impossible. Again it requires longer duration of time to prepare good quality medicines by traditional methods.

In this connection it may be mentioned that, mass production of standardized and efficient metallic preparation is definitely needed for the propagation and practice of Ayurveda. Without such undertaking, practice of Ayurveda can neither be encouraged amongst the physicians nor popularized amongst the sophisticated public.

Key Words: ***Abhrak Bhasma .Maran Process, demographic factors***

INTRODUCTION

Ayurveda "the oldest science of life" aims at maintenance of positive health and treatment of the diseased. For both purposes it needs potent and efficient medicines. It is a common sense that the success or failure of the medicine largely depends on its potency. So to be sure about the potency of a medicinal preparation the question of its quality and standardization automatically comes into the scene. Quality of a medicine may be divided into

PHARMACEUTICAL QUALITIES :

These of are physical properties like Organoleptic characters, qualities of packing etc.

PHARMACOLOGICAL QUALITIES :

These are qualities essential for good therapeutic efficacy.

In the matter of standardization Ayurveda lags behind seriously. So far as the Ayurvedic pharmaceutics is concerned it can be said that though it was quite rational at ancient time but in the present time it definitely requires a through reorientation. Because of lack of standardization nobody knows about the nature of metallic bhasmas and presence of free metals in them. However, it is well known that when the Ras-aushadhis are prepared as per the texts they don't produce any side effect. Also the pharmaceutical process of bhasma preparation is not uniform all over India, hence the quality of bhasmas varies from place to place, and reproducibility of the results becomes impossible. Again it requires longer duration of time to prepare good quality medicines by traditional methods.

In this connection it may be mentioned that, mass production of standardized and efficient metallic preparation is definitely needed for the propagation and practice of

Ayurveda. Without such undertaking, practice of Ayurveda can neither be encouraged amongst the physicians nor popularized amongst the sophisticated public.

Quality improvement of Bhasmas means, improvement above the previous standards, both at physical and chemical levels. We have criteria of standard Bhasmas which include physical properties like Rekhapurnatva, Nischandratva, Varitaratva, and chemical properties like Apunarbhava, Nirutthatva etc. As very few modern techniques are implemented to standardize Bhasmas, today we have very few modern criteria to standardize Bhasmas on modern scientific parameters. Hence the work of quality improvement of Abhraka Bhasma (A.B.) and development of new modern parameters for deciding quality of bhasmas was undertaken.

AIMS AND OBJECTIVES :

Here we are intended to improve the quality of Abhraka bhasma with respect to increasing its fineness and making it free from free metals, by

1. Mechanization of steps of marana process
2. Analysis of pellet size.
3. Reduction of time required for marana by using Electric muffle furnace puta paka.
4. Confirmation of completion of marana process by a simple chemical test.
5. Development of some modern parameters for deciding quality of A.B.

OBJECTIVES OF THE STUDY :

To improve the qualities of Abhraka Bhasma, we are aimed to prepare nischandra

PREVIOUS WORK DONE :

A. B. by giving less number of putas in a modified way without compromising with therapeutic efficacy of Bhasma. By doing so we could reduce the time duration required for preparing nischandra Abhraka Bhasma. Rich quality bhasma may be prepared by this method in same period that is required for preparing nischandra A.B. by classical method, which is very essential thing to cope up with the increasing demand of Bhasmas.

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MATERIALS:

1. Krishna Vajra Abhraka
2. Kanji / Triphala powder
3. Bori (blanket)
4. Dhan (paddy)
5. Wet leaves of kasamarda
6. Vatapraoha
7. Jaggery
8. Wet leaves of Eranda

METHODS :

1. Abhraka shodhana by heating & quenching Abhraka in
    i. kanji/Decoction of Triphala for seven times.
2. Dhanyabhrakikarana
3. Abharka Marana

i. Three putas after addition of jaggery and giving bhavana of juice of the leaves of Eranda.
ii. Ten putas after giving bhavana of Kasamarda juice.
iii. Ten putas after giving bhavana of decoction of Vatapraroha.

4. Two samples of A.B. were made with pellet size 3 cm x 1 cm one by classical method and other by electric muffle furance.One more sample of A.B. was made with pellet size 3 cm x 0.5 cm in electric muffle furance.

The qualities of all samples were compared.

DISCUSSION :

Applied research in Ayurveda may be divided into two categories:

1) Pharmaceutical research.
2) Clinical research.

