

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

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Abstract

Naga Bhasma (calx of Naga i.e. Lead), an unique mineral product used traditionally in the management of *Prameha* (Diabetes) and *Netra Vikaras* (Eye 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. *Naga 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); *Naga Bhasma*.

Introduction

Naga bhasma (calx of Lead) is one of the *Puti Lohas* (Metal with low melting points eg Zinc, Tin etc.). Its *bhasma* (calx) has as its main indication, *Prameha* (Diabetes). Since Vedic period its *bhasma* has been in therapeutic use for various disorders including *Prameha* (Diabetes), *Pandu* (Anemia), *Vatavyadhis* (Neuro muscular diseases), and *Netra Vikaras* (Eye diseases) [1]. *Naga bhasma* prepared using *Manashila* (Arsenic disulphide) is considered as the best in *Rasashastra* [2], branch of Ayurveda. However, in this competitive, commercialized world, the quality of *bhasma* is always open to question. 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 (Whatman 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 [3].

NPST and other classical tests are performed on samples of *Naga 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 Naga Bhasma*: Three market

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samples (sample 1, 2 and 3) were obtained. Raw Naga (Lead) 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. Naga Bhasma of sample 4 was prepared and subjected to classical *bhasma pariksha* (tests for calx).
3. Subjecting all the samples to NPST.

Preparation of Naga Bhasma

Authenticated raw Naga (Lead metal) was taken from the department of Rasashastra, Shri J.G.C.H.S Ayurvedic Medical College, Ghataprabha, Karnataka, and subjected to Samanya shodhana (general purification) by *dhalana* (liquefying and pouring) method in *Tila taila* (Sesamum indicum oil), *Takra* (butter milk), *Gomutra* (Cow's urine), *Kanjika* (sour gruel), *Kulattha* (*Dolichus biflorus*) *kwatha* (decoction). *Dhalana* was carried out three times in each liquid media. After *samanya shodhana*, *Vishesha shodhana* (specific purification) was carried out by the same *dhalana* method in *Churnodhaka* (Lime water) seven times. After *shodhana*, metal became more brittle, and

was then subjected to *Jarana* (roasting) using *Apamarga panchanga churna* (*Achyranthus aspera*). After *Jarana*, the metal was converted into a very fine grey shining powder which was deemed fit for *Marana* (incineration). The powder was then subjected to *marana* by triturating it with *shudha Manashila* (purified Arsenic disulphide) to form a black powder, to which one *bhavana* (trituration in liquid media) with *Nimbu swarasa* (fresh juice of Citrus limon) was given and *chakrikas* (pallets) prepared. After drying, they were kept in *sharava* (casseroles), *Sandhi bandhana* (sealing) was done and subjected to *Kukkuta puta* (burning at about 500°C using 50 cow dung cakes). After three *putas*, *Naga bhasma* of brownish black colour was obtained [4].

Bhasma Parikshas (Tests for Calx)

The *Naga 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).

Table 1: Analysis of *Naga Bhasma* samples

Test	Sample 1	Sample 2	Sample 3	Sample 4
Color	Dark brown	Brown, shiny	Brown	Brownish black
Touch	Smooth	Smooth	Fine	Ultra fine
Odour	Absent	Absent	Absent	Absent
<i>Rekhapurna</i>	Positive	Positive	Positive	Positive
<i>Vaaritara</i>	Positive	Positive	Positive	Positive
<i>Unama</i>	Positive	Negative	Negative	Positive
<i>Jihwa pariksha</i>	Tasteless	Metallic	Tasteless	Tasteless
<i>Nischandrata</i>	Positive	Positive	Positive	Positive
<i>Nirdhuma</i>	Positive	Negative	Negative	Positive

Namburi Phased Spot Test

Materials

- a. Distilled water
- b. 5N HNO₃
- c. 10% potassium iodide paper
- d. Test tubes: Four
- e. *Naga Bhasma* (sample 1 to 4)

Procedure [5]:

All the four samples were subjected to NPST. Initially 0.25g of *bhasma* was placed in a centrifuge test tube, 0.5 ml of 5N HNO₃ was then added to all the test tubes drop by drop. It was kept in a stand for 50

hours, during which time it was shaken occasionally. It was then allowed to settle while a clear layer formed. One drop was taken from the clear layer and placed on 10% potassium iodide paper (prepared using Whatman's filter paper no 1), colour changes in the paper was observed over 3 time periods.

- 1st phase: 0 to 5 min
- 2nd phase: 5 min to 20 min
- 3rd phase: 20 min to 1 day

Observations of NPST

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

Table 2: NPST observations of *Naga Bhasma* samples

Phase	Sample 1	Sample 2	Sample 3	Sample 4
1 st phase (0-5 min)	A yellow solid spot forms at centre which turns to deep yellow leaving behind a Reddish periphery.	A yellow solid spot forms at centre which turns to deep yellow central spot leaving behind a whitish yellow periphery.	A yellow solid spot forms at centre which turns to light yellow spot leaving behind a Reddish periphery.	A wide yellow solid spot forms at centre which turns into deep bright yellow central spot leaving behind a yellow periphery.
2 nd Phase (5-20 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.
3 rd Phase (20 min- 1 day)	The brightness of yellow spot reduced considerable and the reddish periphery around it also faded away.	The brightness of yellow spot reduced considerable and the whitish yellow periphery around it also faded away.	The brightness of yellow spot reduced considerable and the reddish periphery around it also faded away.	The brightness of yellow spot was maintained and yellow periphery around the central spot fades away leaving behind a thin yellow circle.

Table 3: Standard NPST result of *Naga Bhasma*

Sample name	Phase I	Phase II	Phase III
<i>Naga Bhasma</i>	A solid yellow wide spot which turns immediately into more deep yellow central solid spot.	This continues to be the same throughout its II nd phase.	Yellow colour around the central spot fades away leaving behind a thin yellow circle as big as the spot forms in the I st phase.

Discussion and Conclusion

The colours of the four *bhasmas* all differ a great deal, varying from dark brown to brownish black. 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 yellowish 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 *Naga 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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