Assessing the Genuineness of Abhraka Bhasma by Namburi Phased Spot Test

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Abstract
In the present era, the Standardization of the Ayurvedic formulation is very important to improve the quality of the formulation and maintain the uniformity among the batches of the formulation. The Rasaushadi are been widely used by the Ayurvedic Pharmaceutical companies for the preparation of the medicine. It is very important to recognize the quality of the bhasma which are procured from the market. Even though certain test is mentioned by ancient scholars for the bhasma, the genuinety of bhasma cannot be assessed through those tests. Namburi Phased spot test is an analytical technique which helps to assess the quality of the final drug. The test depends upon the pattern of the spot which develops after a specific chemical reaction. Abraka bhasma and Gairika have similar organoleptic characters and hence it is common practice to substitute abhraka bhasma with gairika. In the present study the genuinety of abhraka bhasma was assessed by preparing Abhraka parpati using three different samples viz., Department Abraka bhasma, Gairika, Market Abraka bhasma undertaken in three batches in 1st batch Abhraka parpati was prepared with Abraka bhasma procured from the department, 2nd batch was prepared from gairika instead of Abhraka bhasma and 3rd batch market sample of Abhraka bhasma was used to prepare Abhraka parpati.

Keywords
Abhra parpati, Gairika, Abhraka bhasma, NPST
INTRODUCTION

Ayurveda Pharmaceutics utilizes different drugs of mineral, herbal and animal origin for the preparation of medicines. Among them Rasaushadhis (metal/mineral preparations) are considered more potent and effective due to their quick action in very low doses. The growing popularity and increased demand of Ayurvedic medicines creates a challenge for Ayurvedic pharmaceutical companies to produce a standard, genuine and safe drug to meet the demand of the society. Though many standardization parameters are available now days to assess the quality, one has to be very selective in choosing them so as to get an accurate result of the drug being tested. Analytical chemistry has become an easy tool in testing these formulations which give qualitative and quantitative measure of these drugs. “Namburi Phased Spot Test” (NPST) is an analytical technique which gives the accurate assessment of the mineral or metal preparation under test.

In Rasashastra, Abhraka is one such mineral which has a wide range of therapeutic benefits and is used commonly by many physicians. The method involved in the preparation of this bhasma is tedious as it requires more number of putas to obtain good quality bhasma. Any variations in the method can lead to improper bhasma. Gairika is another mineral which is commonly used in various formulations. It is used after shodhana (purification) and does not require incineration process like Abhraka. It is also cheaper and has somewhat similar properties like Abhraka. This makes it a common replacement for pharmaceutical companies to use Gairika in place of Abhraka bhasma to make more profit. The final product being similar makes it difficult to differentiate both the minerals. NPST is one such analytical tool that makes it easy to differentiate between Gairika and Abhraka. It uses the technique of chemistry to analyse the complex drugs of Rasashastra. In this the spot is observed in three different phases to know the genuinity of the final product. This technique of Namburi Phased Spot test (NPST) was developed and standardized by Dr. Namburi Hanumantha Rao in 1970, it has been accepted by CCRAS, New Delhi.

Definition of Namburi Phased Spot Test:

When a drop of clear solution of a substance that is under examination is put on one of the chemical reacting papers, a spot with a series of changes in colour and pattern will appear. It is the study of this spot and colour
at three successive phases spreading over three different time intervals in known as the “phased spot test”.

These spots is studied in three phases –

- 1st phase (Immediate reaction): Moment of formation of spot to the end of 5th minute.
- 2nd phase (Intermediate reaction): From end of 5th minute to 20th minute.
- 3rd phase (Late reaction): From end of 20th minute to 24 hours

Depending on the substance, specific pattern and colour of the spot is formed. The chain of chemical changes that takes place before the actual chemical reaction is completed is detected by their distinct colour manifestations or changes in the pattern of spot as the case may be, is studied here.

**Advantages:**

- This technique is very helpful for quality assessment of Bhasmas as per the standards of Rasashastra.
- The study of differential identification of various Bhasmas is made possible by N.P.S.T. This test has an advantage of measuring the sensitivity of reactions at different time intervals.
- This is a method to study or detect continual chemical changes (reaction) that take place gradually between two chemical substances on static media at every second or even at a fraction of a second.
- Some initial (or) intermediate reactions (or) changes which occur before culminating it to a major chemical reaction can be detected by the present technique.