Again pharmaceutical research is of two types:

1) Researches in preparatory pharmacy
2) Standardization.

Here the work is presented under two headings -

1) Techniques of Quality improvement of Abhraka bhasma.
2) Physicochemical analysis of intermediates and final product.

To improve the quality of A.B. care is taken at every step of shodhana and marana.

1. SELECTION OF ABHRAKA:

A) Black coloured Abhraka (Biotite) showing no effect of heat on it was considered as Krishna vajra abhraka and selected for the experiment.

B) Also the classical characteristics of best Abhraka were observed before the selection.

2. ABHRAKA SHODHANA :

It is done by heating it to red hot and then quenching in kanji having Ph = 4. This procedure was repeated for 7 times. Heating Abhraka to red hot must be done *because it is essential for conversion of Abhraka to fine powder, which in turn proves helpful in reducing the time required* for Marana. Shodhana was also done by using decoction of Triphala but the results of the previous method was observed to of be much better.

3. DHANYABHRAKA NIRMANA:

The process was done in two ways.

a. By using kanji we got homogenous particles of Abhraka in short time.
b. When the process was done in lukewarm water it took more time and large amount of slag was left back in the pottali.

4. MARANA (Rasatarangini) :

It was also done by two methods.

a. Classical puta method (C.P.M.)
b. Electric Muffle Furnace (E.M.F.)

Marana was done in following three steps :

1. Bhavana
2. Pelletization
3. Heating

1. **BHAVANA:** In first three putas Jaggery and Erandapatra swarsa was used as bhavana drug. In next ten putas Kasamarda swarasa and there after decoction of Vatapraroha was used as a bhavana two drug. In classical gajaputa method bhavana was given manually in simple iron mortar and pestle. In Electrically

heated muffle furnace method bhavana was given in an electric motor assisted pestle machine.

2. PELLETIZATION : After giving bhavana the circular pellets of 3 cm x 1 cm and 3 cm x 0.5 cm were made. On drying, the pellets were arranged in an earthen crucible. Joint of the crucible was sealed in three layers with cloth and mud in C.P.M. Joint sealing is not necessary while preparing bhasma in electric muffle furnace.

(3) PUTA (Heating/Firing) :

a) Classical Gajaputa Method :

Three gajaputas were given successively by using Jaggery and Erandapatra juice as a bhavana drug. After that juice of Kasamarda was used for bhavana and 10 more gajaputas were given. Here onwards 22 gajaputas were given by using decoction of Vatapraroha for bhavana. This bhavana was followed manually in simple iron mortar and pestle.

b) Electrically heated Muffle Furnace Method :

Two experiments were done in this method. In first experiment the pellets of 3 cm x 1 cm were made. In second experiment the pellets of 3 cm x 0.5 cm were made. Bhavana drugs used were the same as those used in C.P.M. and equal numbers of putas were given to the pellets having different thickness. Temperature was increased gradually. The maximum temperature given was 1000°C over eight hours and then the furnace was set off. We got nischandra A.B. of thin pellets after 23 putas, where as thick pellets became nishchandra after 31 putas. Here the bhavana was given mechanically. (through electrical motor assisted mortar pestle machine.)

The observations of the above experiments are given below.

OBSERVATION

S. No.	Observation	In C.P.M. method	In E.M.F. method	In E.M.F. method
1	Pellet size	3 cm x 1cm	3 cm x 1cm	3 cm x 0.5cm
2	Varitaratva	after 6^{th} puta	After 5^{th} puta	After 5^{th} puta
3	Rekhapurnatva	after 6^{th} puta	After 6^{th} puta	After 5^{th} puta
4	Nischandra	After 35^{th} puta	After 31^{st} puta	After 23^{rd} puta
5	Development of istikabha Colour	After 3^{rd} puta, and gradually darkened after successive putas	After 1st puta, and gradually darkened after successive putas	After 1st puta, and gradually darkened after successive putas.

The samples of Abhraka Bhasma produced by two different methods were compared at physico-chemical levels by implementing modern techniques. Need of implementation of modern techniques aroused because the texts of Rasa-shastra have described certain criterias based on physico-chemical characteristics of bhasma to decide the quality of bhasma preparations. which are based on Organoleptic observations and they have a limited sensitivity. Hence we have opted the following modern tests.

1. Chemical analysis : Qualitative and Quantitative,

Qualitative analysis.

