Case Report

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Evaluation of Market Samples of 'Haratala Bhasma' Using 'Namburi Phased Spot Test' (NPST)

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Abstract

Haratala Bhasma (calx of *Haratala* i.e. Arsenic Trisulphide), an unique mineral product used traditionally in the management of *Kushta* (Laprocy) & *Swasa, Kasa Vikaras* (Respiratory disorders) was prepared according to the prescription in the Ayurvedic classics and subjected to various *bhasma pariksha* (tests for calx), including the Namburi Phased Spot Test (NPST), one of the qualitative tests described for various Ayurvedic preparations. NPST helps to differentiate between, and thus identify, various *bhasmas* (calx). It depends upon the pattern of the spot, which develops after a specific chemical reaction. *Haratala bhasma* prepared by classical reference in our department along with three market samples were subjected to above said tests and the results were compared. The various *bhasmas* exhibited marked differences in color, and though NPST yielded desired results for all the samples, there were difference in their spot pattern and color. The *bhasma* prepared in our department had produced the nearest results to standard NPST of *Naga Bhasma*.

Keywords: Namburi Phased Spot Test (NPST); *Haratala Bhasma.*

Introduction

Haratala bhasma (calx of Arsenic Trisulphide) is one of the *Khanija dravya* (Mineral Substance) & "best Rasayana (Immunomodulator)." Its *bhasma* (calx) has as its main indication, *Kushta* (Laprocy).

Since Vedic period its *bhasma* has been in therapeutic use for various disorders including *Swasa, Kasa Vikaras* (Respiratory disorders), *Vatarakta (Gout) & firanga* (Skin disease) [1].

Haratala bhasma prepared using *Kumari Swarasa* (Juice of Aloe barbadensis Mill) & *Punarnava* (boerhavia diffusa) Swarasa is considered as the best in Rasashastra branch of Ayurveda.

However, in this competitive, commercialized world, the quality of *bhasma* is always open to question.

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For the quality assessment of *bhasma*, various *bhasma parikshas* (tests for calx) are mentioned in Ayurvedic classics.

The Namburi Phased Spot Test (NPST), a spot test based on a chemical reaction, is a new technique for assessing the quality of a prepared *bhasma.* When a drop of clear solution of a substance (*bhasma* or *sindura*) under examination is put on specially prepared chemical reacting papers (What man paper impregnated with suitable reagent), a spot appears which manifests a series of color and pattern changes. Techniques involving spot test or chromatography are commonly used in chemistry.

It thus has the advantage of measuring sensitivity of reactions at different time intervals. This method is used to study or detect continual chemical reactions taking place gradually between two chemical substances on static media at every second or even fraction of a second.

The technique was developed and standardized by Nambhuri Hanamantha Rao in 1970, It has been accepted by CCRAS, New Delhi. It is used to assess the *bhasma* qualitatively [2].

NPST and other classical tests are performed on samples of *Haratala bhasma*: the first prepared classically and three other market samples in order to compare and evaluate their quality.

Materials and Methods

A Three- Part Methodology was Used

1. Obtaining samples of *Haratala Bhasma*: Three market samples (sample 1, 2 and 3) were obtained. Raw *Haratala* (Arsenic Trisulphide) for fourth sample (sample 4) was obtained from Dorle and Suns professional supplier in Kolhapur and was authenticated by HOD Rasashastra department of Shri J.G.C.H.S Ayurvedic Medical College, Ghataprabha, Karnataka.
2. *Haratala Bhasma* of sample 4 was prepared and subjected to classical *bhasma pariksha* (tests for calx).
3. Subjecting all the samples to NPST.

Preparation of *Haratala Bhasma*

Authenticated raw *Haratala* (Arsenic Trisulphide) was taken from the department of Rasashastra, Shri J.G.C.H.S Ayurvedic Medical College, Ghataprabha. Karnataka, and subjected to Shodhana (Purification) by *Kumari swarasa* (Juice of Aloe barbadensis Mill) using dolayantra to remove impurities and increase its potency. For *Shodhana* 1000 gm *Patra Haratal* was taken and made it into small pieces. These pieces were kept in a *vastra* (cloth) and vastra pottali was Prepared. This pottali was tied tightly so that the material does not come out. This pottali was tied in Dolayantra containing 6 Liter of *Kumari swarasa*. This Dolayantra was kept on the LPG gas stove and mild heat was applied to boil *Kumari swarasa* for sixteen hours. When the level of *Kumari swarasa* was decreased, again extra 500 ml *Kumari Swarasa* was added in it. After completion of processing, the heating was stopped and left for self cooling. Then pottali was opened *Haratal* pieces were washed thoroughly with hot water [3]. After drying it was stored in bottles and used for *marana (Incineration)* procedure.

The *Shodhita Haratala* was then subjected to *marana (Incineration)* by giving *bhavana* (triturating in liquid media) with *Punarnava swarasa* (fresh juice of boerhavia diffusa) and *chakrikas* (pallets) prepared. After drying, they were kept in *sharava*(casseroles), *Sandhi bandhan* (sealing) was done and subjected to *Bhanda puta* (Earthen pot filled with white ash of *Punarnava Panchanga*). After eight *putas*, *Haratala bhasma* of dark brown color was obtained [4].