**MATERIALS AND METHODS**

1. **To prepare Abhraka parpati by 3 different ingredients**
2. **To assess three samples by using NPST**

1. **To prepare Abharka parpati by 3 different ingredients**-
   - a) Abharka parpati I prepared using department Abharka bhasma
   - b) Abharka parpati II prepared using Gairka
   - c) Abharka parpati III prepared using marketed Abharka bhasma

**Procedure4:**

Kajjali eight grams + Four grams of departmental abhanka bhasma was taken in pestle and mortar and triturated to obtain homogenous mixture. This mixture was taken in iron ladle which was smeared with ghee and placed over the mild fire till it
attained proper *paka*. Immediately it was poured on banana leaf smeared with ghee, upon this another banana leaf was placed and pressed with a bundle containing cow dung$^5$. This was sample I. Same procedure was repeated for sample II where instead of *Abhraka bhasma*, *Gairika* was used. In sample III marketed *Abhraka bhasma* was used. The results are tabulated in Table 1 and Image 1.

**Table 1** Preparation of Abhraka Parpati with 3 different ingredients

<table>
<thead>
<tr>
<th>Name of sample</th>
<th>Ingredients</th>
<th>Pakalakshana</th>
<th>Final weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Abrakaparpati</em> I</td>
<td>Kajjali eight grams + departmental <em>abharka bhasma</em> four grams</td>
<td>Madhyama <em>paka</em></td>
<td>12 grams</td>
</tr>
<tr>
<td><em>Abrakaparpati</em> II</td>
<td>Kajjali eight grams + four grams <em>gairka</em></td>
<td>Madhyama <em>paka</em></td>
<td>10 grams</td>
</tr>
<tr>
<td><em>Abrakaparpati</em> III</td>
<td>Kajjali eight grams + marketed <em>abharka bhasma</em> four grams</td>
<td>Madhyama <em>paka</em></td>
<td>12gms</td>
</tr>
</tbody>
</table>

2. **To assess three samples by using NPST**

   In the present study, *Gairika* and *Abraka* are belonging to fifth group as mentioned in NPST.

   **Materials:**
   
   * Aqua regia – Reagent
   
   1) 10% potassium iodide paper
   
   2) 2.5% potassium ferrocyanide paper

   3) Whatman filter paper No 1
   
   4) Test tubes
   
   5) Test sample – 0.5gm
   
   6) Dropper

   **Procedure:**
   
   - The reagent aqua regia was prepared using ratio 3:1 of HCl and HNO$_3$
   
   - Watman’s filter paper were taken and treated with 10% potassium iodide. 10 gm of Potassium iodide was dissolved in
100 ml of distilled water and poured into a tray. Watman’s paper no.1 was used. This paper was dipped in the solution and dried.

- 2.5% potassium ferrocyanide paper.

2.5 gms gm of Potassium iodide was dissolved in 100 ml of distilled water and poured into a tray. Paper no.1 was used. This paper was dipped in the solution and dried.

- Preparation of the sample: Here 5gms was dissolved in 1 ml of aqua regia.

- 0.5gm of test sample was taken into test tube and 1ml of aqua regia was added to three set of sample.

- The samples are heated for the minute before treating with the reagent and also for a minute, 30 minutes after treating with the reagent.

- Time allowed to react with the reagent was 20 hrs

- Shake now and then till two hours before they are treated with the chemical reacting paper.

- Then a drop of the solution was added to the respective paper

- Table No 2 shows the standard reaction of spots for Abhraka bhasma & Gairika on 10% Potassium iodide paper.

- Table No 3 shows the standard reaction of spots for Abhraka bhasma & Gairika on 2.5% Potassium ferrocyanide paper.

- Table No 4 and Image No 2 shows the actual reaction of spots of Abrakaparpati I, Abrakaparpati II and Abrakaparpati III on 10% Potassium iodide paper.

- Table No 5 and Image No 3 shows the actual reaction of spots of Abrakaparpati I, Abrakaparpati II and Abrakaparpati III on 2.5% Potassium ferrocyanide paper.

### Table 2
NPST of Abhara bhasma and genuine Gairika on 10% potassium iodide paper

<table>
<thead>
<tr>
<th>Name of drug</th>
<th>First phase</th>
<th>Second phase</th>
<th>Third phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abhraka bhasma</td>
<td>Deep brown solid spot</td>
<td>Deep brown spot fades with small white spot in centre</td>
<td>Colourless spot at the centre</td>
</tr>
<tr>
<td>Gairika</td>
<td>Deep brown solid spot</td>
<td>Deep brown spot fades with small yellow spot at centre</td>
<td>Yellow spot at the centre</td>
</tr>
</tbody>
</table>

### Table 3
NPST of Abhara bhasma and genuine gairika on 2.5% potassium ferrocyanide paper

<table>
<thead>
<tr>
<th>Name of drug</th>
<th>First phase</th>
<th>Second phase</th>
<th>Third phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abhraka bhasma</td>
<td>Deep blue solid spot</td>
<td>Deep blue spot fades with small light blue margin</td>
<td>Blue periphery turns to dark blue with deep blue spot at centre</td>
</tr>
<tr>
<td>Gairika</td>
<td>Deep green solid spot</td>
<td>Deep green spot with green margin</td>
<td>Deep green spot turns deep blue solid spot with dark blue periphery.</td>
</tr>
</tbody>
</table>