S.No.	Sample	Findings	
		Major elements	Minor elements
1	Raw Abhraka	Fe, Al, Mg.	K in traces
2	Shodhita Abhraka	Fe, Al, Mg	K in traces
3	After 1 puta	Fe, Al, Mg	K in traces
4	After 5 puta	Fe, Al, Mg	K in traces
5	After 10 puta	Fe, Al, Mg	K in traces
6	After 20 puta	Fe, Al, Mg	K in traces

(Source : Primary Data)

Quantitative Analysis.

S. No	Sample (E.M.F. method)	% age of Fe	% age of Al	% age of Mg
1	Raw Abhraka	19.86	5.4	1.84
2	Shodhita Abhraka	19.94	5.6	1.86
3	After 1 puta	19.9	5.6	2.13
4	After 5 puta	20.06	5.2	2.46
5	After 10 puta	20.46	6.8	2.69
6	After 20 puta	20.48	6.8	2.72

(Source : Primary Data)

2. X-ray diffraction study :-

This is useful to detect the compounds and free metals in the compound formulation.

Table : showing difference in Abhraka bhasma at different levels of preparations by XRD.

Sr. No	Sample	Various compounds in the bhasma
1	After 4 puta C.P.M	Al_3Fe, Fe_3Al, Mg_2Si, FeO, AI, Fe.
2	After 6 puta E.M.F.	Fe_3Al, AL_3Fe, Mg_2Si FeO, AI, Fe.
3	After 6 puta C.P.M.	Fe_3Al, Al_3Fe, Mg_2Si FeO, Al, Fe.
4	After 10 puta E.M.F.	Fe_3Al, Al_3Fe, Mg_2Si, FeO, MgO, Mg, Al
5	After 10 puta C.P.M.	Fe_3Al, Al_3Fe, Mg_2Si, Mg

(Source : Primary Data)

3. Metallographic study :

It is one of the modern techniques which can be applied to test the physical quality of bhasmas more accurately and to study their oxidation process, presence of free metals in them, their structural characterization which includes morphology, crystal structure of the metal. It is done by using Metallographic Microscope (M.M.) and Scanning Electronic Microscope (S.E.M.). S.E.M. detects the shape and size of the particle of bhasma. By doing S.E.M. study we may conclude that the particle size go on decreasing with increase in number of shodhana and the number of putas.

4. Test for detection of free metal :

Bhasma should not contain free metal (In modern sciences free metals are considered to be toxic. So the bhasma should not contain any free metal). The marana process may be considered complete when all the free metal gets converted into various compounds. Presence of trace amount of free metal in the bhasma cannot be detected by apunarbhava and niruttha test. The undesirable presence of free metals in an Ayurvedic metallic preparation can be easily detected by simple chemical tests and it is possible to ascertain whether the bhasma is virtually devoid of free metal or not. For this test yellow coloured phospho-molybdic acid is made to react with the free metal which in its presence becomes blue. By means of this test one can detect presence of Cu, Zn, Fe, up to 0.01%.

CONCLUSION:

For improving the quality of Abhraka bhasma following tips should be remembered.

1. Selection of Krishna vajra Abhraka is essential.
2. Kanji is the most suitable liquid for shodhana and Dhanyabhraka nirman purposes.
3. Mechanical grinding **reduces the number of putas** as well as produces **finer bhasma** particles of A.B.
4. Thin pellets facilitate **quick conversion** to nischandra A.B.
5. Electrically heated muffle furnace is more suitable and perfect in achieving desired amount of heat without increasing pollution, also it lessens the no. of puta and produces the best quality Abhraka bhasma. C.P.M. requires about 35 putas where as E.M.F. requires just 23 putas to get nischandra A.B. Drawbacks of conventional puta method are 1) Requirement of more man

power, 2) Great variation in the quality of cow dung cake, 3) Atmospheric changes affect the heating process.

6. Qualitative analysis of Abhraka bhasma reveals the presence of Fe, AI, Mg.
7. Quantitative chemical analysis of A.B. reveals that Abhraka bhasma contains Fe 20.48%, AI 6.8%, Mg 1.28%
8. XRD study shows that Fe_3Al and Al_3Fe are the major components of A.B.
9. Metallography is a most sensitive physical technique for the detection of free metals. It may be considered as the expansion of niruttha and apunarbhava tests.
10. S.E.M. study shows that the particle size goes on decreasing with no. of putas.
11. Phospho molibdic acid test is useful for detection of free metal in metallic bhasma.

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