Bhasma Parikshas (Tests for Calx) [5]

The *Haratala Bhasma* prepared in our department (sample number 4) and other three market samples (number 1, 2 and 3) were subjected to various classical *bhasma parikshas* (tests for calx) like *Rekhapurna* (enters in furrows of fingers), *Vaaritara* (floats on water), *Unama* (even after keeping a rice grain on *bhasma* it floats on water), *Nischandrata* (absence of shining), *Jihwa pariksha* (taste) and *Nirdhuma* (absence of fumes when kept on fire) (Table 1).

Namburi Phased Spot Test

Equipments and Materials

a. Distilled water : For reagent preparation
b. Reagents : 0.5 ml concentrated HCL
c. 10% KI and 2.5% KCN
d. Capillary or Pipette: For Putting the spot on paper
e. Centrifuge & simple test tube (04): For the preparation of drug solution.
f. Glass rods & sheet: For drying of paper & to create a platform during test.
g. *Haratala Bhasma* (sample 1 to 4)

Procedure [6]

All the four samples were subjected to NPST. Initially 0.25g of *bhasma* was placed in a centrifuge test tube; 0.5 ml of conc. HCl was then added to all the test tubes drop by drop. It was kept in a stand for 8 hours, during which time it was shaken occasionally.

Table 1: Analysis of *Haratala Bhasma* samples

Test	Sample 1	Sample 2	Sample 3	Sample 4
Color	White	Brown, shiny	Brown	Dark Brown
Touch	Smooth	Smooth	Fine	Ultra fine
Odour	Faint	Absent	Absent	Absent
Rekhapurna	Positive	Positive	Positive	Positive
Vaaritara	Positive	Positive	Positive	Positive
Unama	Positive	Negative	Negative	Positive
Jihwa pariksha	Tasteless	Metallic	Tasteless	Tasteless
Nischandrata	Positive	Positive	Positive	Positive
Nirdhuma	Positive	Negative	Negative	Positive

It was then allowed to settle while a clear layer formed. One drop was taken from the clear layer and placed on 10% KI and 2.5% KCN papers (prepared using What man's filter paper no 1), color changes in the paper was observed over 3 time periods.

- 1st phase (Phase of immediate reaction): 0 to 5 min
- 2nd phase (Phase of delayed reaction): 90 min
- 3rd phase (Phase of late reaction):74 hours

Observations of NPST

There was difference in the spot pattern of all the four samples when compared to standard NPST of *Haratala Bhasma* (Table 3).

Table 2: NPST observations of *Haratala Bhasma* samples

Phase	Sample 1	Sample 2	Sample 3	Sample 4
1st phase (0-5 min)	A brown central spot forms at centre which turns to deep brown leaving behind a light brown periphery. With wide margin around the central spot.	A brown solid spot forms at centre which turns to deep brown central spot leaving behind a brown periphery.	A brown solid spot forms at centre which turns to light brown spot leaving behind a Reddish periphery.	A wide brown solid spot forms at centre which turns into deep bright brown central spot leaving behind a brown periphery.
2nd Phase (90 min)	This continues to be the same by the end of II nd phase.	This continues to be the same by the end of II nd phase.	This continues to be the same by the end of II nd phase.	This continues to be the same by the end of II nd phase.
3rd Phase (74 hours)	The brightness of brown spot reduced considerable and the brown periphery around it also faded away.	The brightness of brown spot reduced considerable and the whitish brown periphery around it also faded away.	The brightness of brown spot reduced considerable and the reddish periphery around it also faded away.	The brightness of brown spot was maintained and brown periphery around the central spot fades away leaving behind a thin brown circle.

Table 3: Standard NPST result of *Haratala Bhasma*

Sample name	Phase I	Phase II	Phase III
Haratala Bhasma	Light brown periphery with wide colorless margin around the brown central spot.	This continues to be the same throughout its II nd phase.	Brown color around the central spot fades away leaving behind a thin brown circle as big as the spot forms in the I st phase.

Images of NPST Study

Filter paper after First minutes 90 minutes after first phase 74 hours after first phase

Discussion and Conclusion

The colors of the four *bhasmas* all differ a great deal, varying from light brown to dark brown. The wide range of colour difference may be due to the difference in *bhavana* drugs used and number of *puta* given. The touch of *bhasma* showed that samples 3 and 4 are much finer than the other two samples.

In sample 2, a metallic taste was present which may indicate improper formation of the *bhasma*. This was substantiated when it evolved fumes in the *Nirdhuma* test.

Though all samples passed the Varitara test, Samples 2 and 3 failed in the Unama test, indicating the presence of untransformed metal in the *bhasma.* The *Apunarbhava* and *Niruttha* tests were conducted only on samples 4, which passed both tests, showing that chemically the *bhasma* was totally formed. If these tests had been negative then it would have indicated the presence of a metallic part in the *bhasma*.

In NPST the desired results were seen in all 4 samples, but sample 4 showed more accurate results compared to the others. The results seemed to be similar, but were not the same - an advantage of conducting NPST over other classical *bhasma pariksha.*

In samples 1, 2 and 3 the NPST spot pattern was accordingly seen but the brownish periphery circle was not seen as in sample 4.

The desired accurate NPST results were observed in sample 4 prepared in our department. In the first three samples, there is difference in the spot pattern when compared to standard NPST. Probable reason may the difference in *bhavana* drugs used and number of *puta* given for preparing *Haratala Bhasma*.

Conclusion

NPST is a chemical reaction based test helpful for quality assessment of *bhasma* before being used therapeutically. In the present study, though the *bhasma* was said to be prepared by same method, there was difference in *bhasma* color and according to NPST in all these four samples, sample 4 showed very nearer results compared to standard NPST which indicates the genuinity of the sample.

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