### Table 4
Spot reaction of the 3 samples on 10% of potassium iodide paper

<table>
<thead>
<tr>
<th>Sample</th>
<th>First phase</th>
<th>Second phase</th>
<th>Third phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrakaparpati I</td>
<td>Deep brown solid spot</td>
<td>Deep brown spot fades with small yellow spot at centre</td>
<td>Colourless spot at the centre</td>
</tr>
</tbody>
</table>
### DISCUSSION

- *Abraka parpati* is a preparation which is used in *Kasa*, *swasa* and *atisara* and is widely sold in the market. It is very important to know the quality of ingredients which are used in the preparation. NPST is very simple test which gives assurance about the quality of bhasma used. There is no reference where *gairika* is used in the preparation of *Abhraka parpati* but *gairika* was used in this preparation just see what changes would be seen.

- During the preparation of *Parpati* all the three *parpat* is attained *madhya paka* with more loss of final product in sample III.
• In Abhraka parpati I the development of spot on potassium iodide paper was deep brown solid spot in 1\textsuperscript{st} phase, in 2\textsuperscript{nd} phase the deep brown spot faded away and few drops of distilled water was put over the spot at the end of its 2\textsuperscript{nd} phase which washed away the brown colour leaving behind a colourless space. This was in accordance with the spot reaction mentioned for genuine Abhraka bhasma.

• In Abhraka parpati II the development of spot on potassium iodide paper was deep brown solid spot in 1\textsuperscript{st} phase, in 2\textsuperscript{nd} phase the deep brown spot faded away and in 3\textsuperscript{rd} phase the brown spot faded away leaving behind deep yellow spot at the centre. This was in accordance with the spot reaction mentioned for genuine gairika.

• In Abhraka parpati III the development of spot on potassium iodide paper was deep brown solid spot in 1\textsuperscript{st} phase, in 2\textsuperscript{nd} phase the deep brown spot faded away and few drops of distilled water was put over the spot at the end of its 2\textsuperscript{nd} phase which washed away the brown colour leaving behind a whitish yellow space. This was not in accordance with the spot reaction mentioned for genuine Abhraka bhasma but moreover the spot reaction was similar to both gairika as well as genuine Abhraka bhasma. As sample III was a market sample it may have been adulterated with gairika.

• In Abhraka parpati I the development of spot on potassium ferrocyanide paper was deep blue solid spot in 1\textsuperscript{st} phase, in 2\textsuperscript{nd} phase the deep blue spot with light blue margin, 3\textsuperscript{rd} phase light blue periphery changes to dark blue. This was in accordance with the spot reaction for genuine abhraka.

• In Abhraka parpati II the development of spot on potassium ferrocyanide paper was deep green solid spot in 1\textsuperscript{st} phase, in 2\textsuperscript{nd} phase the deep green spot with light green margin, 3\textsuperscript{rd} phase the green solid spot turns to dark blue spot and light green periphery changes to light blue periphery. This was in accordance with the spot reaction for genuine gairika.

• In Abhraka parpati III the development of spot on potassium ferrocyanide paper was deep blue solid spot in 1\textsuperscript{st} phase, in 2\textsuperscript{nd} phase the deep greenish blue solid spot with light greenish blue margin, 3\textsuperscript{rd} phase light greenish blue periphery changes to dark blue and dark greenish blue spot to dark blue spot. This was in accordance with the spot reaction for genuine gairika and Abhraka.
• It is evident from the above discussion that the sample of Abhraka and Gairika used for preparation of parpati I & II are genuine, but the abhraka used for preparation of parpati III showed a spot reaction which was a mixture of Abhraka and Gairika. It was more evident in the spot reaction shown on potassium iodide paper than on potassium ferrocynide paper. This may be because of Abhraka bhasma in parpati III (market sample) may have been adulterated with gairika.

CONCLUSION

NPST analysis of all the samples showed slight differences with the respect to colour in all the phases. This is a simple and cost effective test which helps to know the quality of the bhasma which are used in the preparation. Sample I & II of Abraka parpati showed the correct colour changes as of genreue Abhraka bhasma and Gairika respectively where as sample III showed a spot reaction which was a mixture of both Abhraka and genuine gairika. In many of the preparations of Rasashastra which requires the use of expensive drugs and tedious procedures there are high chances of the formulation being replaced with cheaper drugs and less tedious processes. In such cases NPST plays a very important role to bring about the genuinety of such formulations.
REFERENCES

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